SERTP - 1st Quarter Meeting

First RPSG Meeting & Interactive Training Session

March 25, 2026

Agenda

- **Welcome and Introductions**
  - Safety Briefing
- **Purpose and Goals of Meeting**
- **Miscellaneous Items**
  - Public Policy Requirement (PPR) Stakeholder Requests
- **Interactive Training Session**
  - MMWG Overview
  - Alternatives Proposal Overview
- **Lunch (~12 pm ET)**
- **Form the Regional Planning Stakeholders Group (RPSG)**
  - Committee Structure & Requirements
- **Economic Planning Studies**
  - Review Requested Sensitivities for 2026
  - RPSG to Select up to Five Economic Planning Studies
- **Next Meeting Activities**

Housekeeping

- This is a hybrid meeting.
  - **Virtual attendees**, please use the  function to ask questions.
  - **In-person attendees**, please raise your  to indicate you have a question, wait to be called on and use the  to ensure all participants can hear.

- All attendees, please state your name and company when asking and answering questions.

SERTP

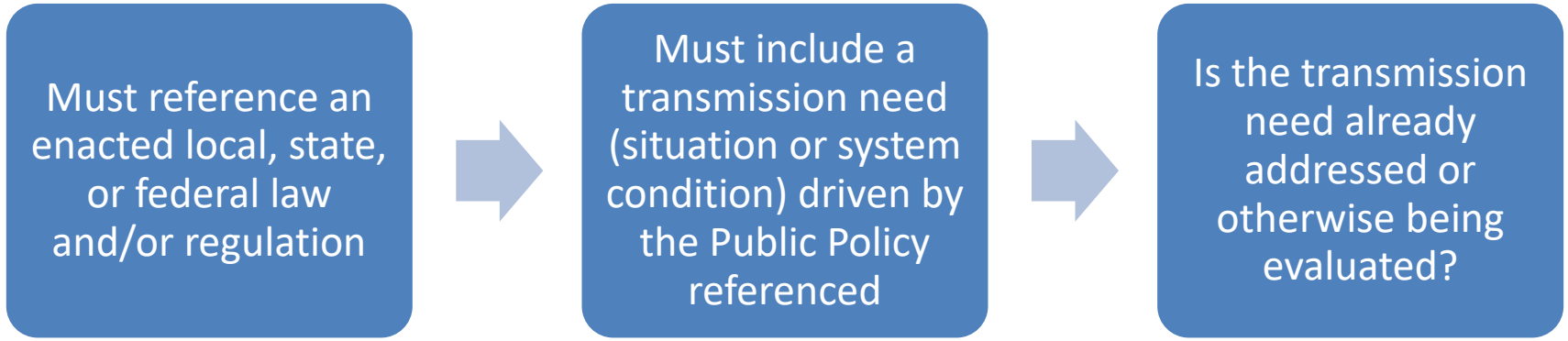
Public Policy Requirements Stakeholder Proposals

SERTP PPR Evaluation

Transmission Needs Driven by Public Policy Requirements (PPRs)

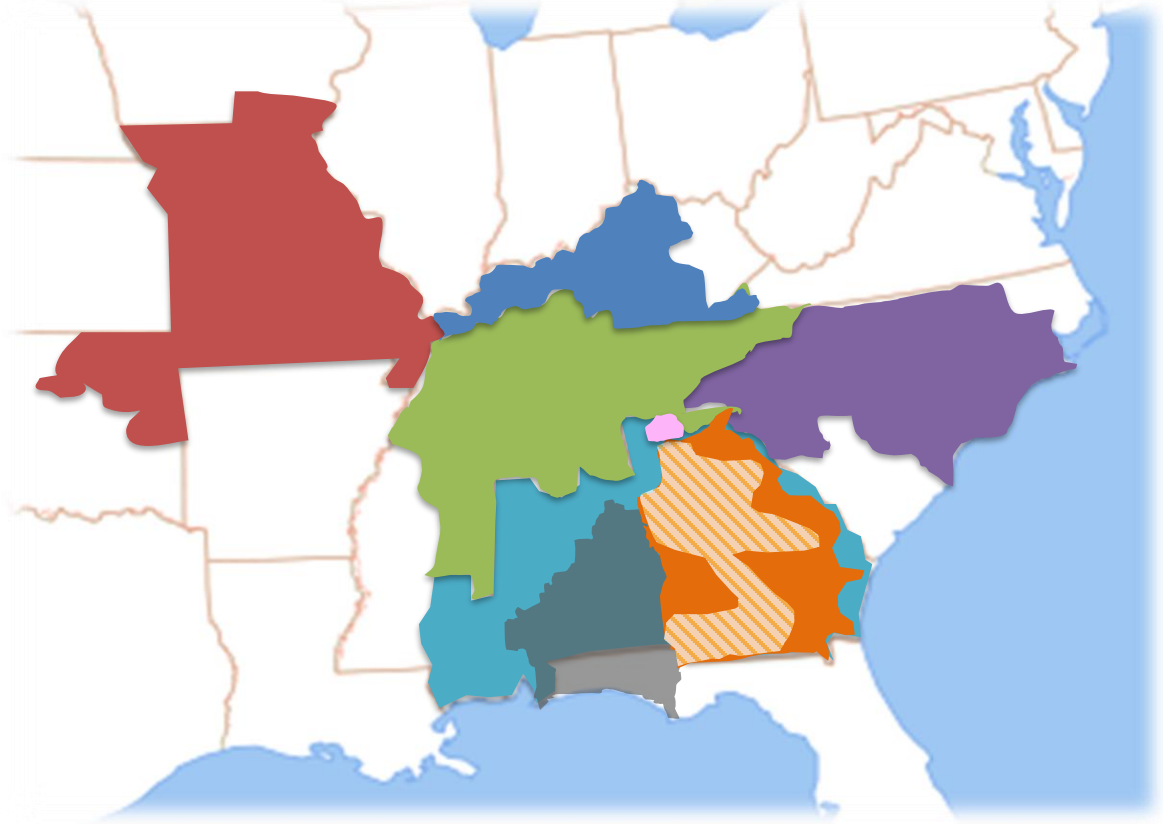
- The SERTP process received seven (7) submissions for transmission needs driven by Public Policy Requirements. Submissions were related to the North Carolina Carbon Plan, One Big Beautiful Bill , SERTP Sponsor IRP and CPCN Orders and their governing state and federal public policies, various state sales tax and use law, and a suite of Executive Orders under President Trump. Submissions are being reviewed based on the criteria below and will be addressed at the 2nd Quarter SERTP meeting in June.

- PPR Evaluation Criteria



SERTP Process Overview

Southeastern Regional Transmission Planning (SERTP)



SERTP

- Associated Electric Cooperative Inc.
- Dalton Utilities
- Duke Energy
- Georgia Transmission
- LG&E KU
- MEAG Power
- PowerSouth Energy Cooperative
- Southern Company
- TVA

SERTP Process General Information

- The SERTP process is a transmission planning process.

- Please contact the respective transmission provider for questions related to real-time operations or Open Access Transmission Tariff (OATT) transmission service.

- SERTP
  - Website Address: www.southeasternrtp.com
  - E-mail Address: southeasternrtp@southernco.com

Southeastern Regional TRANSMISSION PLANNING

2026 SERTP

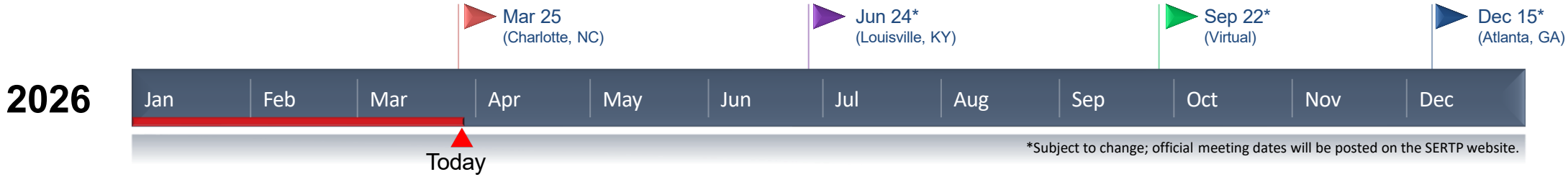
10-Year SERTP Process

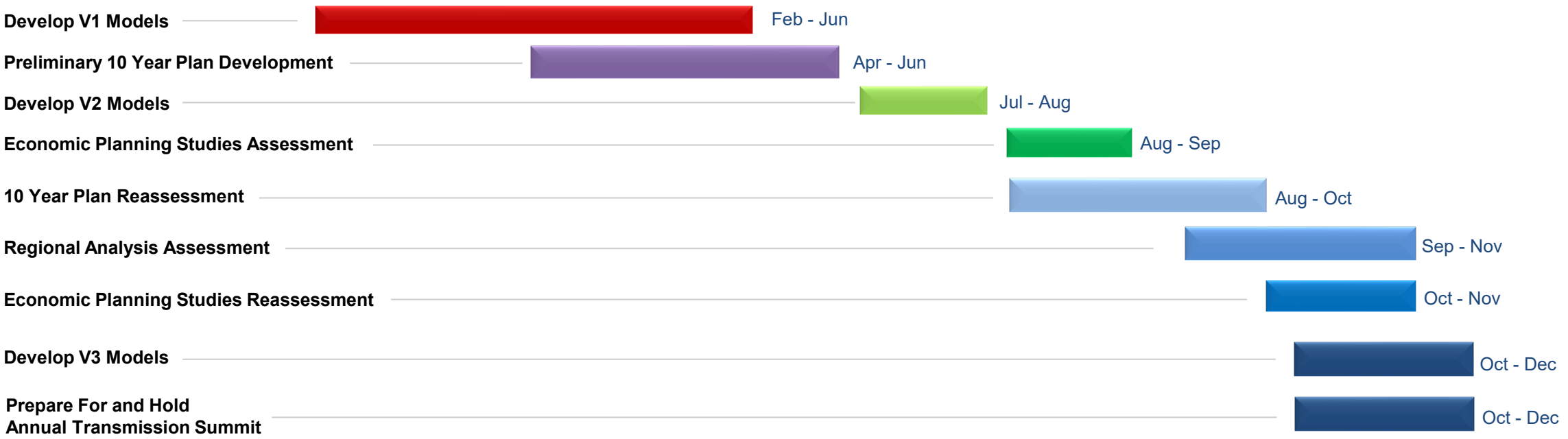
1st Quarter Meeting
("First RPSG Meeting and Interactive Training Session")
- RPSG and Interactive Training

2nd Quarter Meeting
("Preliminary Expansion Plan Meeting")
- Preliminary Expansion Plans

3rd Quarter Meeting
("Second RPSG Meeting")
- Preliminary Economic Studies

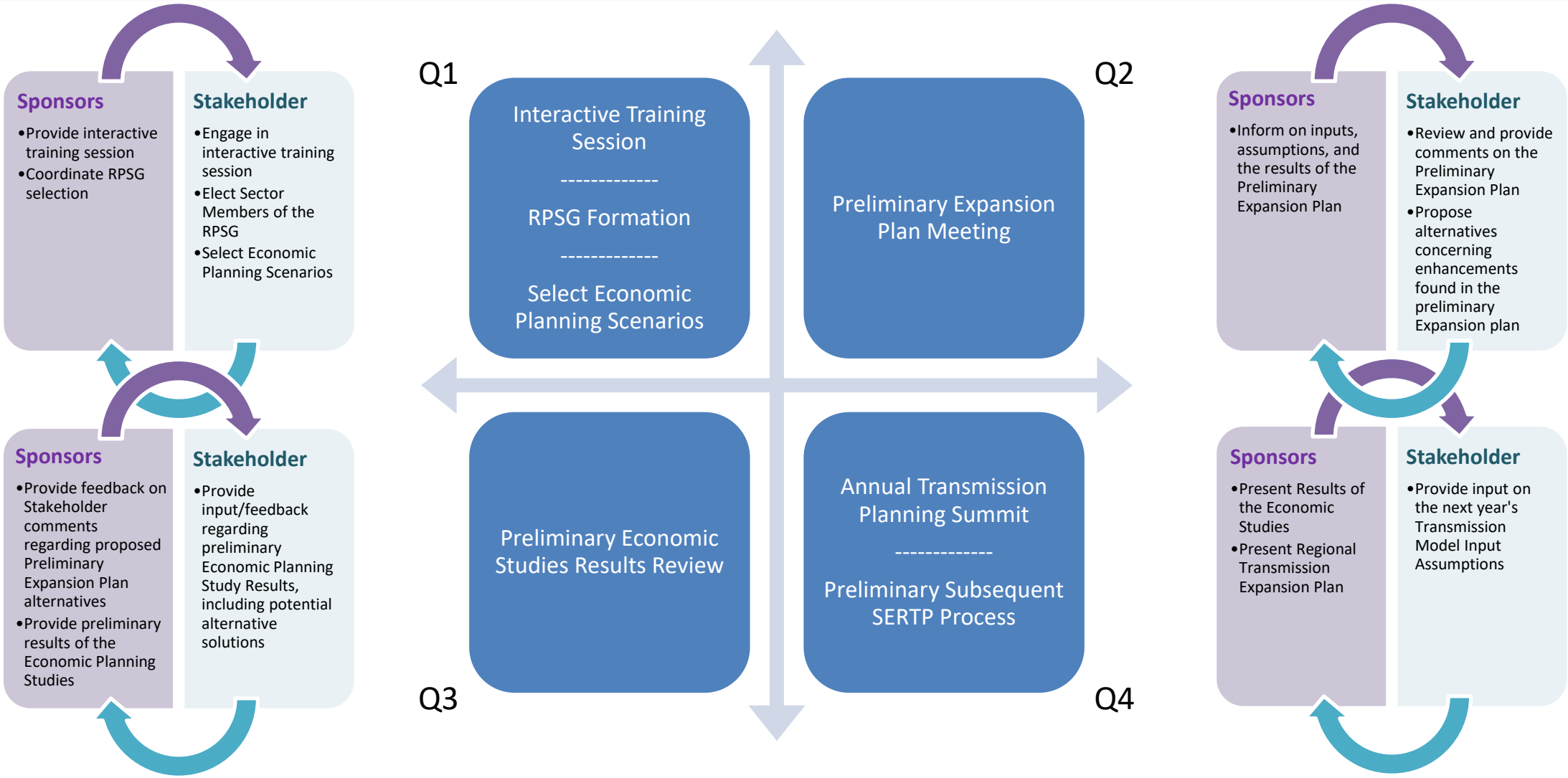
4th Quarter Meeting
("Annual Transmission Planning Summit and Assumptions Input Meeting")
- Annual Transmission Summit





2026 SERTP

Quarterly Meeting Purpose and Goals

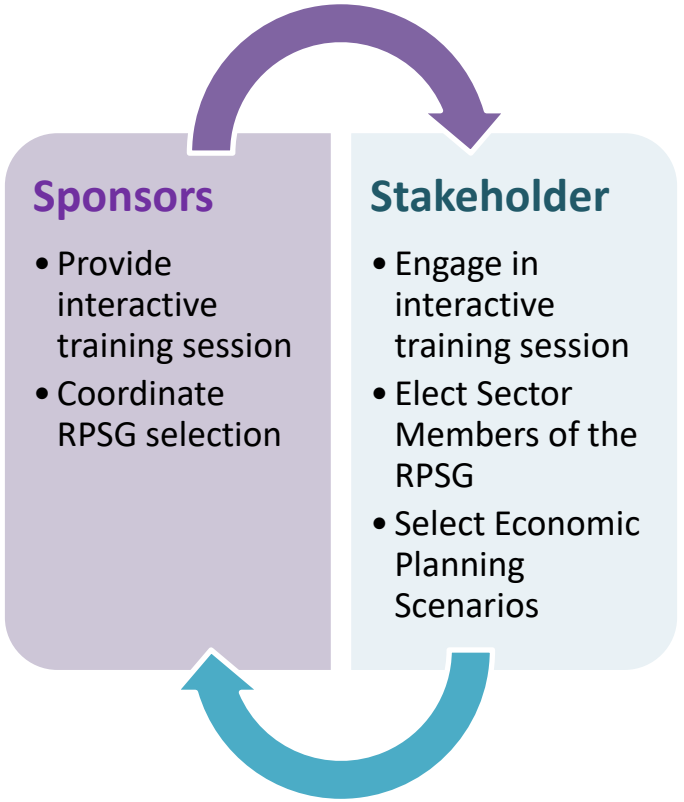


First Quarter Meeting Purpose and Goals (Q1)

Interactive Training Session

RPSG Formation

Select Economic Planning Scenarios



Typ. held annually in March as an in-person/hybrid meeting

SERTP Processes

Expansion Plan

- Inputs:
  - Previous year Q4 Preliminary Assumptions and Inputs
  - Transmission Provider Presentation and Continued Stakeholder feedback
- Outputs
  - Q2: Preliminary Expansion Plan
  - Q4: Final 10-Year Expansion Plan

Regional Transmission Planning Analyses

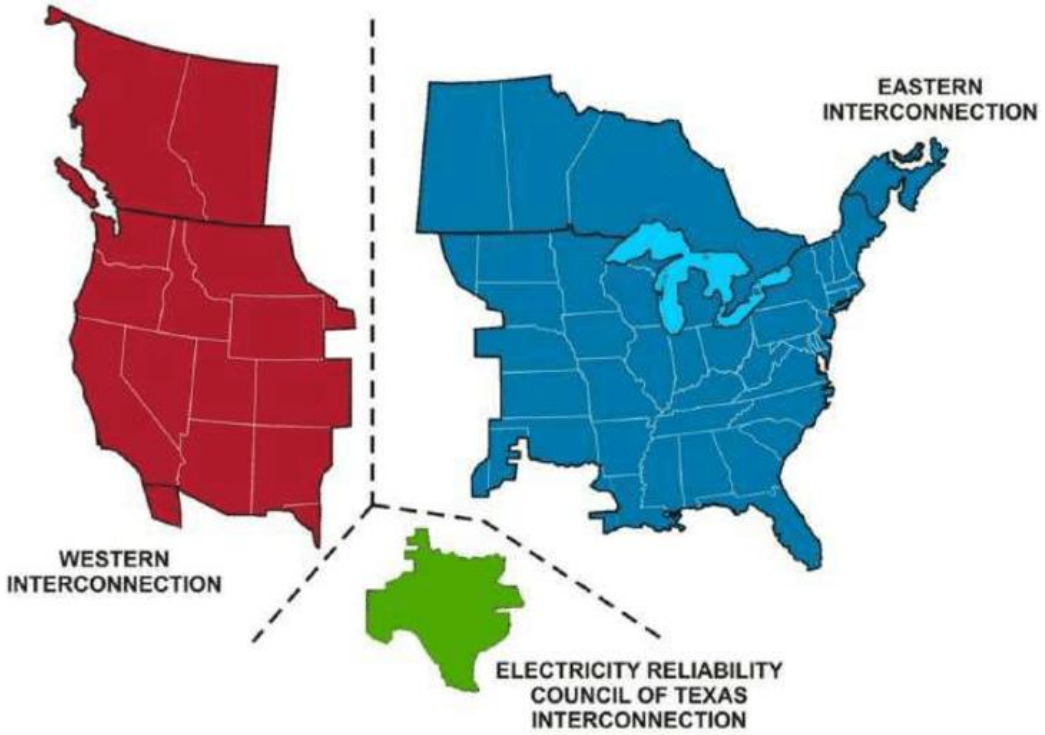
- Identify potentially more efficient or cost-effective solutions from the preliminary 10-year regional expansion plan
- Verify that the regional expansion plan is coordinated and cohesive

Economic Studies

- Hypothetical scenarios to move large amounts of power above and beyond existing long-term, firm transmission service commitments requested by the stakeholders, selected by the RPSG, and do not represent an actual transmission need or commitment to build (consistent with NERC standards and company-specific planning criteria)

Southeastern Regional
TRANSMISSION PLANNING

What are Power Flow Models

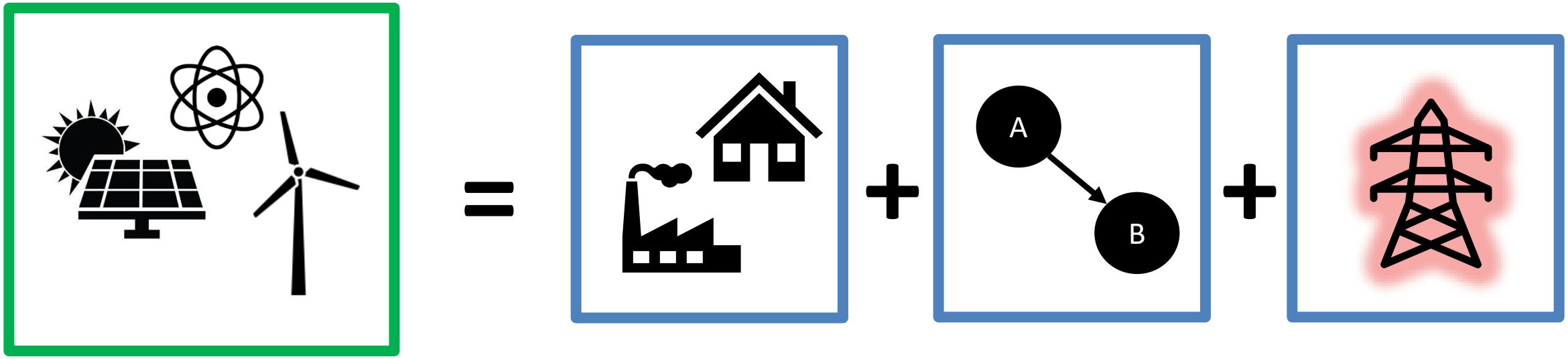


- Power Flow models (also called cases) are a mathematical representation of the Bulk Electric System and consist of detailed information for each transmission element.
- Used to simulate and analyze the flow of electrical power through a transmission network.
- Models are broken down into Areas and Zones to represent individual Balancing Authority Areas and Companies.

Fun Facts

- The Eastern Interconnection is the largest power system in the world.
- There are over 130,000 substations modeled for the Eastern Interconnection.
- The models include transmission voltages from 44 kV to 765 kV.
- To solve a power flow model requires thousands of simultaneous equations.

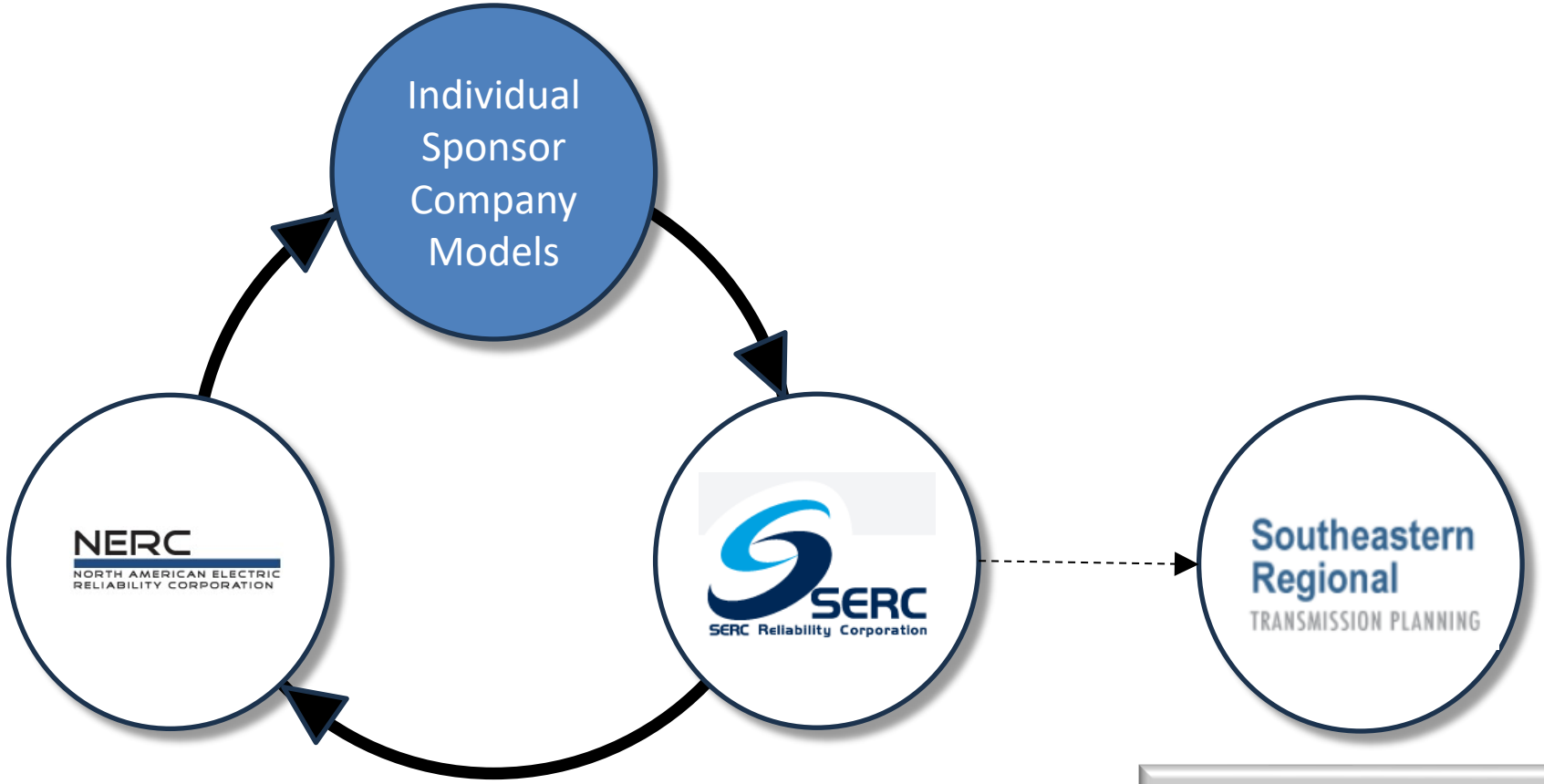
Power Flow Modeling: Fundamental Equation



Generation Load Interchange Losses

SERTP 2017 Load Forecast Training

Model Building Cycle

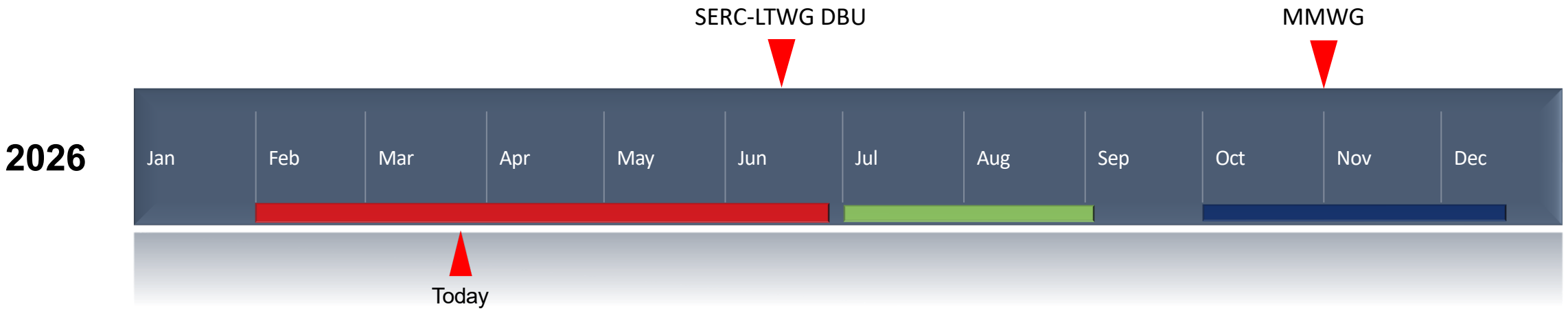


MMWG_Procedural_Manual_v43.pdf (rfirst.org)

SERTP 2024 Model Development Training

Southeastern Regional TRANSMISSION PLANNING

SERTP Model Development and Usage*



Version 1 (V1)

Economic Planning Studies

Version 2 (V2)

Regional Transmission Planning Analyses

Version 3 (V3)

Final models published to Secure Area of the SERTP Website

*Depending on when studies are performed in the SERTP, different versions of the models may be utilized

Interactive Training Session

MMWG Overview

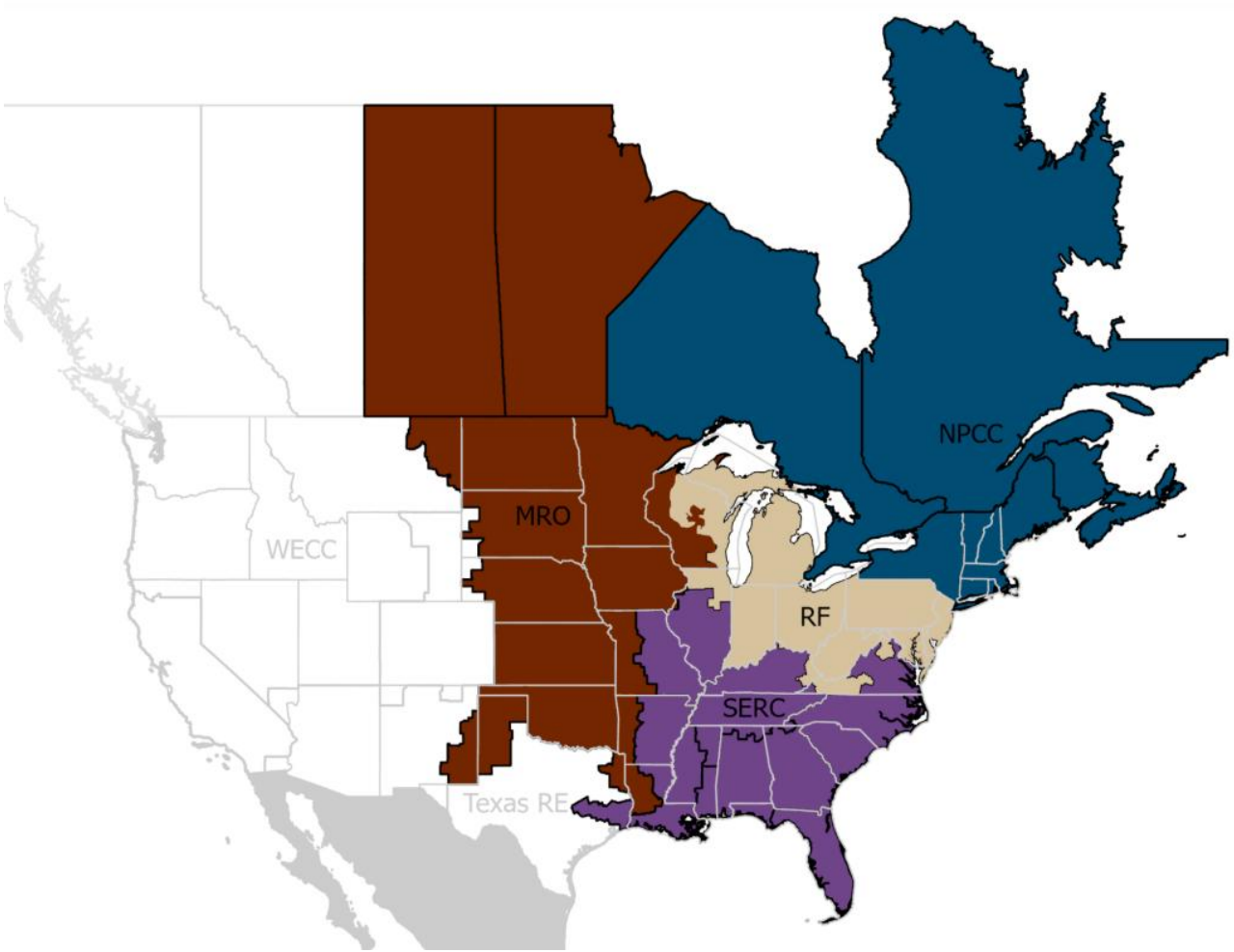
and

Alternatives Proposals Overview

MMWG Process & Procedure Manual

(Bob Pierce – Duke Energy)

Eastern Interconnection Map



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EASTERN INTERCONNECTION RELIABILITY ASSESSMENT GROUP (ERAG)

The Eastern Interconnection Reliability Assessment Group (ERAG)'s mission is to preserve and enhance the bulk power system reliability of the Eastern Interconnection. In doing so, ERAG is committed to supporting the efforts of and serving as an extension of North American Electric Reliability Corporation (NERC) in its mission as the Electric Reliability Organization (ERO) to ensure the reliability of the bulk power system within North America. ERAG's vision is to be recognized as the trusted and credible technical resource that leads the independent analysis, assessment, and enhancement of bulk power system reliability for the Eastern Interconnection.

To achieve this outcome the President & CEOs of the four Regional Entities within the Eastern Interconnection (ReliabilityFirst, SERC, NPCC and MRO) developed and executed an agreement that governs the inter-regional transmission reliability assessment studies and model building activities within the Eastern Interconnection.

https://www.rfirst.org/eastern-interconnection-reliability-assessment-group/

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The scope of ERAG's work includes the following:

1. Fulfill its obligations under the ERO Enterprise MOD-032 Designation Agreement with NERC
2. Review periodic reliability assessments and develop its own assessments to identify key reliability issues and the risks and uncertainties affecting adequacy and security of the Bulk Power System in the Eastern Interconnection and the Québec Interconnection
3. Oversee the Multiregional Modeling Working Group (MMWG)
4. Oversee the Acceptable Model Working Group (AMWG)

Documents:

ERAG Roster – January 2025

Eastern Interconnection Regional Entity Agreement

ERAG Strategic Plan 2023-2025

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Multiregional Modeling Working Group (MMWG)

The MMWG was formed to coordinate the development of designated power flow and dynamics simulation base case models that simulate steady state and dynamic Bulk Electric System behavior of the Eastern Interconnection.

Documents:

MMWG Charter – 2024

MMWG Roster – January 2024

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Acceptable Model Working Group (AMWG)

The AMWG was established by the ERAG to develop and maintain an Eastern Interconnection acceptable model list and support the maintenance of the NERC dynamic modeling recommendations document. Dynamic models for the Eastern Interconnection will be reviewed, developed, and validated. Acceptable models will be recommended for use in reliability assessments performed using MMWG cases.

Documents:

ERAG Acceptable Model Working Group Charter

AMWG Roster – January 2024

ERAG AMWG Dynamic Model List

EASTERN INTERCONNECTION REGIONAL ENTITY AGREEMENT

This Eastern Interconnection Regional Entity Agreement (Agreement), is effective August 1, 2025, and is entered into by and among all of the Eastern Interconnection Regional Entities (REs) (individually a Party and collectively Parties):

- **Midwest Reliability Organization, Inc. (MRO),** a non-profit corporation registered in the State of Delaware;
- **Northeast Power Coordinating Council, Inc. (NPCC),** a non-profit corporation registered in the State of New York;
- **ReliabilityFirst Corporation (RF),** a non-profit corporation registered in the State of Delaware; and
- **SERC Reliability Corporation (SERC),** a non-profit corporation registered in the State of North Carolina.

WHEREAS, this Agreement addresses the Eastern Interconnection REs governance of and ongoing work to perform reliability studies, analyses and assessments of the Eastern Interconnection to identify potential reliability issues and risks supplemented by the review of appropriate reliability studies, analyses and assessments prepared by Eastern Interconnection Reliability Coordinators and Planning Coordinators;

WHEREAS, this Agreement allows the Eastern Interconnection REs to fulfill their delegated responsibilities and obligations under the ERO Enterprise Designation process document (ERO Enterprise Designation attached as Exhibit A and incorporated herein) with the North American Electric Reliability Corporation (NERC);

NOW, THEREFORE, the Eastern Interconnection REs, as the sole members of the Eastern Interconnection Reliability Assessment Group (ERAG), agree to act collectively and collaboratively as follows:

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Exhibit A

ERO Enterprise Designation
MOD-032-1

This Reliability Standard MOD-032-1 process document is being made pursuant to the certain Federal Energy Regulatory Commission ("FERC")-approved Regional Delegation Agreements ("RDA"), between the North American Electric Reliability Corporation ("NERC") and each of, Midwest Reliability Organization ("MRO"), Northeast Power Coordinating Council, Inc. ("NPCC"), ReliabilityFirst ("RF"), SERC Reliability Corporation ("SERC"), Texas Reliability Entity, Inc. ("Texas RE"), and the Western Electricity Coordinating Council ("WECC"), respectively (together the "Regional Entities"). The purpose of this process document is to establish the necessary procedures the Regional Entities, participating as Designated Entities as further described below and in **Attachment 1,** perform in supporting NERC's efforts to fulfill its regulatory obligations under Reliability Standard MOD-032-1 (or its successor) and associated events analysis activities. Together, NERC, as the Electric Reliability Organization ("ERO") and the six Regional Entities are referred to as the ERO Enterprise.

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Attachment 1:

Designated Entity Functions and Attributes

This Attachment 1 outlines the requirements for each Designated Entity as referenced in the accompanying process document. Any capitalized terms not defined in this Attachment 1 shall have the same meaning ascribed to them in the process document.

The Designated Entities assigned by NERC as ERO under Reliability Standard MOD-032-1 Requirement R4 to support the creation of Interconnection-wide planning cases shall have the following attributes:

- A governance structure responsive to the needs of the Planning Coordinators for its Interconnection, Regional Entities, and NERC.
    - Clear definition of roles and responsibilities related to the creation of the models
    - Transparency regarding the development of data requirements, sampling, testing, data correction, and feedback to applicable stakeholders
    - Establish timeframes that allow for the review cycle
    - Define security and access related to models
- In coordination with the Planning Coordinators of the Interconnection, Regional Entities, and NERC, annually create and make available a specific set of powerflow and dynamics cases that include, but are not limited to, the cases identified below.

Core Cases[1] for the ERO:

- Upcoming[2] winter peak-load case -for seasonal planning studies (interregional) and event analyses, and as external models of outside world for operational planningstudies.
- Upcoming summer peak-load case -for seasonal planning studies (interregional) and event analyses, and as external models of outside world for operational planning studies.
- Upcoming year low Inertia/ low load case -for use in validation of Interconnection Frequency Response Obligations and event analyses.

- Planning cases:
  - Planning case for year 1 or 2 system peak steady-state analysis[4]
  - Planning case for year 5 system peak steady-state analysis[5]
  - Planning case for near-term (1-5 years) system off-peak steady-state analysis[6]
  - Planning case for near-term (1-5 years) system peak stability analysis[7]
  - Planning case for near-term (1-5 years) system off-peak stability analysis[8]
  - Planning case for Long-term Transmission Planning Horizon system peak steady-state analysis[9]
  - Planning case for Long-term Transmission Planning Horizon system peak stability analysis[10]

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[4] Pursuant to R2.I.1 of TPL-001-4 and TPL-001-5.1
[5] Pursuant to R2.I.1 of TPL-001-4 and TPL-001-5.1
[6] Pursuant to R2.I.2 of TPL-001-4 and TPL-001-5.1
[7] Pursuant to R2.4.1 of TPL-001-4 and TPL-001-5.1
[8] Pursuant to R2.4.2 of TPL-001-4 and TPL-001-5.1
[9] Pursuant to R2.2.I of TPL-001-4 and TPL-001-5.1
[10] Pursuant to R2.5 of TPL-001-4 and TPL-001-5.1

Other cases and processes:

- Designated Entities shall have a process with appropriate controls consistent with Section 1500 of the ROP for identifying and vetting of qualified usas of the powerflow and dynamics cases of the Interconnection. NERC, Regional Entities, Planning Coordinators, Reliability Coordinators, Transmission Operators, and Transmission Planners, within the Interconnection are pre-vetted users of the cases.
- Existing powerflow and dynamics cases shall be made available by the Designated Entity to NERC, the Regional Entities, Reliability Coordinators, Planning Coordinators, Transmission Operators, and Transmission Planners within the Interconnection under appropriate controls.
- NERC or Regional Entities may designate additional specialized cases; e.g., Year 10 off-peak load case with low inertia, high BPS-connected inverter-based resource, and representation of distributed energy resources (dynamics case, in particular). An example of special cases may include the following:
    - Year 5 low inertia/Minimum load case to produce the Frequency Measures 1, 2, and 4 of the Essential Reliability Taskforce for the NERC Long Term Reliability Assessment tracking and trending.
    - Upcoming summer short-circuit case -for use in specialized Inverter-Based Resources studies, event analysis, and designation of electromagnetic transient (EMT) zones. These would not be interconnection wide cases but collected from the PC or TO, depending on how they are currently being built.
    - Collection of EMT zones as designated by NERC, as needed

- Designated Entities shall develop a process to ensure that all Planning Coordinators in their Interconnection and all system elements defined in the Planning Coordinator's modeling procedures[11] be included in the data collection process through a common method (e.g. MMWG case creation process) of collecting data and model(s).
- Designated Entities shall develop[12] and maintain a case creation manual for the Interconnection, including the process by which the designated cases must be assembled, tested for quality (e.g., MOD-033 or its successor), and tested for case fidelity (ERO Metric 1[13]). NERC will conduct an annual case quality assessment compared to the criteria in this Attachment. The Designee shall have a process to address any case quality deficiencies identified by NERC. The Designated Entity shall collaborate with NERC to address any case and/or process deficiencies.

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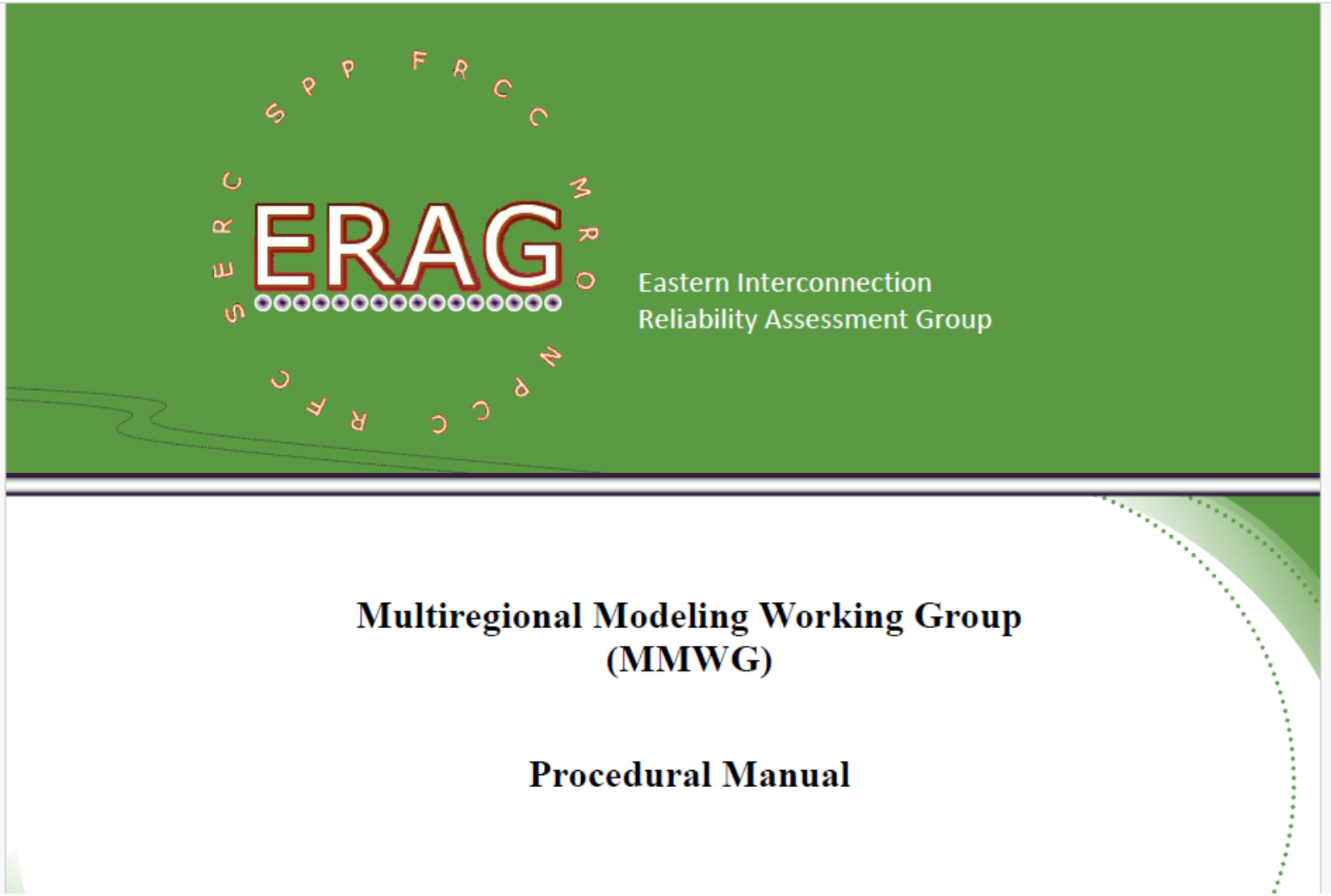

INTRODUCTION

- Develop an annual series of power flow and dynamics models for the benefit of the electric industry to act as the bases to perform reliability, interconnection, regional expansion, and market efficiency analyses.

- Power flow and dynamic cases are created annually for selected years and seasons within the planning horizon

- Each case reflects the latest available:
  - forecasted load at each node or bus on the interconnected system,
  - the branches (lines and transformers) linking buses,
  - the generating units available to supply the load, and
  - the patterns of generation and interchange determined by economics and maintenance within the constraints of available capacity.

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MMWG Scope of Activities

A. Establish a schedule for all case development work.

B. Maintain a database of annually updated system modeling data and series of solved power flow (Attachment 1 of ERAG Entity Agreement) & initialized dynamics models (for at least two time periods — near term and approximately five years into the future) of the Eastern Interconnection (EI).

C. Annually review the power flow base case & system dynamics simulation model requirements of the EI and recommend models to be developed.

D. Maintain a Procedural Manual for use by the Regional Data Coordinators in submitting modeling data, and for use by the MMWG Coordinator(s) in developing models.

E. Work with the Regional Data Coordinators to ensure the timely submission of system data.

F. Keep abreast of the modeling requirements of the Regions and member systems and adopt or develop improved modeling and data handling techniques as required.

G. Evaluate alternative methods and software for developing the models.

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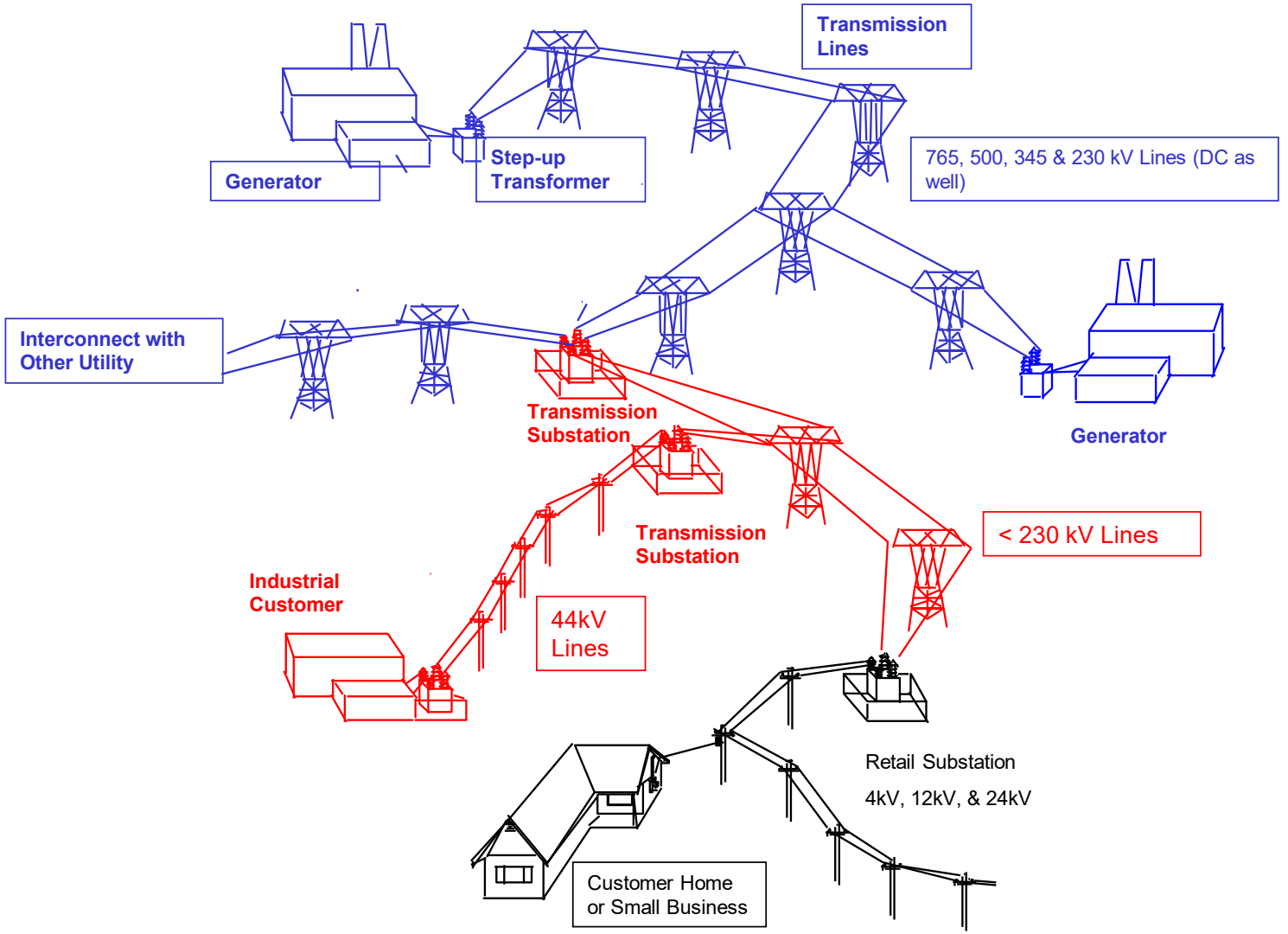
TYPICAL TRANSMISSION NETWORK



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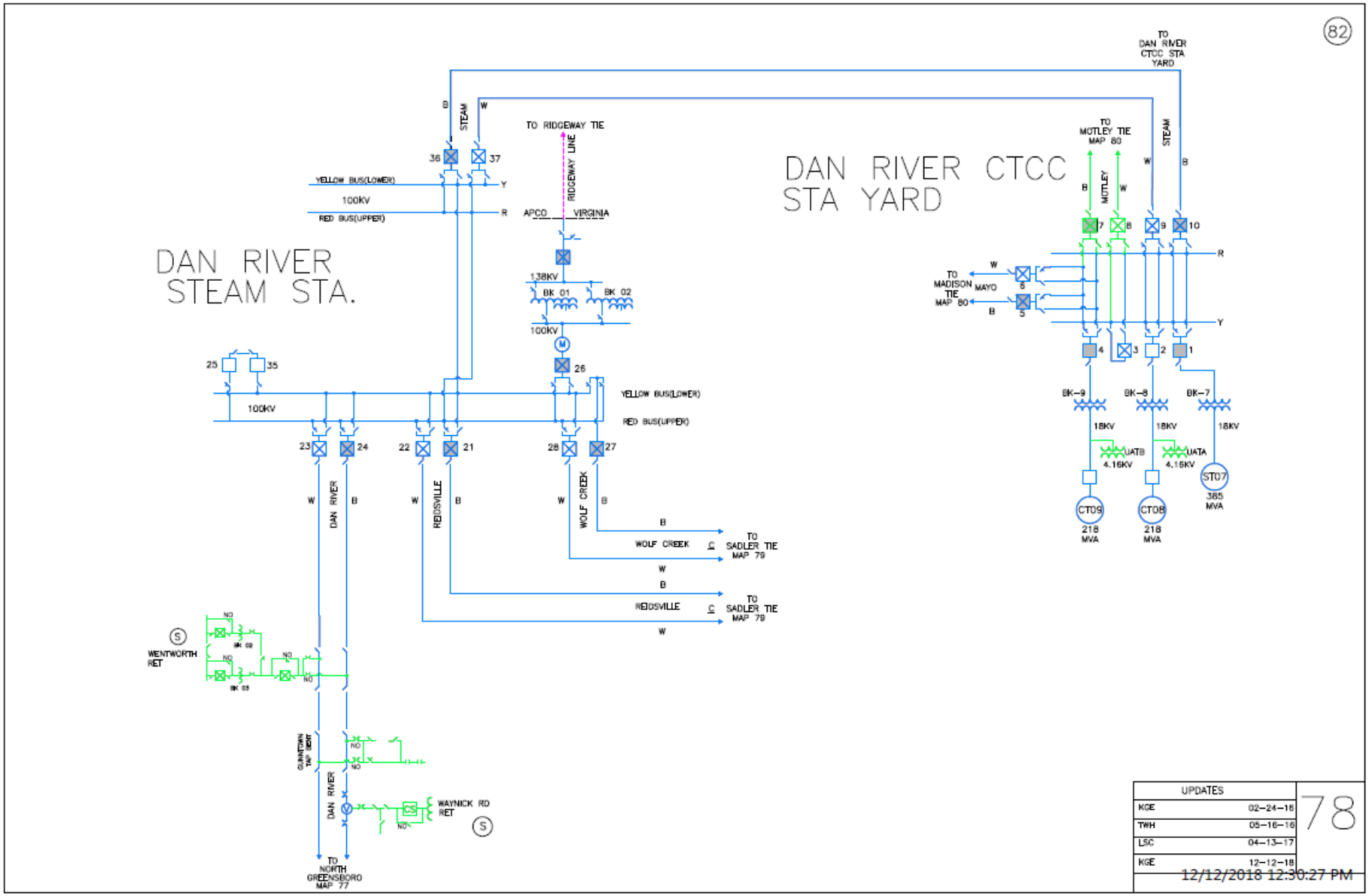
TYPICAL TRANSMISSION NETWORK



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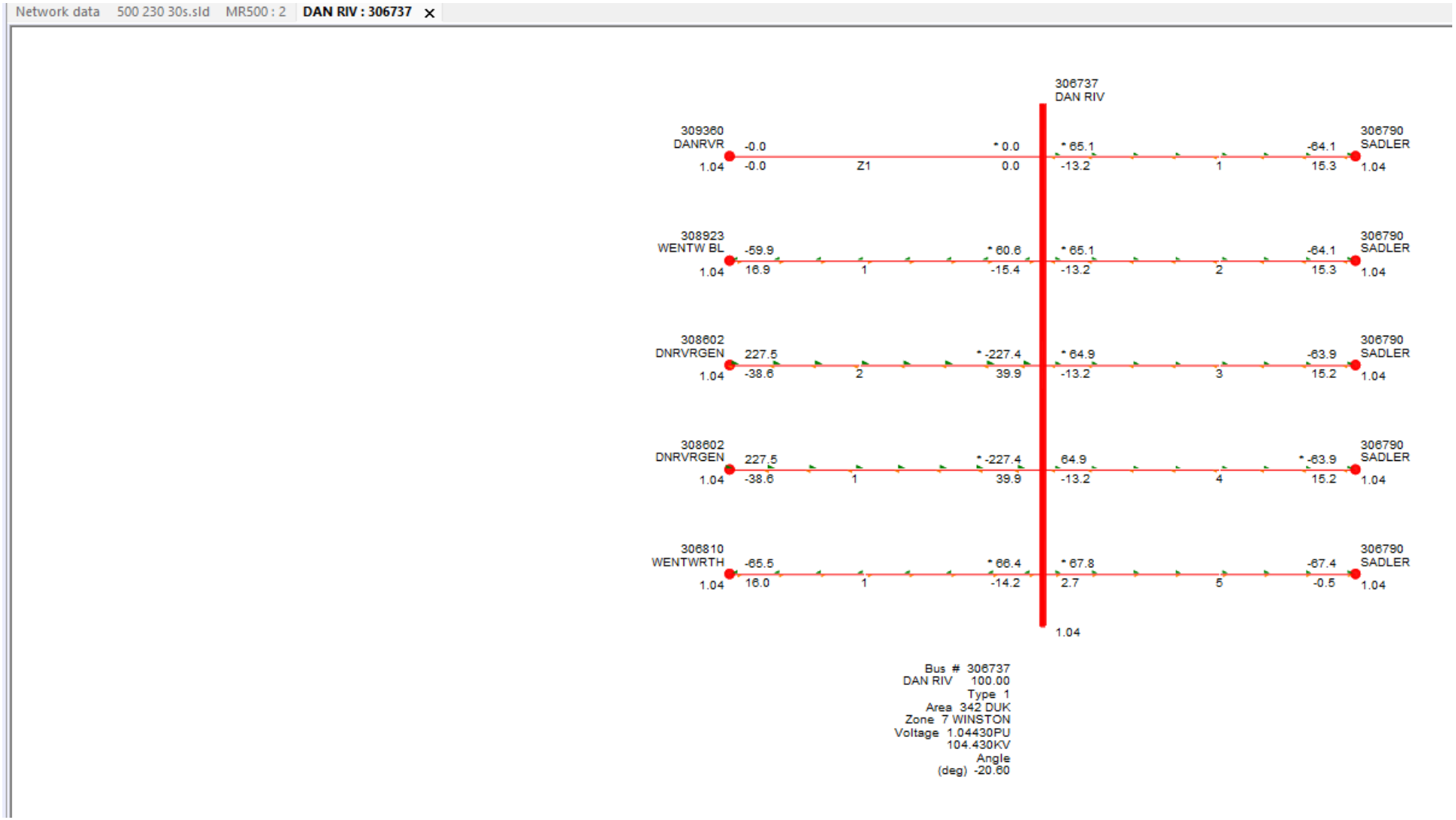
TYPICAL TRANSMISSION NETWORK



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CASE DEFINITIONS

Spring Minimum Load (yyyySML) — is defined as the lowest "net" load level typically seen or expected to be seen by an area's transmission system under the spring timeframe, excluding data associated with significant outages caused by unexpected events such as but not limited to: acts of nature (e.g. hurricanes or wildfires), pandemics or terrorism. Topological modeling changes shall be incorporated into the model if they are to go into effect on or before April 15th. Depending on an area's typical load profile, this may occur during weekend overnight or early morning hours, or during weekend midday hours with mild weather and high distribution-connected resource (DER) production. Where multiple times of day produce fairly similar load levels, the condition that produces the most severe high voltage conditions should be chosen. Load power factor should represent typical minimum load conditions, and inter-area transfers should be relatively light. Planned spring maintenance of generation and transmission should be reflected in this case. Summer or appropriate ratings should be used. Interchange should be based on what is allowable up to what is available under firm transmission service. Non-firm transactions that historically occur may be used when agreed upon between PC's. Due to these non-firm transactions, this model may not be appropriate for use in determination of AFC/ATC/or transfer capability.

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DATA FLOW

INDIVIDUAL DISTRIBUTION, TRANSMISSION AND GENERATION OWNER, TRANSMISSION SERVICE PROVIDER, RESOURCE PLANNING DATA

TRANSMISSION PLANNERS/PLANNING COORDINATORS

REGIONAL DATA COORDINATORS

MMWG COORDINATOR

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MODEL SCHEDULE

APRIL – STEADY STATE MODEL DEVELOPMENT BEGINS

AUGUST – DYNAMIC MODEL DEVELOPMENT BEGINS

OCTOBER – STEADY STATE MODELS COMPLETE

FEBRUARY – DYNAMIC MODELS COMPLETE

Southeastern Regional TRANSMISSION PLANNING

MODELING DATA

MASTER TIELINE DATABASE

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	
1	TieLineName	InService	OutService	IPC	IArea	IAreaNam	IBusNum	IBusName	IBusKv	JPC	JArea	JAreaNam	JBusNum	JBusName	JBusKv	METER(F:	CKT	R	X	B	Summer Rate 1	Summer Rate 2	Summer Rate 3	Winter Rate 1	Winter Rate 2	Winter Rate 3	Spring Rate 1	Spri
2	249937-324253	2026-04-01		MISO	208	DEI	249937	08HUNTS_CRK	138.00	SERC_PC	363	LGEE	324253	4GHENT	138.00	1	1	0.0021700	0.0133300	0.00351000000000	316.00	345.00	0.00	413.00	413.00	0.00	361.00	361
3	300071-505502	2016-01-01	2099-01-01	SERC_PC	330	AECI	300071	5CLINTN	161.00	SPP_RTO	515	SWPA	505502	TRUMAN 5	161.00	1	1	0.0145000	0.0865000	0.04186000000000	239.00	249.00	0.00	278.00	278.00	0.00	239.00	249
4	300097-541251	2016-01-01	2099-01-01	SERC_PC	330	AECI	300097	5MARYVB2	161.00	SPP_RTO	541	KCPL	541251	MARYVLE5	161.00	1	1	0.0001360	0.0012740	0.00068400000000	557.00	557.00	0.00	557.00	557.00	0.00	557.00	557
5	300101-505498	2016-01-01	2099-01-01	SERC_PC	330	AECI	300101	5MORGAN	161.00	SPP_RTO	515	SWPA	505498	STOCKTN5	161.00	1	1	0.0129310	0.0555000	0.02592800000000	202.00	202.00	0.00	238.00	238.00	0.00	202.00	202
6	300118-505498	2016-01-01	2099-01-01	SERC_PC	330	AECI	300118	5STKAEC	161.00	SPP_RTO	515	SWPA	505498	STOCKTN5	161.00	1	1	0.0014970	0.0086670	0.00435600000000	203.00	203.00	0.00	223.00	223.00	0.00	203.00	203
7	300816-505498	2016-01-01	2099-01-01	SERC_PC	330	AECI	300816	5COLLINS	161.00	SPP_RTO	515	SWPA	505498	STOCKTN5	161.00	1	1	0.0105770	0.0445600	0.02084200000000	172.00	172.00	0.00	238.00	238.00	0.00	172.00	172
8	300893-513083-1			SERC_PC	330	AECI	300893	2CHECDST	69.00	SPP_RTO	523	GRDA	513083	SUMMIT 2	69.00	1	1	0.1557550	0.2364440	0.00336100000000	35.00	35.00		49.00	49.00		35.00	35.(
9	300899-513080-1			SERC_PC	330	AECI	300899	2KEEFTON	69.00	SPP_RTO	523	GRDA	513080	KEEFTP 2	69.00	2	1	0.0827270	0.1257060	0.00178500000000	35.00	35.00		49.00	49.00		35.00	35.(
10	300927-513098-NO			SERC_PC	330	AECI	300927	2CLEVLND	69.00	SPP_RTO	523	GRDA	513098	HALLETTAP 2	69.00	2	NO	0.0253680	0.1458290	0.00251000000000	87.00	87.00		103.00	103.00		87.00	87.(
11	300936-512641	2016-01-01	2099-01-01	SERC_PC	330	AECI	300936	2MANFORD	69.00	SPP_RTO	523	GRDA	512641	MANFORD2	69.00	1	1	0.0454350	0.0677450	0.00099400000000	35.00	35.00	0.00	49.00	49.00	0.00	35.00	35.(
12	300964-513056-1			SERC_PC	330	AECI	300964	2PERK	69.00	SPP_RTO	523	GRDA	513056	PERKTAP 2	69.00	1	1	0.0547350	0.0833750	0.00118200000000	35.00	35.00		49.00	49.00		35.00	35.(
13	300968-513062-1			SERC_PC	330	AECI	300968	2SLEEPYH	69.00	SPP_RTO	523	GRDA	513062	TAHLWEST 2	69.00	2	1	0.0285120	0.1473460	0.00312600000000	85.00	85.00		109.00	109.00		85.00	85.(
14	300974-300974	2016-01-01	2099-01-01	SERC_PC	330	AECI	300974	2WHITHRN	69.00	SPP_RTO	523	GRDA	512693	WHITETP 2	69.00	1	1	0.0680530	0.1207940	0.00184100000000	44.00	44.00	0.00	53.00	53.00	0.00	44.00	44.(
15	300982-513038-z1			SERC_PC	330	AECI	300982	2NGREASYKM	69.00	SPP_RTO	523	GRDA	513038	NGREASY 2	69.00	1	Z1	0.0000010	0.0000010	0.00000100000000	71.00	71.00		90.00	90.00		71.00	71.(
16	300985-513041-1			SERC_PC	330	AECI	300985	2TITANIC	69.00	SPP_RTO	523	GRDA	513041	TITANTAP 2	69.00	1	1	0.0289720	0.0441310	0.00062600000000	35.00	35.00		49.00	49.00		35.00	35.(
17	301344-513050-1			SERC_PC	330	AECI	301344	5CDRCRST	161.00	SPP_RTO	523	GRDA	513050	LOCSTGV 5	161.00	2	1	0.0015610	0.0181720	0.01006600000000	335.00	335.00		335.00	335.00		335.00	335
18	301402-541314	2016-01-01	2099-01-01	SERC_PC	330	AECI	301402	5LOSTVALY	161.00	SPP_RTO	541	KCPL	541314	NWARSAW5	161.00	1	1	0.0000200	0.0001170	0.00005900000000	175.00	196.00	0.00	204.00	223.00	0.00	175.00	196
19	301433-512809	2016-01-01	2099-01-01	SERC_PC	330	AECI	301433	2CIMARRON	69.00	SPP_RTO	523	GRDA	512809	STILLWTR2	69.00	1	1	0.0517050	0.1351180	0.00202600000000	70.00	70.00	0.00	85.00	85.00	0.00	70.00	70.(
20	301549-505448	2016-01-01	2099-01-01	SERC_PC	330	AECI	301549	5WPLAINE	161.00	SPP_RTO	515	SWPA	505448	NORFORK5	161.00	1	1	0.0243360	0.1410060	0.07063300000000	167.00	167.00	0.00	167.00	167.00	0.00	167.00	167
21	301558-505526	2016-01-01	2099-01-01	SERC_PC	330	AECI	301558	5AKINSKM	161.00	SPP_RTO	515	SWPA	505526	AKINS E5	161.00	1	Z1	0.0000100	0.0001000	0.00000000000000	557.00	557.00	0.00	595.00	595.00	0.00	557.00	557
22	301687-631216-Z1			SERC_PC	330	AECI	301687	5LEE	161.00	MISO	627	ALTW	631216	WEVER5	161.00	2	Z1	0.0000100	0.0000100	0.00000000000000	285.00	285.00	0.00	349.00	349.00	0.00	285.00	285
23	340171-324080-1	2021-04-01		MISO	314	BREC	340171	HARTFORD TAP	69.00	SERC_PC	363	LGEE	324080	2HARTFORD	69.00	2	1	0.0115500	0.0326800	0.00061000000000	72.00	88.00		103.00	114.00		76.00	92.(
24	340651-325073-1	2022-01-01		MISO	314	BREC	340651	OTTERCRK345	345.00	SERC_PC	363	LGEE	325073	7REDMON RD	345.00	2	1	0.0000800	0.0013000	0.02220000000000	1518.00	1793.00		1793.00	1793.00		1740.00	179
25	505507-338110	2024-12-01	2100-01-01	SPP_RTO	515	SWPA	505507	SWPINEY5	161.00	MISO	327	EES-EAI	338110	5HILLTOP%	161.00	0	1	0.0326420	0.1398200	0.06492500000000	189.00	189.00	0.00	250.00	250.00	0.00	218.00	218
26	505507-505508	2024-12-01	2100-01-01	SPP_RTO	515	SWPA	505507	SWPINEY5	161.00	SPP_RTO	515	SWPA	505508	DARDANE5	161.00	2	1	0.0109680	0.0469800	0.02181500000000	189.00	189.00	0.00	250.00	250.00	0.00	218.00	218
27	505592-301553-z1			SPP_RTO	515	swpa	505592	WELEETK4	138.00	SERC_PC	330	aeci	301553	4WELEETKA	138.00	1	Z1	0.0000100	0.0001000	0.00000000000000	861.00	861.00		861.00	861.00		861.00	861
28	513059-300975-1			SPP_RTO	523	GRDA	513059	HULBERT 2	69.00	SERC_PC	330	AECI	300975	2HULBERT	69.00	1	1	0.0307680	0.0468660	0.00066500000000	35.00	35.00		49.00	49.00		35.00	35.(
29	513059-301441-1			SPP_RTO	523	GRDA	513059	HULBERT 2	69.00	SERC_PC	330	AECI	301441	2WOODAL	69.00	1	1	0.0214780	0.1239540	0.00210300000000	122.00	122.00		149.00	149.00		122.00	122

Southeastern Regional TRANSMISSION PLANNING

MODELING DATA

INTERCHANGE SPREADSHEET

S E R C

INTERCHANGE DATA FOR 2025 SERIES SERC/LTWG LOAD FLOW BASE CASES

									I	J	K	L	M	N	O	P	Q	R	S	T
								Your changes SUM to:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PC	FROM #	FRO	TO	TO	Comments	Firm	TRID	26L	26S	26W	27L	27S	27W	30M	30H	30S	30W	35S	35W
	PC	From#			To#	Comments			2026SLL	2026SUM	2026WIN	2027SLL	2027SUM	2027WIN	2030SML	2030SSH	2030SUM	2030WIN	2035SUM	2035WIN
8	SERC	330	AECI		327	EES-EAI	1604055 (PLUM - AECI)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	SERC	330	AECI		327	EES-EAI	75460486 (PLUM - AECI)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	SERC	330	AECI		327	EES-EAI	Dell		0.0	-578.0	-599.0	0.0	-578.0	-599.0	0.0	-578.0	-578.0	-599.0	-578.0	-599.0
11	SERC	330	AECI		541	KCPL	SWPP-AESM		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	SERC	330	AECI		541	KCPL	WR-MOPEP_AECI		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	SERC	330	AECI		333	CWLD	72491785 (CWLD - Wind)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
14	SERC	330	AECI		356	AMMO	Rolla Wheeling		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	SERC	330	AECI		357	AMIL	Mt. Pleasant		-5.0	-18.0	-13.0	-13.0	-18.0	-20.0	-5.0	-13.0	-18.0	-13.0	-18.0	-13.0
16	SERC	330	AECI		357	AMIL	97 MW for MJMEUC		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	SERC	330	AECI		515	SWPA			-26	-520	-517.0	-26	-520.0	-517	-20.0	-515.0	-520.0	-517	-520.0	-517
18	SERC	330	AECI		515	SWPA	New Madrid (city), China		2.0	6.0	6.0	2.0	6.0	6.0	2.0	5.0	6.0	6.0	6.0	6.0
19	SERC	330	AECI		520	AEPW	PSO-7		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	SERC	330	AECI		523	GRDA			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	SERC	330	AECI		536	WERE	Flat Ridge Wind		-154	-109	-148	-154	-109	-148	-154	-109	-109	-148	-109	-148
22	SERC	330	AECI		541	KCPL	Harrisonville & Odessa		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	SERC	330	AECI		645	OPPD	MJMEUC		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24		NET	330	AECI		Associated Electric Cooperative, Inc.			-177.0	-1213.0	-1265.0	-185.0	-1213.0	-1272.0	-171.0	-1204.0	-1213.0	-1265.0	-1213.0	-1265.0
25	SERC	340	CPLE		341	CPLW	(Transfer) [(73399065, 73399080)]		0.0	0.0	150.0	0.0	0.0	150.0	0.0	0.0	0.0	150.0	0.0	200.0
26	SERC	340	CPLE		342	DUK	(Broad River) [(76440628)/(77041366)]		0.0	-925.0	-925.0	0.0	-925.0	-925.0	0.0	-925.0	-925.0	-925.0	-925.0	-925.0
27	SERC	340	CPLE		342	DUK	(Cleveland) [91089100]		0.0	-196.0	-196.0	0.0	-196.0	-196.0	0.0	-196.0	-196.0	-196.0	-196.0	-196.0
28	SERC	340	CPLE		342	DUK	(NCEMC) [(77513525)/(72380530, 77513487, 77685019)]		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
29	SERC	340	CPLE		342	DUK	(NCEMC/CNS) [(74929058, 74929074, 82002147, 82002151)/(74929112, 74929122, 82002143,		-205.0	-205.0	-205.0	-205.0	-205.0	-205.0	-205.0	-205.0	-205.0	-205.0	-205.0	-205.0
30	SERC	340	CPLE		342	DUK	(NCEMC/CNS) [87232557]		-102.0	-102.0	-102.0	-102.0	-102.0	-102.0	-102.0	-102.0	-102.0	-102.0	-102.0	-102.0
31	SERC	340	CPLE		342	DUK	(Rowan) [88405054, 89125561]		-183.0	-183.0	-186.0	-186.0	-186.0	-180.0	-180.0	-180.0	-180.0	-180.0	-180.0	-180.0
32	SERC	340	CPLE		342	DUK	(Rowan) [(91206790)/(90300770, 91206794)]		-190.0	-190.0	-190.0	-190.0	-190.0	-190.0	0.0	0.0	0.0	0.0	0.0	0.0
33	SERC	340	CPLE		342	DUK	(CPLE) (92402897, 92402911, 92403054, 92403131, 92403135, 92403139)		-87.0	-87.0	-87.0	-87.0	-87.0	-87.0	-87.0	-87.0	-87.0	-87.0	-87.0	-87.0
34	SERC	340	CPLE		342	DUK	Transfer		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	300.0	0.0
35	SERC	340	CPLE		225	PJM	(SEPA-KERR) - 345 DVP (Grandfathered 131489)		-95.0	-95.0	-95.0	-95.0	-95.0	-95.0	-95.0	-95.0	-95.0	-95.0	-95.0	-95.0
36	SERC	340	CPLE		225	PJM	(NCEMC) [87641242]		-75.0	-75.0	-75.0	-75.0	-75.0	-75.0	-75.0	-75.0	-75.0	-75.0	-75.0	-75.0
37	SERC	340	CPLE		225	PJM	(NCEMC) - 205 AEP (80471206)											100.0	-100.0	-100.0	-100.0
38	SERC	340	CPLE		225	PJM	(NCEMC/Hamlet#6) (78092310)											55.0	55.0	55.0	55.0
39	SERC	340	CPLE		225	PJM	(NCEMC/Hamlet#1&2) (74024215, 74024219, 808159											110.0	110.0	110.0	110.0
40	SERC	340	CPLE		342	DUK	(NCEMC/Hamlet#3) (81937117)											0.0	0.0	0.0	0.0
41		NET	340	CPLE		Carolina Power and Light (East)												800.0	-1650.0	-1500.0	-1600.0
42	SERC	341	CPLW	340	CPLE	(Transfer) [(73399065, 73399080)]												0.0	-150.0	0.0	-200.0
43	SERC	341	CPLW	344	SC	(Waynesville) [(81722322)]												-22.0	-22.0	-22.0	-22.0
44	SERC	341	CPLW	347	TVA	(SEPA) (Grandfathered 123657)												-14.0	-14.0	-14.0	-14.0
45		NET	341	CPLW		Carolina Power and Light (West)												-36.0	-186.0	-36.0	-236.0
46	SERC	342	DUK		225	PJM	(NCEMC-CNS) [88232176, 95571544]											100.0	100.0	100.0	100.0

NPCC_PC | PJM | SERC | FRCC | SPP RTO | MISO

Study Explorer | Network Tree

236 234305 -39.90 5.00 UGI

Ratings | Area | Owner | Zone | Inter-area Transfer | Voltage Droop | Impedance Correction Table | Machine Capabil

Buses and Equipment | Branch | Node-Breaker | Other | Time Series Power Flow

Output Bar

Warning: Sum of the desired interchanges (265.0) is not 0.0 MW

AREAS NOT MEETING DESIRED INTERCHANGE TOLERANCE:
X---- AREA -----X X-- INTERCHANGE --X
X-- NAME --X ACTUAL DESIRED TOLERANCE
347 TVA -608.5 -344.0 5.0

Progress | Alerts/Warnings

MODELING DATA

INTERCHANGE AND RESOURCE RULES

1. Prior to the creation of each trial in the series, all transactions and interchange schedules shall conform to the template and be agreed to by the relevant Regional Data Coordinators in order to be included. Interchange coordination must be performed to ensure generation resources are allocated to the appropriate modeling area and therefore, generation in each modeling area is accurately dispatched to meet the modeling area's assigned load plus losses. The interchange coordination should consider all transactions that have confirmed annual firm transmission service (for one year or longer, including consideration of rollover rights) along the entire path from source to sink and have a firm energy contract for the resource. The amount of interchange in any given year/season may not utilize the full capacity allowed under the transmission service or energy contract. The amount of interchange for a year/season should represent the expected and agreed upon firm capacity expected to serve load. For clarity and understanding, the table should include information identifying the source generation and the associated transmission service request numbers. It is important that the area where generation resources are expected to be sinking verify that the transfer is properly modeled to ensure the area's load will be served reliably. Omission of such firm transfers can create both transmission system reliability concerns, as well as

MODELING DATA

INTERCHANGE AND RESOURCE RULES – CONTD.

resource planning issues. Transmission system reliability concerns are created because the models, when used for evaluation of transmission service requests and planning studies, would not contain the flows associated with these firm transfers that are expected to occur in real time. Resource planning issues, such as double counting of resources and incorrect utilization or dispatch priority of generation, may also not be recognized.

If the existing and future resources with a signed interconnection agreement within a local Balancing Authority (BA) area and firm transactions from neighboring BA areas are insufficient to serve customer load, the preferred modeling practice is to coordinate non-firm transactions between BA areas. If coordination of non-firm transactions is not achieved, future generation resources which do not have signed interconnection agreements may be modeled in the Long-Term horizon.

Generation resources and transmission service are frequently not contracted for the entire ten years that the models are developed for. Coordination of interchange for these cases will require some judgment because all of the required elements (generation contract, source to sink transmission service) may not be available. Information provided by Distribution Provider's resource forecasts and plans, rollover/renewal of transmission service, and duration of energy contracts should be considered when interchange coordination, particularly in the out-year cases, is being performed.

Southeastern Regional
TRANSMISSION PLANNING

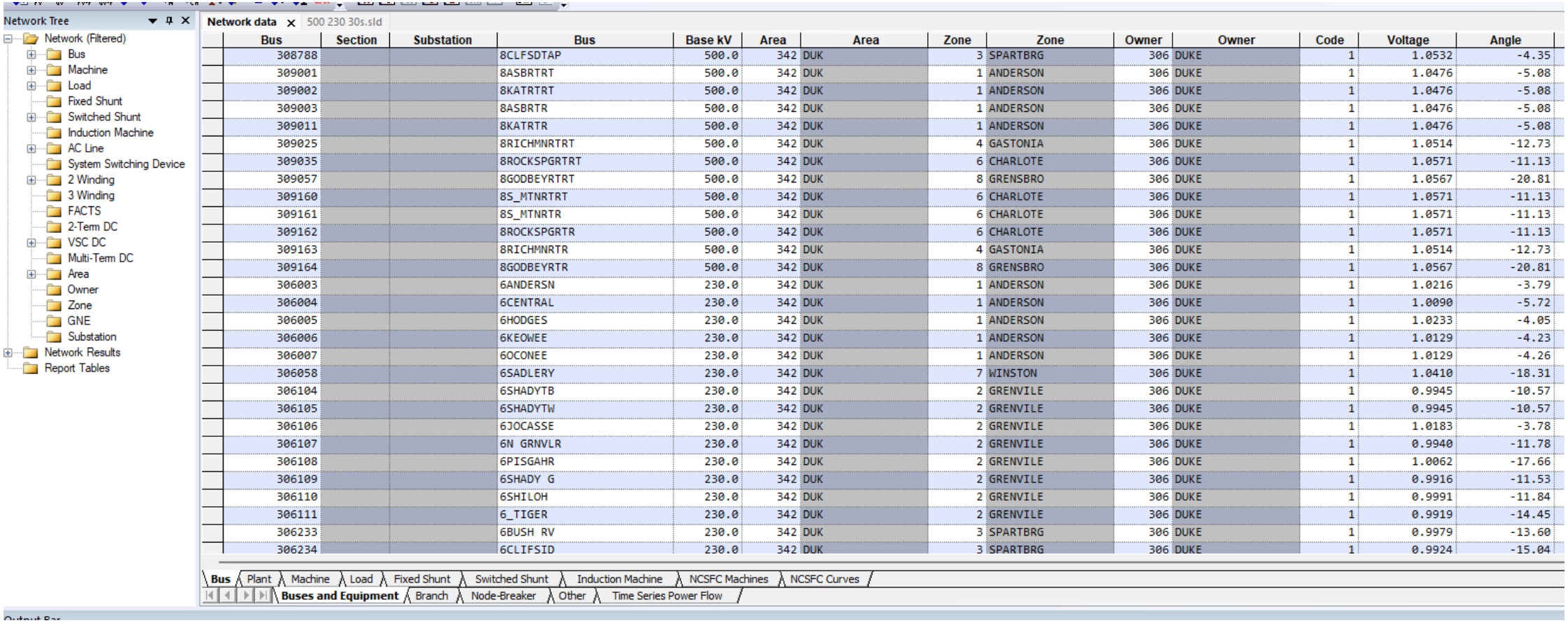
MODELING DATA

BUS DATA
LOAD DATA
FIXED SHUNT DATA
GENERATOR DATA
BRANCH DATA
SYSTEM SWITCHING DEVICE DATA
TRANSFORMER DATA
AREA DATA
TWO-TERMINAL DC DATA
VSC DC LINE DAT
IMPEDANCE CORRECTION DATA
MULTI-TERMINAL DC DATA
MULTI-SECTIONAL LINE DATA
ZONE DATA
INTER-AREA TRANSFER DATA
OWNER DATA
FACTS DEVICE DATA
SWITCHED SHUNT DATA
GNE DATA
INDUCTION MOTOR DATA
SUBSTATION DATA

Southeastern Regional TRANSMISSION PLANNING

MODELING DATA

BUS DATA

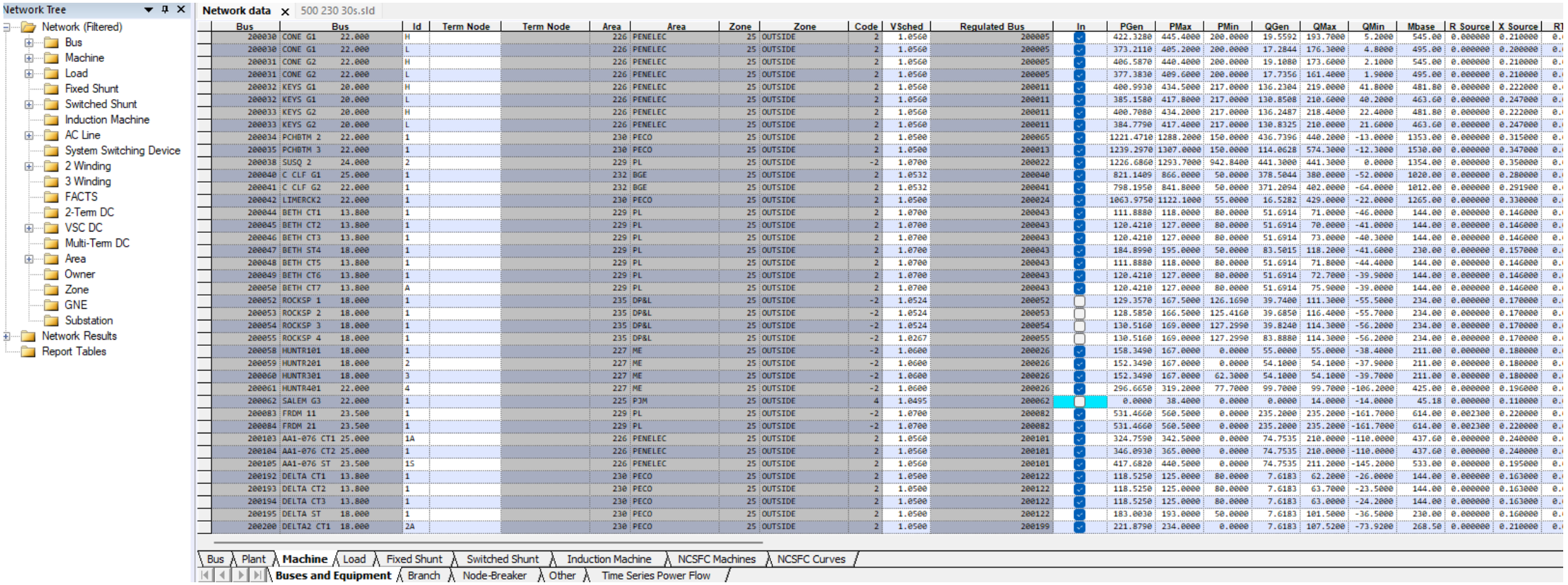


Bus	Section	Substation	Bus	Base kV	Area	Area	Zone	Zone	Owner	Owner	Code	Voltage	Angle
308788			8CLFSDTAP	500.0	342	DUK	3	SPARTBRG	306	DUKE	1	1.0532	-4.35
309001			8ASBRTRT	500.0	342	DUK	1	ANDERSON	306	DUKE	1	1.0476	-5.08
309002			8KATRTRT	500.0	342	DUK	1	ANDERSON	306	DUKE	1	1.0476	-5.08
309003			8ASBRTR	500.0	342	DUK	1	ANDERSON	306	DUKE	1	1.0476	-5.08
309011			8KATRTR	500.0	342	DUK	1	ANDERSON	306	DUKE	1	1.0476	-5.08
309025			8RICHMNRTRT	500.0	342	DUK	4	GASTONIA	306	DUKE	1	1.0514	-12.73
309035			8ROCKSPGRTRT	500.0	342	DUK	6	CHARLOTE	306	DUKE	1	1.0571	-11.13
309057			8GODBEYRTRT	500.0	342	DUK	8	GRENSBRO	306	DUKE	1	1.0567	-20.81
309160			8S_MTNRTRT	500.0	342	DUK	6	CHARLOTE	306	DUKE	1	1.0571	-11.13
309161			8S_MTNRTR	500.0	342	DUK	6	CHARLOTE	306	DUKE	1	1.0571	-11.13
309162			8ROCKSPGRTR	500.0	342	DUK	6	CHARLOTE	306	DUKE	1	1.0571	-11.13
309163			8RICHMNRTR	500.0	342	DUK	4	GASTONIA	306	DUKE	1	1.0514	-12.73
309164			8GODBEYRTR	500.0	342	DUK	8	GRENSBRO	306	DUKE	1	1.0567	-20.81
306003			6ANDERSN	230.0	342	DUK	1	ANDERSON	306	DUKE	1	1.0216	-3.79
306004			6CENTRAL	230.0	342	DUK	1	ANDERSON	306	DUKE	1	1.0090	-5.72
306005			6HODGES	230.0	342	DUK	1	ANDERSON	306	DUKE	1	1.0233	-4.05
306006			6KEOWEE	230.0	342	DUK	1	ANDERSON	306	DUKE	1	1.0129	-4.23
306007			6OCONEE	230.0	342	DUK	1	ANDERSON	306	DUKE	1	1.0129	-4.26
306058			6SADLERY	230.0	342	DUK	7	WINSTON	306	DUKE	1	1.0410	-18.31
306104			6SHADYTB	230.0	342	DUK	2	GRENVILE	306	DUKE	1	0.9945	-10.57
306105			6SHADYTW	230.0	342	DUK	2	GRENVILE	306	DUKE	1	0.9945	-10.57
306106			6JOCASSE	230.0	342	DUK	2	GRENVILE	306	DUKE	1	1.0183	-3.78
306107			6N GRNVLR	230.0	342	DUK	2	GRENVILE	306	DUKE	1	0.9940	-11.78
306108			6PISGAHR	230.0	342	DUK	2	GRENVILE	306	DUKE	1	1.0062	-17.66
306109			6SHADY G	230.0	342	DUK	2	GRENVILE	306	DUKE	1	0.9916	-11.53
306110			6SHILOH	230.0	342	DUK	2	GRENVILE	306	DUKE	1	0.9991	-11.84
306111			6_TIGER	230.0	342	DUK	2	GRENVILE	306	DUKE	1	0.9919	-14.45
306233			6BUSH RV	230.0	342	DUK	3	SPARTBRG	306	DUKE	1	0.9979	-13.60
306234			6CLIFSID	230.0	342	DUK	3	SPARTBRG	306	DUKE	1	0.9924	-15.04

Southeastern Regional TRANSMISSION PLANNING

MODELING DATA

GENERATOR DATA

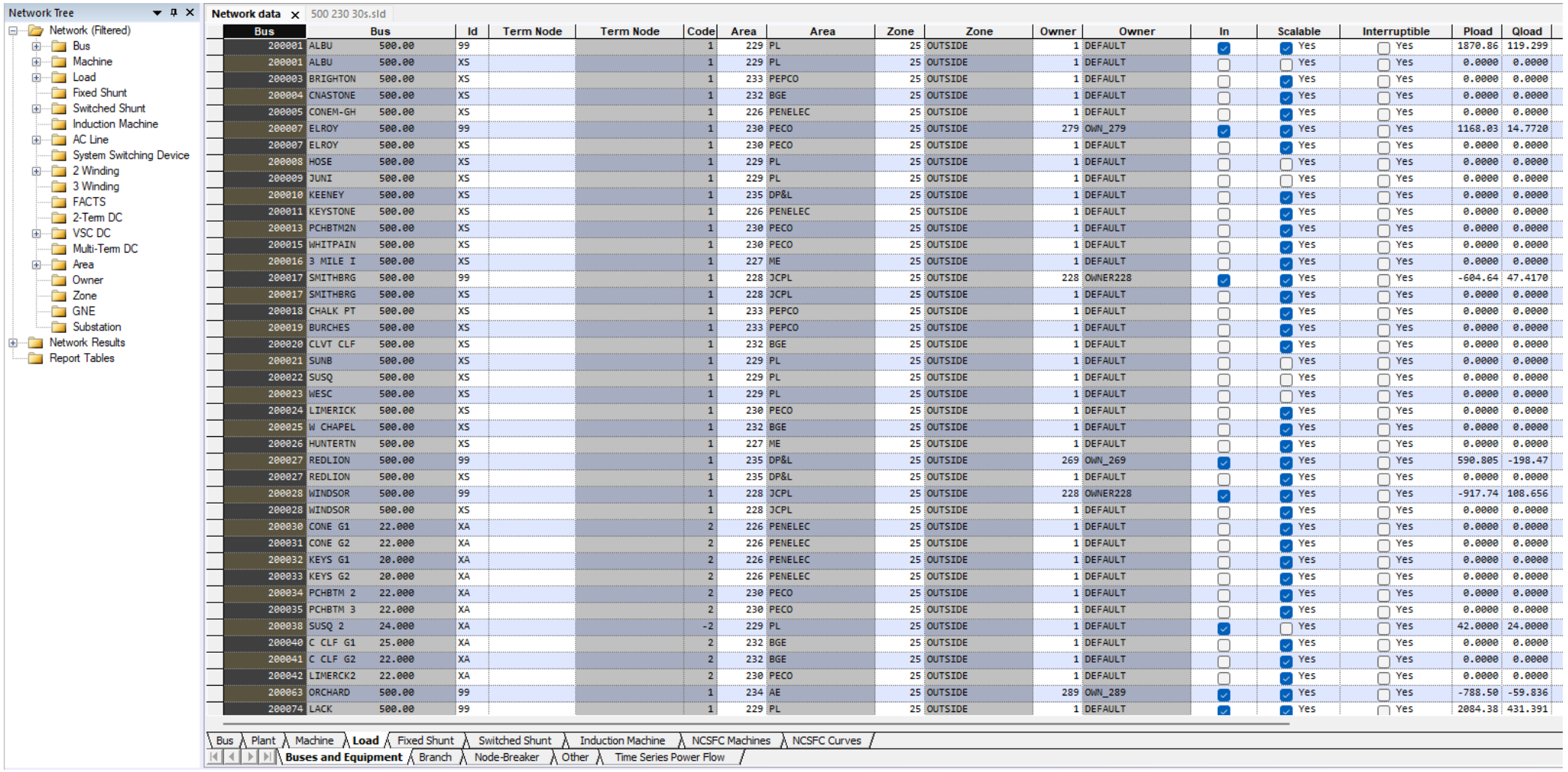


Bus	Bus	Id	Term Node	Term Node	Area	Area	Zone	Zone	Code	VSched	Regulated Bus	In	PGen	PMax	PMin	QGen	QMax	QMin	Mbase	R Source	X Source	RT
200030	CONE G1 22.000	H			226	PENELEC	25	OUTSIDE	2	1.0560	200005	☑	422.3280	445.4000	200.0000	19.5592	193.7000	5.2000	545.00	0.000000	0.210000	0.
200030	CONE G1 22.000	L			226	PENELEC	25	OUTSIDE	2	1.0560	200005	☑	373.2110	405.2000	200.0000	17.2844	176.3000	4.8000	495.00	0.000000	0.200000	0.
200031	CONE G2 22.000	H			226	PENELEC	25	OUTSIDE	2	1.0560	200005	☑	406.5870	440.4000	200.0000	19.1080	173.6000	2.1000	545.00	0.000000	0.210000	0.
200031	CONE G2 22.000	L			226	PENELEC	25	OUTSIDE	2	1.0560	200005	☑	377.3830	409.6000	200.0000	17.7356	161.4000	1.9000	495.00	0.000000	0.210000	0.
200032	KEYS G1 20.000	H			226	PENELEC	25	OUTSIDE	2	1.0560	200011	☑	400.9930	434.5000	217.0000	136.2304	219.0000	41.8000	481.80	0.000000	0.222000	0.
200032	KEYS G1 20.000	L			226	PENELEC	25	OUTSIDE	2	1.0560	200011	☑	385.1580	417.8000	217.0000	130.8508	210.6000	40.2000	463.60	0.000000	0.247000	0.
200033	KEYS G2 20.000	H			226	PENELEC	25	OUTSIDE	2	1.0560	200011	☑	400.7080	434.2000	217.0000	136.2487	218.4000	22.4000	481.80	0.000000	0.222000	0.
200033	KEYS G2 20.000	L			226	PENELEC	25	OUTSIDE	2	1.0560	200011	☑	384.7790	417.4000	217.0000	130.8325	210.0000	21.6000	463.60	0.000000	0.247000	0.
200034	PCHBTM 2 22.000	1			230	PECO	25	OUTSIDE	2	1.0500	200065	☑	1221.4710	1288.2000	150.0000	436.7396	440.2000	-13.0000	1353.00	0.000000	0.315000	0.
200035	PCHBTM 3 22.000	1			230	PECO	25	OUTSIDE	2	1.0500	200013	☑	1239.2970	1307.0000	150.0000	114.0628	574.3000	-12.3000	1530.00	0.000000	0.347000	0.
200038	SUSQ 2 24.000	2			229	PL	25	OUTSIDE	-2	1.0700	200022	☑	1226.6860	1293.7000	942.8400	441.3000	441.3000	0.0000	1354.00	0.000000	0.350000	0.
200040	C CLF G1 25.000	1			232	BGE	25	OUTSIDE	2	1.0532	200040	☑	821.1409	866.0000	50.0000	378.5044	380.0000	-52.0000	1020.00	0.000000	0.280000	0.
200041	C CLF G2 22.000	1			232	BGE	25	OUTSIDE	2	1.0532	200041	☑	798.1950	841.8000	50.0000	371.2094	402.0000	-64.0000	1012.00	0.000000	0.291900	0.
200042	LIMERCK2 22.000	1			230	PECO	25	OUTSIDE	2	1.0500	200024	☑	1063.9750	1122.1000	55.0000	16.5282	429.0000	-22.0000	1265.00	0.000000	0.330000	0.
200044	BETH CT1 13.800	1			229	PL	25	OUTSIDE	2	1.0700	200043	☑	111.8880	118.0000	80.0000	51.6914	71.0000	-46.0000	144.00	0.000000	0.146000	0.
200045	BETH CT2 13.800	1			229	PL	25	OUTSIDE	2	1.0700	200043	☑	120.4210	127.0000	80.0000	51.6914	70.0000	-41.0000	144.00	0.000000	0.146000	0.
200046	BETH CT3 13.800	1			229	PL	25	OUTSIDE	2	1.0700	200043	☑	120.4210	127.0000	80.0000	51.6914	73.0000	-40.3000	144.00	0.000000	0.146000	0.
200047	BETH ST4 18.000	1			229	PL	25	OUTSIDE	2	1.0700	200043	☑	184.8990	195.0000	50.0000	83.5015	118.2000	-41.6000	230.00	0.000000	0.157000	0.
200048	BETH CT5 13.800	1			229	PL	25	OUTSIDE	2	1.0700	200043	☑	111.8880	118.0000	80.0000	51.6914	71.8000	-44.4000	144.00	0.000000	0.146000	0.
200049	BETH CT6 13.800	1			229	PL	25	OUTSIDE	2	1.0700	200043	☑	120.4210	127.0000	80.0000	51.6914	72.7000	-39.9000	144.00	0.000000	0.146000	0.
200050	BETH CT7 13.800	A			229	PL	25	OUTSIDE	2	1.0700	200043	☑	120.4210	127.0000	80.0000	51.6914	75.9000	-39.0000	144.00	0.000000	0.146000	0.
200052	ROCKSP 1 18.000	1			235	DP&L	25	OUTSIDE	-2	1.0524	200052	☐	129.3570	167.5000	126.1690	39.7400	111.3000	-55.5000	234.00	0.000000	0.170000	0.
200053	ROCKSP 2 18.000	1			235	DP&L	25	OUTSIDE	-2	1.0524	200053	☐	128.5850	166.5000	125.4160	39.6850	116.4000	-55.7000	234.00	0.000000	0.170000	0.
200054	ROCKSP 3 18.000	1			235	DP&L	25	OUTSIDE	-2	1.0524	200054	☐	130.5160	169.0000	127.2990	39.8240	114.3000	-56.2000	234.00	0.000000	0.170000	0.
200055	ROCKSP 4 18.000	1			235	DP&L	25	OUTSIDE	-2	1.0267	200055	☐	130.5160	169.0000	127.2990	83.8880	114.3000	-56.2000	234.00	0.000000	0.170000	0.
200058	HUNTR101 18.000	1			227	ME	25	OUTSIDE	-2	1.0600	200026	☑	158.3490	167.0000	0.0000	55.0000	55.0000	-38.4000	211.00	0.000000	0.180000	0.
200059	HUNTR201 18.000	2			227	ME	25	OUTSIDE	-2	1.0600	200026	☑	152.3490	167.0000	0.0000	54.1000	54.1000	-37.9000	211.00	0.000000	0.180000	0.
200060	HUNTR301 18.000	3			227	ME	25	OUTSIDE	-2	1.0600	200026	☑	152.3490	167.0000	62.3000	54.1000	54.1000	-39.7000	211.00	0.000000	0.180000	0.
200061	HUNTR401 22.000	4			227	ME	25	OUTSIDE	-2	1.0600	200026	☑	296.6650	319.2000	77.7000	99.7000	99.7000	-106.2000	425.00	0.000000	0.196000	0.
200062	SALEM G3 22.000	1			225	PJM	25	OUTSIDE	4	1.0495	200062	☐	0.0000	38.4000	0.0000	0.0000	14.0000	-14.0000	45.18	0.000000	0.110000	0.
200083	FRDM 11 23.500	1			229	PL	25	OUTSIDE	-2	1.0700	200082	☑	531.4660	560.5000	0.0000	235.2000	235.2000	-161.7000	614.00	0.002300	0.220000	0.
200084	FRDM 21 23.500	1			229	PL	25	OUTSIDE	-2	1.0700	200082	☑	531.4660	560.5000	0.0000	235.2000	235.2000	-161.7000	614.00	0.002300	0.220000	0.
200103	AA1-076 CT1 25.000	1A			226	PENELEC	25	OUTSIDE	2	1.0560	200101	☑	324.7590	342.5000	0.0000	74.7535	210.0000	-110.0000	437.60	0.000000	0.240000	0.
200104	AA1-076 CT2 25.000	1			226	PENELEC	25	OUTSIDE	2	1.0560	200101	☑	346.0930	365.0000	0.0000	74.7535	210.0000	-110.0000	437.60	0.000000	0.240000	0.
200105	AA1-076 ST 23.500	1S			226	PENELEC	25	OUTSIDE	2	1.0560	200101	☑	417.6820	440.5000	0.0000	74.7535	211.2000	-145.2000	533.00	0.000000	0.195000	0.
200192	DELTA CT1 13.800	1			230	PECO	25	OUTSIDE	2	1.0500	200122	☑	118.5250	125.0000	80.0000	7.6183	62.2000	-26.0000	144.00	0.000000	0.163000	0.
200193	DELTA CT2 13.800	1			230	PECO	25	OUTSIDE	2	1.0500	200122	☑	118.5250	125.0000	80.0000	7.6183	63.7000	-23.5000	144.00	0.000000	0.163000	0.
200194	DELTA CT3 13.800	1			230	PECO	25	OUTSIDE	2	1.0500	200122	☑	118.5250	125.0000	80.0000	7.6183	63.0000	-24.2000	144.00	0.000000	0.163000	0.
200195	DELTA ST 18.000	1			230	PECO	25	OUTSIDE	2	1.0500	200122	☑	183.0030	193.0000	50.0000	7.6183	101.5000	-36.5000	230.00	0.000000	0.160000	0.
200200	DELTA2 CT1 18.000	2A			230	PECO	25	OUTSIDE	2	1.0500	200199	☑	221.8790	234.0000	0.0000	7.6183	107.5200	-73.9200	268.50	0.000000	0.210000	0.

Southeastern Regional TRANSMISSION PLANNING

MODELING DATA

LOAD DATA

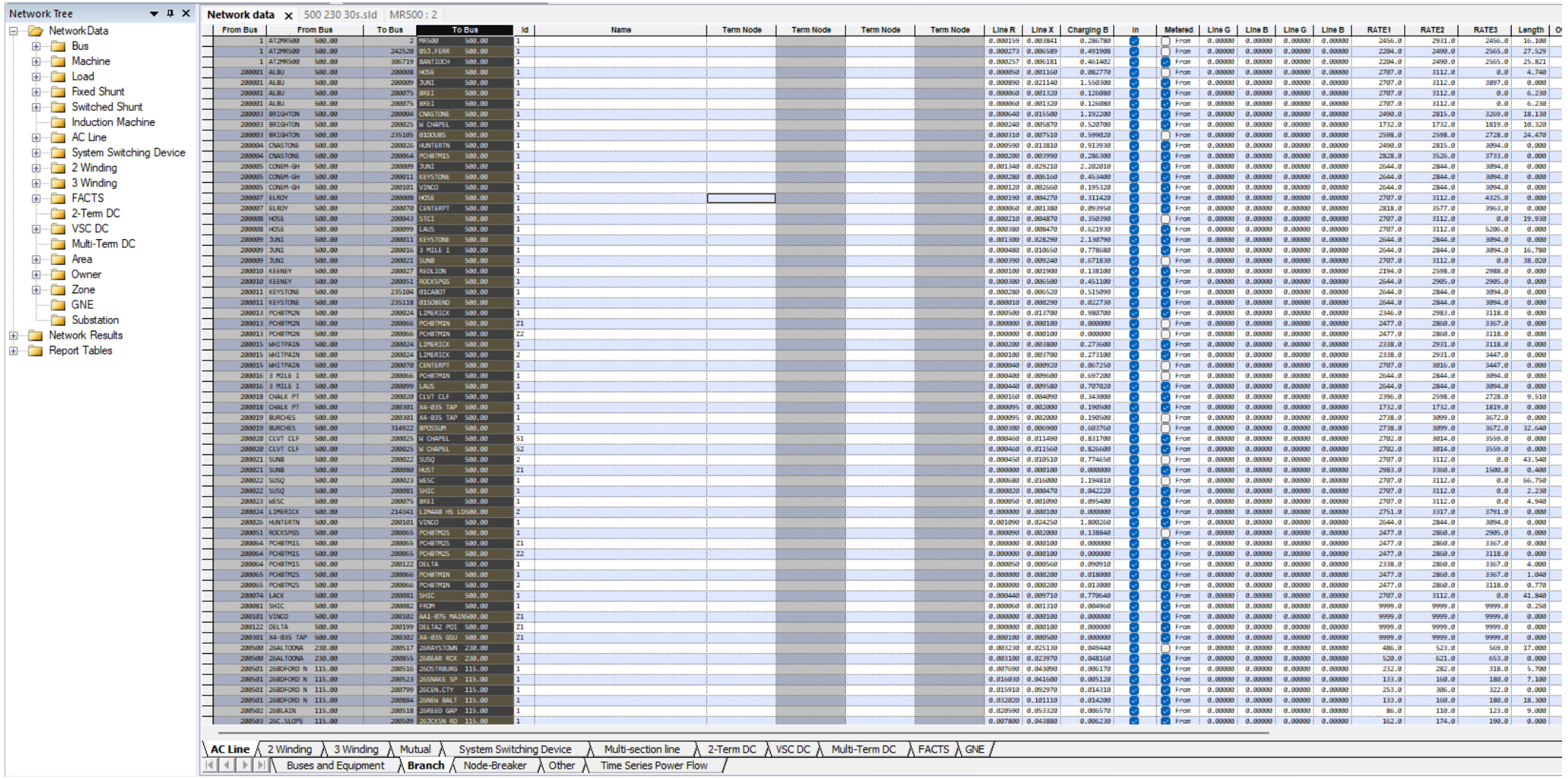


Bus	Bus		Id	Term Node	Term Node	Code	Area	Area	Zone	Zone	Owner	Owner	In	Scalable	Interruptible	Pload	Qload
200001	ALBU	500.00	99			1	229	PL	25	OUTSIDE	1	DEFAULT	☑	☑ Yes	☐ Yes	1870.86	119.299
200001	ALBU	500.00	XS			1	229	PL	25	OUTSIDE	1	DEFAULT	☐	☐ Yes	☐ Yes	0.0000	0.0000
200003	BRIGHTON	500.00	XS			1	233	PEPCO	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200004	CNASTONE	500.00	XS			1	232	BGE	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200005	CONEM-GH	500.00	XS			1	226	PENELEC	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200007	ELROY	500.00	99			1	230	PECO	25	OUTSIDE	279	OWN_279	☑	☑ Yes	☐ Yes	1168.03	14.7720
200007	ELROY	500.00	XS			1	230	PECO	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200008	HOSE	500.00	XS			1	229	PL	25	OUTSIDE	1	DEFAULT	☐	☐ Yes	☐ Yes	0.0000	0.0000
200009	JUNI	500.00	XS			1	229	PL	25	OUTSIDE	1	DEFAULT	☐	☐ Yes	☐ Yes	0.0000	0.0000
200010	KEENEY	500.00	XS			1	235	DP&L	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200011	KEYSTONE	500.00	XS			1	226	PENELEC	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200013	PCHBTM2N	500.00	XS			1	230	PECO	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200015	WHITPAIN	500.00	XS			1	230	PECO	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200016	3 MILE I	500.00	XS			1	227	ME	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200017	SMITHBRG	500.00	99			1	228	JCPL	25	OUTSIDE	228	OWNER228	☑	☑ Yes	☐ Yes	-604.64	47.4170
200017	SMITHBRG	500.00	XS			1	228	JCPL	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200018	CHALK PT	500.00	XS			1	233	PEPCO	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200019	BURCHES	500.00	XS			1	233	PEPCO	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200020	CLVT CLF	500.00	XS			1	232	BGE	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200021	SUNB	500.00	XS			1	229	PL	25	OUTSIDE	1	DEFAULT	☐	☐ Yes	☐ Yes	0.0000	0.0000
200022	SUSQ	500.00	XS			1	229	PL	25	OUTSIDE	1	DEFAULT	☐	☐ Yes	☐ Yes	0.0000	0.0000
200023	WESC	500.00	XS			1	229	PL	25	OUTSIDE	1	DEFAULT	☐	☐ Yes	☐ Yes	0.0000	0.0000
200024	LIMERICK	500.00	XS			1	230	PECO	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200025	W CHAPEL	500.00	XS			1	232	BGE	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200026	HUNTERTN	500.00	XS			1	227	ME	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200027	REDLION	500.00	99			1	235	DP&L	25	OUTSIDE	269	OWN_269	☑	☑ Yes	☐ Yes	590.805	-198.47
200027	REDLION	500.00	XS			1	235	DP&L	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200028	WINDSOR	500.00	99			1	228	JCPL	25	OUTSIDE	228	OWNER228	☑	☑ Yes	☐ Yes	-917.74	108.656
200028	WINDSOR	500.00	XS			1	228	JCPL	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200030	CONE G1	22.000	XA			2	226	PENELEC	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200031	CONE G2	22.000	XA			2	226	PENELEC	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200032	KEYS G1	20.000	XA			2	226	PENELEC	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200033	KEYS G2	20.000	XA			2	226	PENELEC	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200034	PCHBTM 2	22.000	XA			2	230	PECO	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200035	PCHBTM 3	22.000	XA			2	230	PECO	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200038	SUSQ 2	24.000	XA			-2	229	PL	25	OUTSIDE	1	DEFAULT	☑	☐ Yes	☐ Yes	42.0000	24.0000
200040	C CLF G1	25.000	XA			2	232	BGE	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200041	C CLF G2	22.000	XA			2	232	BGE	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200042	LIMERCK2	22.000	XA			2	230	PECO	25	OUTSIDE	1	DEFAULT	☐	☑ Yes	☐ Yes	0.0000	0.0000
200063	ORCHARD	500.00	99			1	234	AE	25	OUTSIDE	289	OWN_289	☑	☑ Yes	☐ Yes	-788.50	-59.836
200074	LACK	500.00	99			1	229	PL	25	OUTSIDE	1	DEFAULT	☑	☑ Yes	☐ Yes	2084.38	431.391

Southeastern Regional TRANSMISSION PLANNING

MODELING DATA

BRANCH DATA



Southeastern Regional TRANSMISSION PLANNING

DATA CHECKS

7.3. Power Flow Data Checks

The MMWG has established a set of Power Flow Data Checks, defined in the table below. The checks are implemented by the MMWG Coordinator in a data checking program which is capable of identifying all errors according to the criteria given in this table. All finalized MMWG power flow models shall be free of all such errors. Only specific exceptions from the table below are allowed and shall be documented unless listed as informational only.

Reference Appendix IX for Process Flowcharts.

Name	Data Checked	Conditions Not Allowed	Exceptions Allowed	Comment
RAW Read Warning	All Data	Warnings generated by PSS®E activity READ	Documented Exceptions Allowed	When reading in a case in RAW format, PSS®E performs certain checks to highlight suspect data that should be reviewed and corrected.
Duplicate Bus Names	Buses	Two or more buses in the same area with identical 12-char NAME and 4-char BASKV	No Exceptions	
Bus Number Out of Range	Buses	Bus number not in MMWG range	Bus numbers must follow table in Appendix IV. Documented and valid exceptions are allowed.	The MMWG defines a range of bus numbers for each Regional Data Coordinator in the interconnection. All buses must have a number in the range of the appropriate Regional Data Coordinator.
Owner Out of Range	Buses in Regional Data Coordinator	Bus number not in Regional Data Coordinator owner number range	Owner numbers must follow table in Appendix IV. Documented and valid exceptions are allowed.	Regional Data Coordinator is defined by a range of bus numbers. Owner number ranges are assigned to the Regional Data Coordinator by the MMWG.
Zone Out of Range	Buses in Regional Data Coordinator	Zone number not in Regional Data Coordinator zone number range	Zone numbers must follow table in Appendix IV. Documented and valid exceptions are allowed.	Regional Data Coordinator is defined by a range of bus numbers. Zone Number ranges are assigned to the Regional Data Coordinator by the MMWG.
Bus Voltage	Buses $\geq$ 100 kV;	VM > 1.1 p.u., VM < 0.9 p.u.	Documented buses normally operated at voltages higher or lower than their BASKV. Zones 1101 & 1102 in Area 103 operate at higher voltages and are checked for voltages greater than 260 kV for the 230 kV system and 132 kV for the 115 kV system.	
Gen Terminal Bus Voltage	All online Gen Terminal Buses	VM > 1.05 p.u., VM < 0.95 p.u.	Documented buses normally operated at voltages higher or lower than their BASKV.	

DATA CHECKS

ERAG Eastern Interconnection Reliability Assessment Group

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Name	Data Checked	Conditions Not Allowed	Exceptions Allowed	Comment
Blank Voltage Fields	Buses	Blank BASKV field	No Exceptions	
Machines on Code 1 Buses	Buses; Generators	Generator at bus with IDE = 1	No Exceptions	
Code 2 Buses	Buses; Generators	Bus with IDE of 2 and no generator at the bus	No Exceptions	
Unrealistic PMAX and PMIN	Generators Including off-line generators	PMAX < PMIN, PMAX > 2000, PMIN < -1000	No Exceptions	Identifies machines with unreasonable PMAX or PMIN
Unrealistic QMAX and QMIN	Generators Including off-line generators	QMAX < QMIN, QMAX > 1000, QMAX < -1000	No Exceptions	Identifies machines with unreasonable QMAX or QMIN
PGEN Outside Range	Generators with STAT = 1 & Bus IDE=2 or 3	PGEN > PMAX, PGEN < PMIN	No Exceptions	Identifies machines operating outside of their limits
Generator Rsource / Xsource Ratio	Generators with PMAX > 0	$(R_{source} / X_{source}) > 1.0$	$X_{source} = 9999$, Documented Exceptions	
Gen Reactive Limit Power Factor	Generators with PMAX > 0 Mbase > 20 MVA	Power factor outside +0.80 (producing Vars) and -0.85 (consuming Vars)	Documented Exceptions	Generator reactive power limits (Qmax, Qmin) should have a reasonable power factor compared with maximum active power (Pmax)
Pos Seq TX Circulating Current	All Parallel XFMRs in case, T1, T, … Tn	For each pair of transformers, Tj and Tk, current cannot be in reverse directions. If Amps in Tj > 0, Amps in Tk cannot be < 0 and vice versa.	Documented Exceptions	
Poor Load Power Factor	Positive MW Loads > 2 MVA	(Pload / MVAload) < 0.5	Documented exceptions for eq and station service loads	
MBASE	Generators	MBASE = 100; MBASE ≤ PMAX	Winter Cases; Documented Exceptions	
Non-positive RMPCT	Generators	RMPCT ≤ 0	No Exceptions	RMPCT is the percent of the total Mvar required to hold the voltage at the bus controlled by the generator bus that are to be contributed by the generation at that bus. This value must be positive.
GTAP Out Of Range	Generators	GTAP > 1.1, GTAP < 0.9	Only Exceptions allowed: VSC Modeled as Generator	GTAP is the step up transformer off-nominal turns ratio.

DATA CHECKS

ERAG Eastern Interconnection Reliability Assessment Group

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Name	Data Checked	Conditions Not Allowed	Exceptions Allowed	Comment
Node Voltage Regulation	Switched Shunts; Generators; Transformers with CODI = 1	Regulated bus more than one bus away from regulating bus	Three winding transformers modeled with star-point bus (unconverted); Zero impedance lines; Wind farms, solar farms, and battery energy storage; Voltage controlling devices radially connected to the bus being controlled.	Regulation of a distant bus can cause extra power flow solution iterations.
CNTB Errors	Switched Shunts; Generators; Transformers with CODI = 1	Conflicting voltage objectives	Documented SMES units	This is performed using the activity CNTB which tabulates the voltage set points and desired voltage bands of voltage controlling equipment. It also performs certain checks on voltage controlling buses that are not themselves voltage controlled buses and includes those with suspect or conflicting voltage schedules or other errors.
Small Voltage Band Shunts	Switched Shunts in Control Mode 1	VSWHI – VSWLO < 0.0005	No Exceptions	A small voltage band can cause unnecessary switched shunt toggling and may prevent power flow convergence.
Missing Block 1 Steps	Switched Shunts	Missing Block 1 steps	No Exceptions	
Continuous Control Voltage Mode Band Mismatch	Switched Shunts	Control Mode 2, Vhi not equal to Vlow	No Exceptions	If condition not satisfied, the average of Vhi and Vlo will be selected as the target voltage.
Transformer MAX below MIN	2-Winding Transformers with CODI ≠ 0	VMA1 ≤ VMI1, RMA1 ≤ RMI1	No Exceptions	
Transformer Default R	2-Winding Transformers with CODI ≠ 0	RMA1 = 1.5 and RMA2 = 0.51	No Exceptions	Checks for PSS®E default values.
Transformer Default V	2-Winding Transformers with CODI ≠ 0	VMA1 = 1.5 and VMA2 = 0.51	No Exceptions	Checks for PSS®E default values.
Small Voltage Band Transformer	All Transformers with CODI = 1	VMA – VMI < 1.95 × Step Size[2]	Document Exceptions	A small voltage band can cause unnecessary transformer tap toggling and extra power flow solution iterations[3].
Max or Min at 0	2-Winding Transformers with CODI ≠ 0	RMA1 = 0, RMI1 = 0, VMA1 = 0, VMI1 = 0	No Exceptions	
High Resistance Branches	Branches ≥ 100kV[4]; 2-Winding Transformers ≥ 100kV[4]	Branches: R > |X| or X/R ratio > 100 Transformers: R1-2 > |X1-2| or X/R ratio = 5 - 100	Document Exceptions Exception of R = 0 and R or X < 0	Fast-decoupled power flow solver is sensitive to the ratio R/X.

DATA CHECKS

ERAG Eastern Interconnection Reliability Assessment Group

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Name	Data Checked	Conditions Not Allowed	Exceptions Allowed	Comment
Area Slack Machine	Online area slack machine	Areas without define area slack machine online	Only Exceptions allowed: net zero areas	All areas must have an online slack machine.
Rating Errors	All transformers and branches	RATEB/RATE2 < RATEA/RATE1, RATEA/RATE1 = 0, RATEB/RATE2 = 0 RATEB/RATE2 >= 3 X RATEA/RATE1 (only for 69kV+)	Exception for branches with CKT = '99'/'EQ', zero impedance branches, and verified RATEB/RATE2 >= 3X RATEA/RATE1	The MMWG defines RATEA/RATE1 as Normal and RATEB/RATE2 as Emergency.
3 Winding Rating Errors	3-Winding Transformers[3]	RATEB/RATE2 < RATEA/RATE1, RATEA/RATE1 = 0, RATEB/RATE2 = 0 RATEB/RATE2 >= 3 X RATEA/RATE1 (only for 69kV+)	No Exceptions	The MMWG defines RATEA/RATE1 as Normal and RATEB/RATE2 as Emergency.
Branch Overloads	Branches ≥ 69kV[1]; Transformers ≥ 69kV[1, 3] All GSU's	Branch loading above 100% of RATEA/RATE1	Exceptions allowed for 10 year cases only. Valid and documented GSU exceptions allowed.	Overloads in the Near-Term with no plans to correct are not allowed. Ten-year cases often contain branches or transformers that will be upgraded but no plans exist. Transformers checked for loading in MVA, non-transformer branches in current.
Zero Impedance ID	Zero impedance branch ID with default PSS®E R, X & B values.	Branch ID must start with 'Z'	No Exceptions	
Gen at reactive power limit	Gen with status = 1 Bus type code = 2, 3 Qmax > Qmin Mbase > 20 MVA	Qgen at Qmax or Qgen at Qmin	Documented Exceptions allowed	Review
Load Owner Number Out of Range	Loads Owner Numbers in Planning Coordinator	Owner number not in Planning Coordinator owner number range	Owner numbers must follow table in Appendix IV. Documented and valid exceptions are allowed.	Planning Coordinator is defined by a range of bus numbers. Owner Number ranges are assigned to the Planning Coordinator by the MMWG.
Generator Owner Number Out of Range	Generator Owner Numbers in Planning Coordinator	Owner number not in Planning Coordinator owner number range	Owner numbers must follow table in Appendix IV. Documented and valid exceptions are allowed.	Planning Coordinator is defined by a range of bus numbers. Owner Number ranges are assigned to the Planning Coordinator by the MMWG.
Branch Owner Number Out of Range	Branch Owner Numbers in Planning Coordinator	Owner number not in Planning Coordinator owner number range	Owner numbers must follow table in Appendix IV. Documented and valid exceptions are allowed.	Planning Coordinator is defined by a range of bus numbers. Owner Number ranges are assigned to the Planning Coordinator by the MMWG.
Load Zone Number Out of Range	Load Zone Numbers in Planning Coordinator	Load Zone number not in Planning Coordinator load zone number range	Load Zone numbers must follow table in Appendix IV. Documented and valid exceptions are allowed.	Planning Coordinator is defined by a range of bus numbers. Load Zone Number ranges are assigned to the Planning Coordinator by the MMWG.

[1] Refers to all two-winding transformers or branches connected to two buses with BASKV ≥ 69.

[2] The value of Step Size is calculated as:

If CW = 1: Step Size = [(RMA1 - RMI1) / WINDV2] / (NTP1 - 1)

If CW = 2: Step Size = {[(RMA1 / KV1) – (RMI1 / KV1)] / (WINDV2 / KV2)} / (NTAP - 1)

Southeastern Regional
TRANSMISSION PLANNING

MODEL CHANGES

```
/*  ADD 500 KV LINE FROM TAP ON ANTIOCH – JACKSON FERRY TO MITCHELL RIVER

BAT_LTAP,306719,242520,'1',0.484,1,'AT2MR500',500.0


BAT_BUS_DATA_4,2,0,1,1,1,1,0.0,1.0,0.0,1.1,0.9,1.1,0.9," "
BAT_BUS_CHNG_4,2,0,,,,,500.0,,,,,,,'MR500'

BAT_BRANCH_DATA_3,2,1,'1',1,2,306,0,0,0,0.000159,0.003841,0.286780,0.0,0.0,0.0,0.0,0.0,16.1,1.0,1
.0,1.0,1.0,2456,2931,2456,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0," "


BAT_TWO_WINDING_DATA_6,2,306716,'1',2,306716,306,0,0,0,159,0,306716,0,0,1,0,1,1,1,0.0002
6,0.02956,100.0,1.0,0.0,0.0,1.0,0.0,1.0,1.0,1.0,1.0,0.0,0.0,1.5,0.51,1.5,0.51,0.0,0.0,0.0,1519.0,151
9.0,1519.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,'MITCHELLRIVER500_230'," "

/* SOLVE CASE
BAT_FDNS,1,2,1,1,1,0,0,0
BAT_FDNS,1,2,1,1,1,0,0,0
```

Southeastern Regional
TRANSMISSION PLANNING

MODEL CHANGES

```
/*  ADD 500 KV LINE FROM TAP ON ANTIOCH – JACKSON FERRY TO MITCHELL RIVER

ACTIVITY? BAT_LTAP,306719,242520,'1',0.484,1,'AT2MR500',500.0

Tapping circuit "1" from bus 306719 [8ANTIOCH    500.00] to bus 242520 [05J.FERR
500.00]
Batch command complete.
:

ACTIVITY? BAT_BUS_DATA_4,2,0,1,1,1,1,0.0,1.0,0.0,1.1,0.9,1.1,0.9," "

Bus 2 [                ] added with default data
Batch command complete.
: BAT_BUS_CHNG_4,2,0,,,,,500.0,,,,,,,'MR500'

Power flow data changed for bus 2 [MR500       500.00]:
X--ORIGINAL--X  X-NEW VALUE--X  DATA ITEM
   0.00000        500.000      BASKV
"           "  "MR500       "  NAME
Batch command complete.
```

Southeastern Regional
TRANSMISSION PLANNING

MODEL CHANGES

ACTIVITY?
BAT_BRANCH_DATA_3,2,1,'1',1,2,306,0,0,0,0.000159,0.003841,0.286780,0.0,0.0,
0.0,0.0,16.1,1.0,1.0,1.0,1.0,2456,2931,2456,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0," "

Non-transformer branch ckt "1" from 2 [MR500 500.00] to 1 [AT2MR500 500.00] added. Power flow data items with non-default values:

X----------DEFAULT----------X	X----------ACTUAL----------X	DATA ITEM
1	306	O1
0.00000	0.159000E-03	R
0.100000E-03	0.384100E-02	X
0.00000	0.286780	B
0.00000	16.1000	LEN
0.00000	2456.00	RATE1
0.00000	2931.00	RATE2
0.00000	2456.00	RATE3

Batch command complete.

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TRANSMISSION PLANNING

MODEL CHANGES

ACTIVITY?
BAT_TWO_WINDING_DATA_6,2,306716,'1',2,306716,306,0,0,0,159,0,306716,0,0,1,0,1,1,1,0.00026,0.02956,100.0,1.0,0.0,0.0,1.0,0.0,1.0,1.0,1.0,1.0,0.0,0.0,1.5,0.51,1.5,0.51,0.0,0.0,0.0,1519.0,1519.0,1519.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,'MITCHELLRIVER500_230'," "

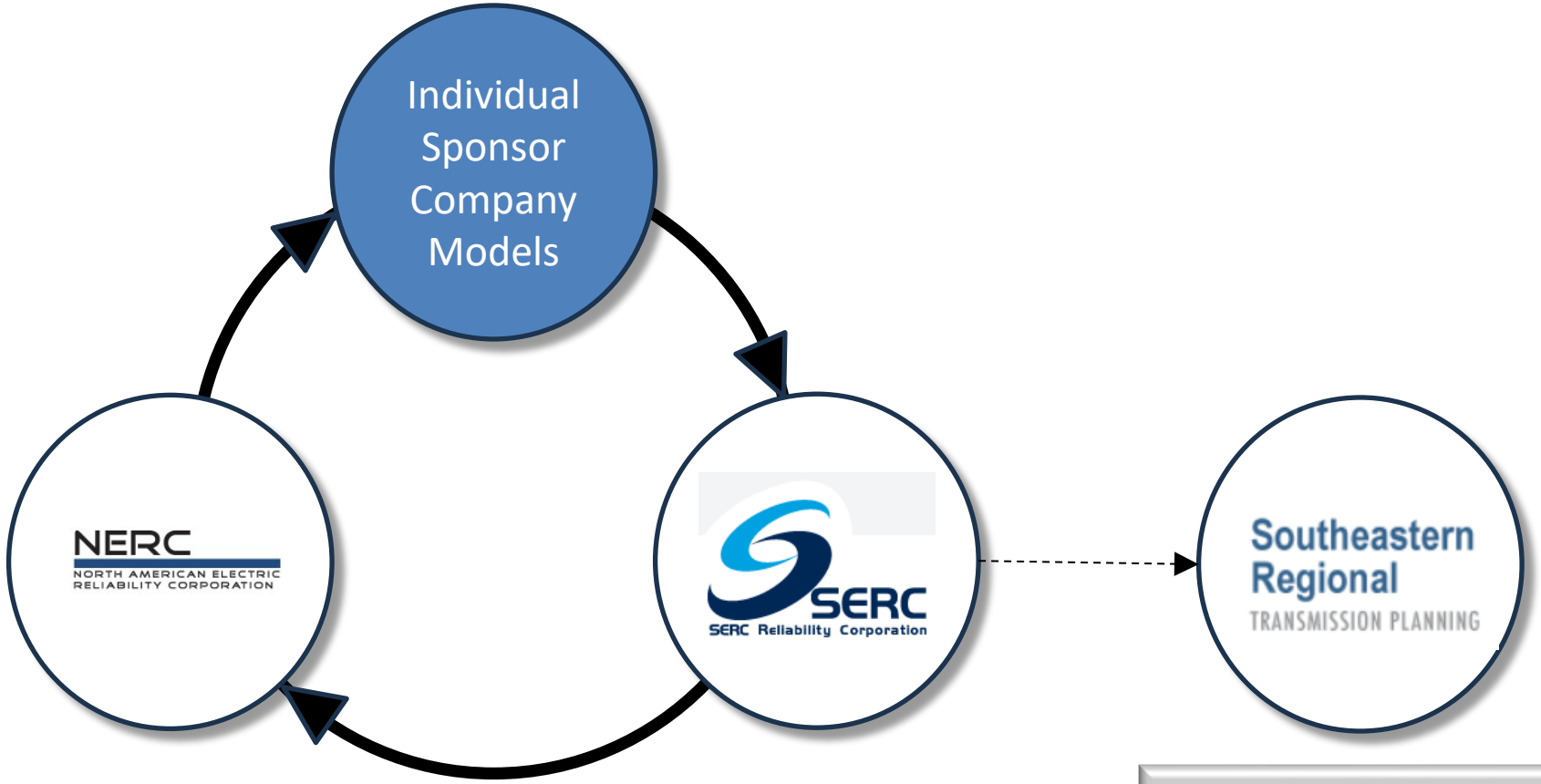
Messages for api TWO_WINDING_DATA_6
Messages for two-winding transformer circuit "1" from 2 [MR500 500.00] to 306716 [6MITCH R 230.00]: (005343)
Error: Invalid transformer status: 2; set to 1 (005346)

Two-winding transformer ckt "1" from 2 [MR500 500.00] to 306716 [6MITCH R 230.00] added. Power flow data items with non-default values:

X----------DEFAULT----------X	X----------ACTUAL----------X	DATA ITEM
2	306716	METBUS
1	306	O1
33	159	NTP1
2	306716	WN1BUS
0.00000	0.260000E-03	R1-2
0.100000E-03	0.295600E-01	X1-2
1.10000	1.50000	RMA1
0.900000	0.510000	RMI1
1.10000	1.50000	VMA1
0.900000	0.510000	VMI1
0.00000	1519.00	RATE1
0.00000	1519.00	RATE2
0.00000	1519.00	RATE3
" "	"MITCHELLRIVER500_230 "	NAME

Batch command completed

Model Building Cycle



MMWG_Procedural_Manual_v43.pdf (rfirst.org)

SERTP 2024 Model Development Training

Southeastern Regional
TRANSMISSION PLANNING

References and Further Information

- To learn more about Power Flow Modeling
  - NATF Power Flow Modeling Reference Document
  - Eastern Reliability Assessment Group – MMWG Manual (v43)
  - NERC MOD-032 Standard

QUESTIONS?

Alternatives Proposals Overview

(Bill Quaintance – Duke Energy)

Southeastern Regional TRANSMISSION PLANNING

2026 SERTP

Topics

Transmission Planning

Lines and Transformers, limiting elements

Basic Upgrades

Additional Upgrades

Alternative Solutions from Stakeholders

Order 1000 Paragraph 148:

- *Through the regional transmission planning process, public utility transmission providers will be required to evaluate, in consultation with stakeholders,* ***alternative transmission solutions*** *that might meet the needs of the transmission planning region more efficiently or cost-effectively than solutions identified by individual public utility transmission providers in their local transmission planning process.*

Two opportunities for stakeholder alternative solutions:

(1) To the extent that Stakeholders have transmission expansion plan/enhancement alternatives that they would like for the Sponsors to consider, the Stakeholders shall perform analysis prior to, and provide any such analysis at, the Preliminary Expansion Plan Meeting. (Duke Energy OATT, Attachment N-1 Section 15.5.3.3)

(2) If proposing a regional transmission facility to be considered for regional cost allocation, Section 24 of Attachment N-1 must be followed, which includes certain requirements for these proposals

- > 300 kV & >= 50 miles, Options by Q2 Meeting, and
- Within 30 days from publishing the preliminary results of the Economic Studies

Southeastern Regional TRANSMISSION PLANNING

What is Transmission Planning?

- *Ensuring the grid is ready for the future*
  - Build models of the future with best available information
  - Test those models with contingency analysis to check for violations (thermal, voltage, stability, short circuit)
  - Develop solutions for violations
  - *Repeat*

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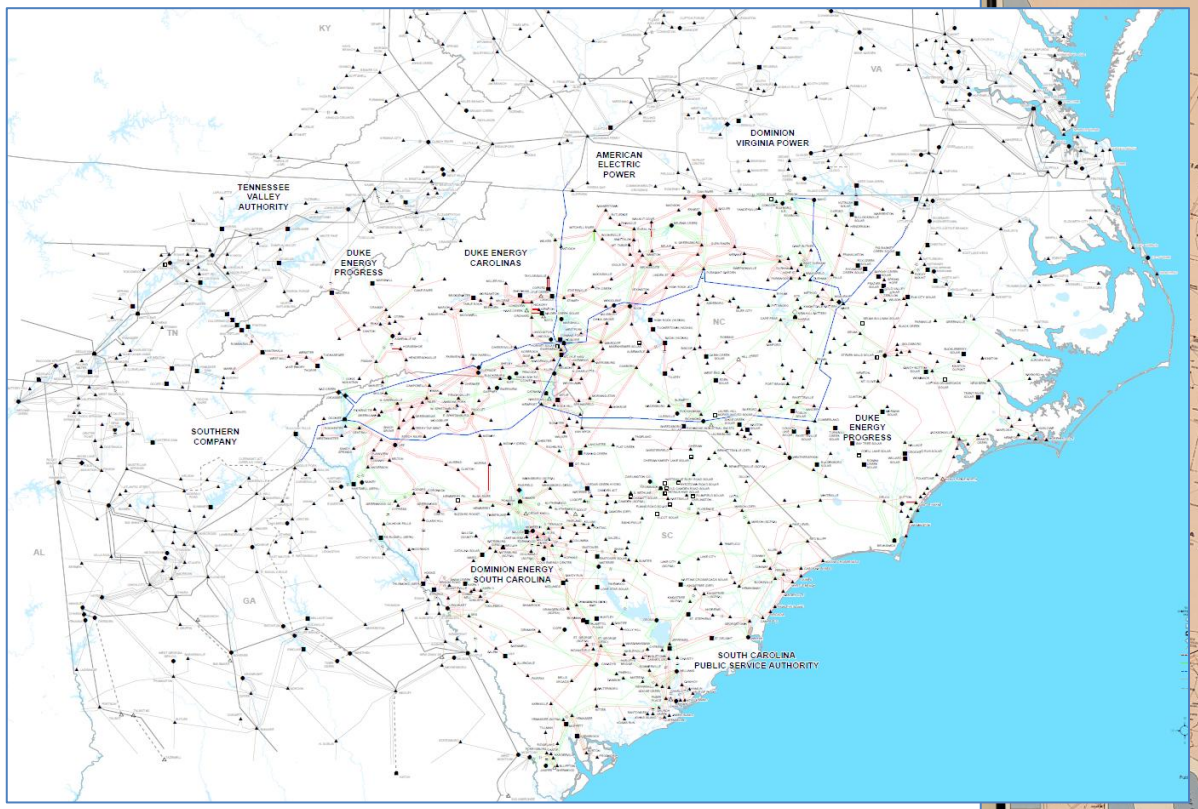
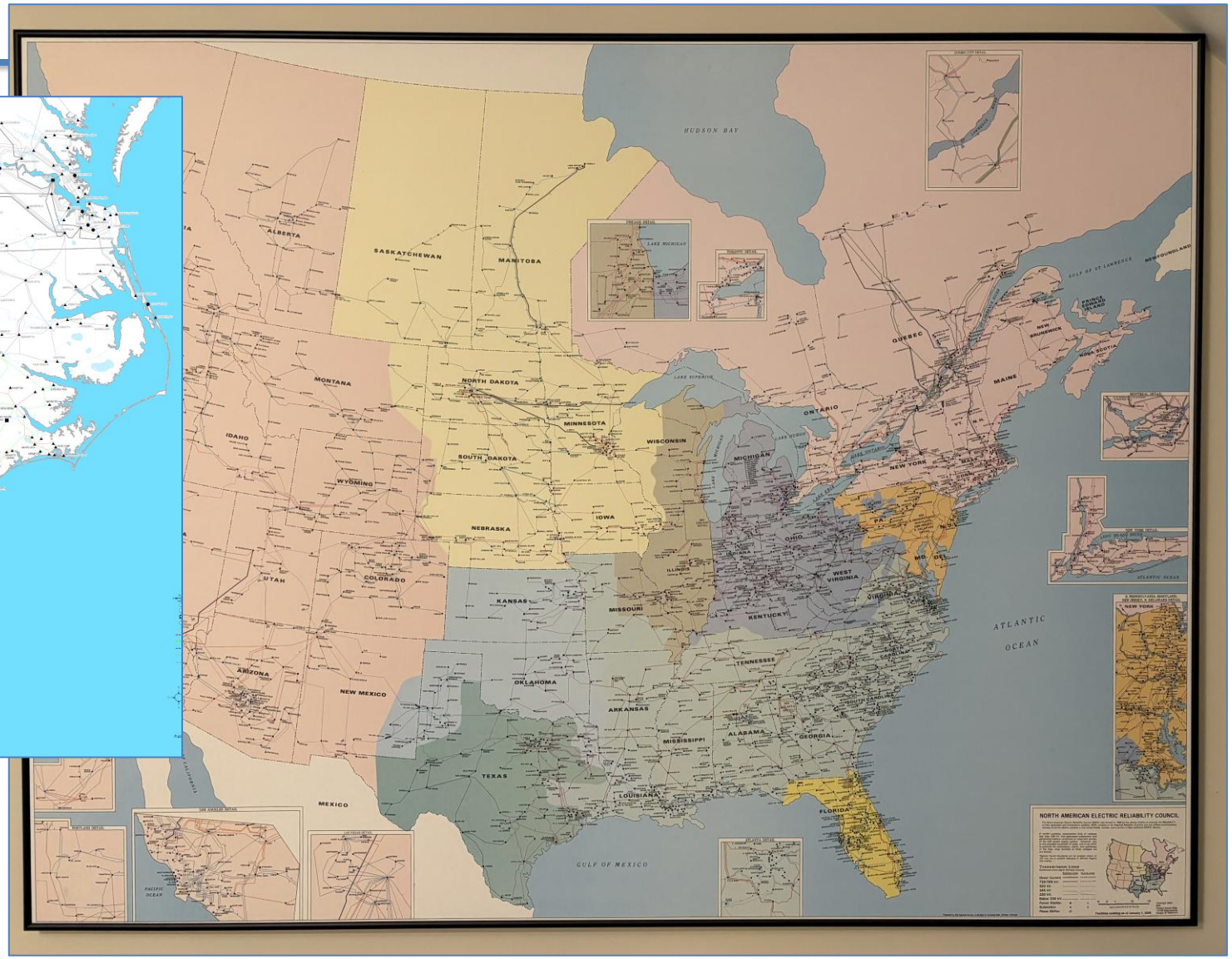
TRANSMISSION PLANNING

2026 SERTP

Transmission System





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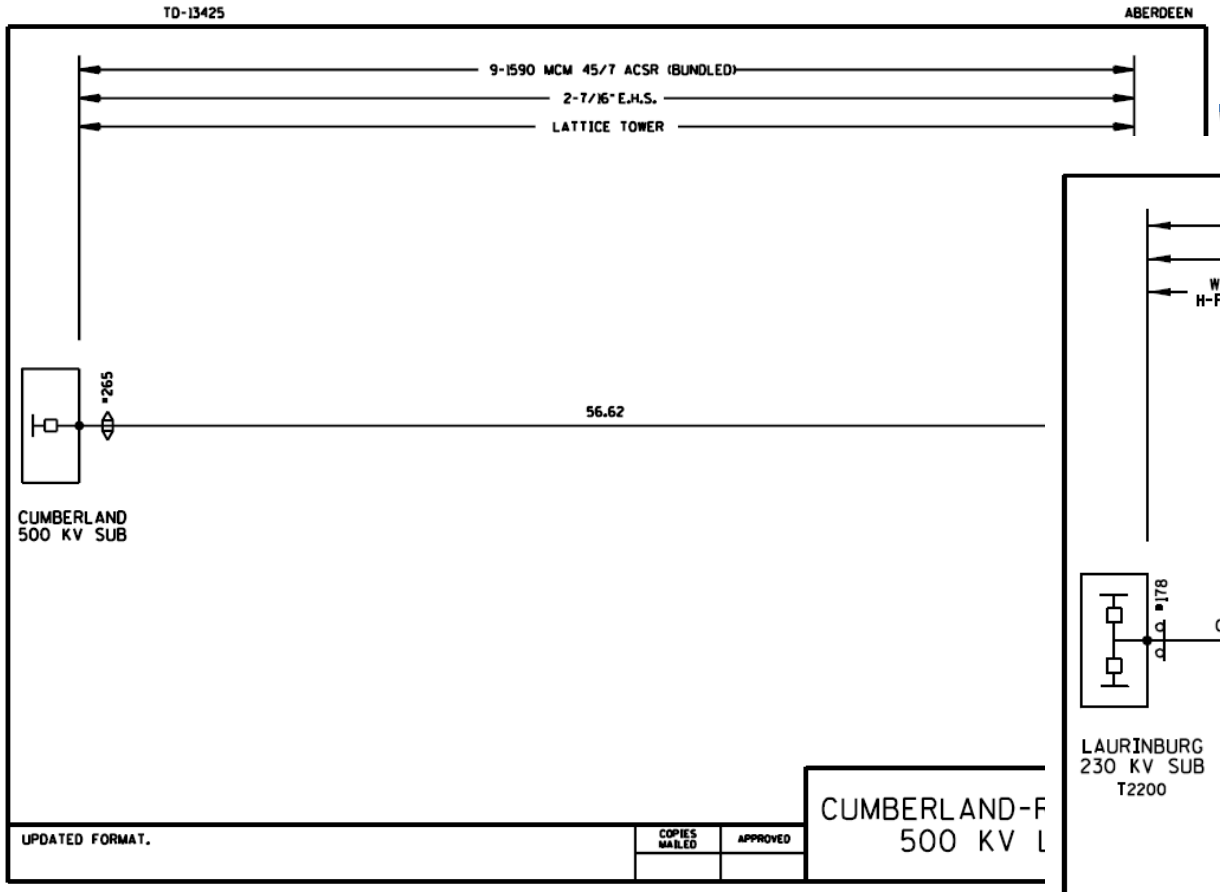
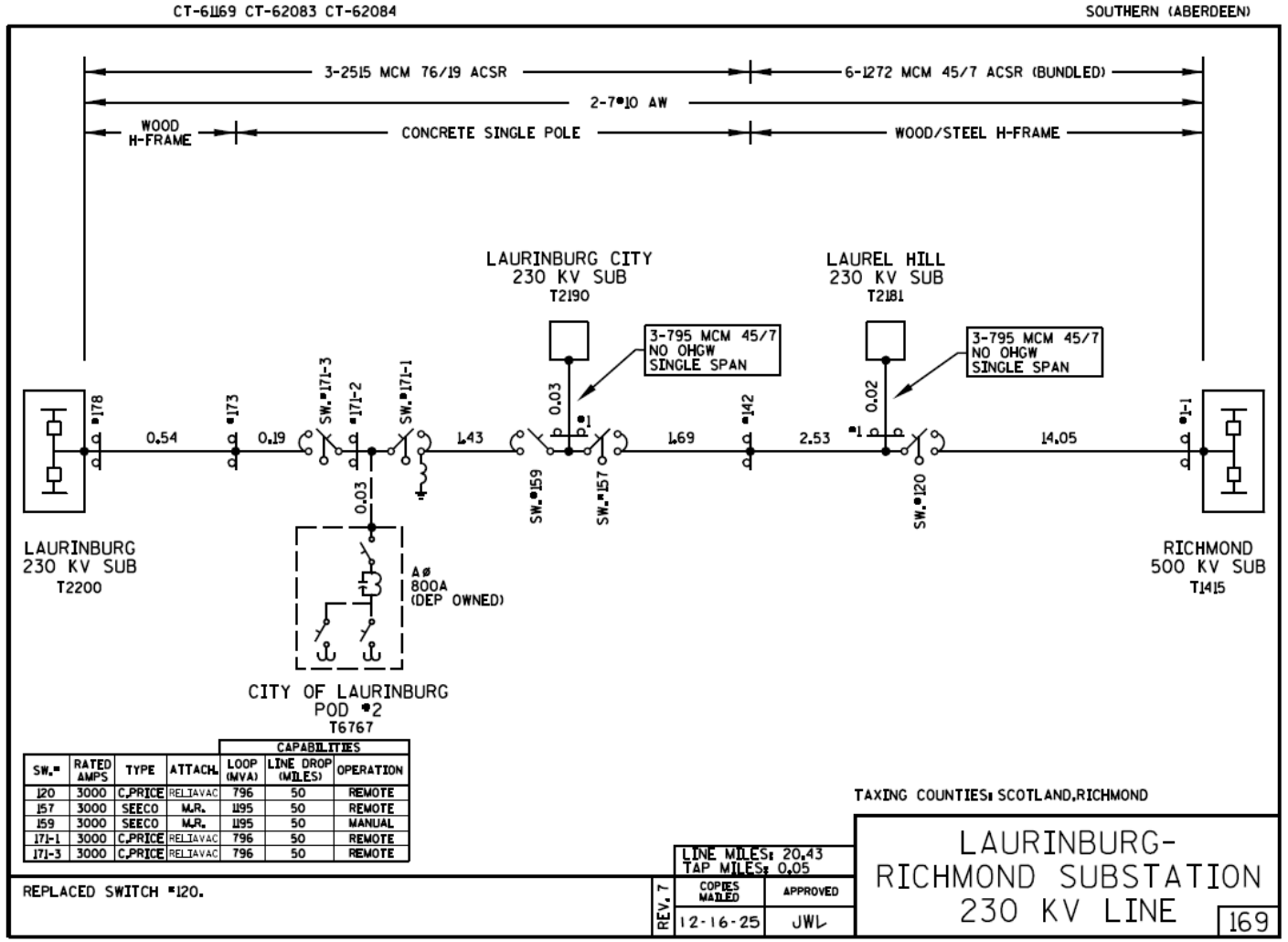
Lines with or without Taps





Southeastern Regional TRANSMISSION PLANNING

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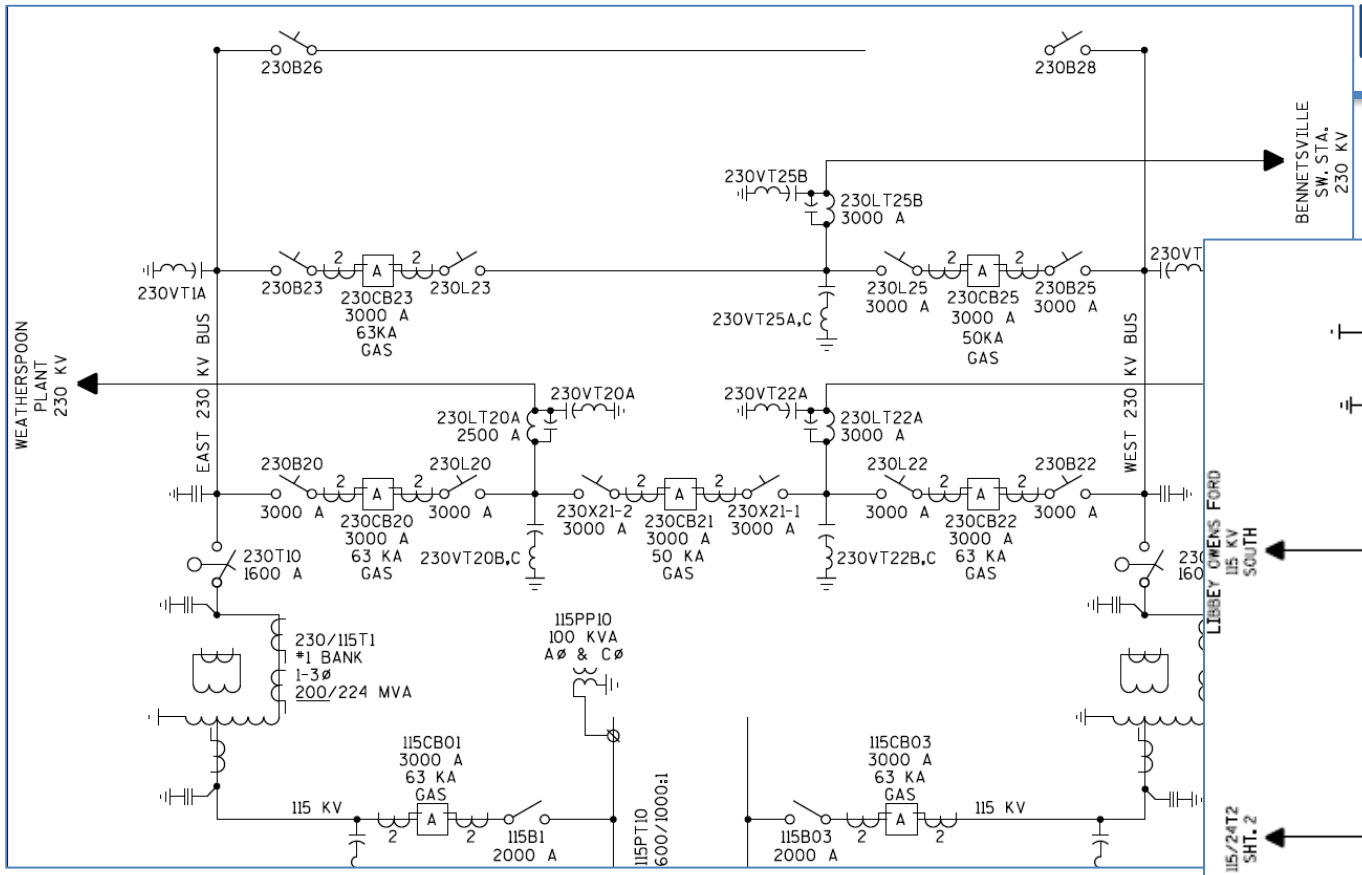
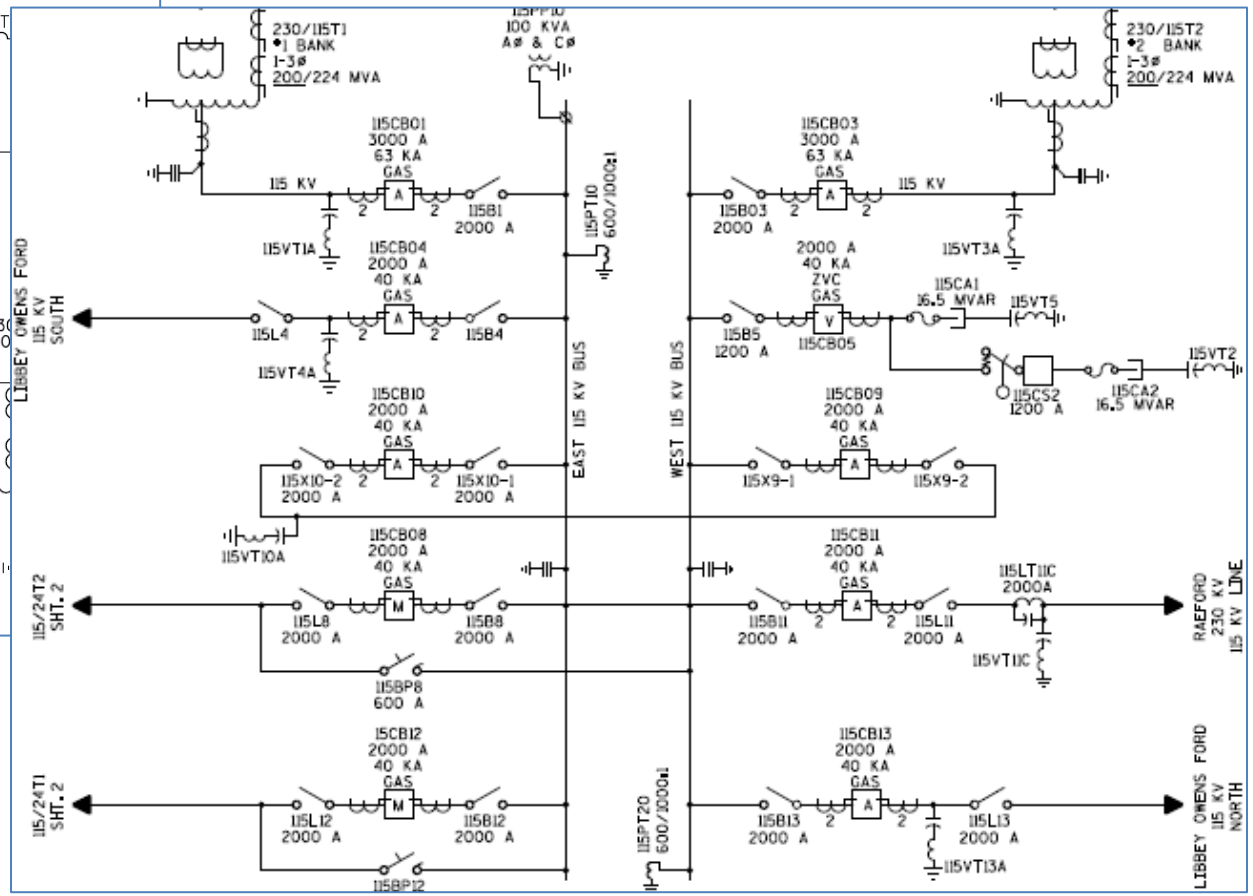
Line Terminals and Substations





Overloaded Lines and Transformers

- **A Transmission Line or Transformer Facility is made up of numerous components**
  - The primary component (line conductor, the transformer itself)
  - Ancillary or terminal equipment (breakers, switches, wave traps, jumpers, solid or flexible bus conductors, relay settings)
    - Line conductors may be derated due to low clearance issues.
    - Transformers may be derated due to mechanical issues (e.g. fans out or water infiltration)
  - The Facility Rating is the minimum of all the component ratings.
    - The limiting element could be different for different ambient temperatures (e.g. 30F vs 95F) and different emergency ratings (e.g. continuous, 12-hour, 2-hour, etc.).
  - PSSE models include the Facility Ratings, not the individual component ratings.

Basic Upgrades

- **If only ancillary/terminal equipment are limiting, upgrades can be relatively inexpensive.**
- **If the line has low clearances that limit the rating, these can often be upgraded relatively inexpensively by raising the conductor with taller structures on the most limiting spans.**
- **If the primary line conductor or transformer are the limit, one option is to upgrade it to a larger capacity, e.g.:**
  - Upgrade a single 795 ACSR line conductor to bundled 954 ACSS/TW
  - Upgrade a 500 MVA transformer to 1500 MVA

Larger Upgrades

- ***Add another transformer***
- ***Build a green field line – Typically from/to existing stations***

Alternative Transmission Technologies (ATTs)

Alternative Transmission Technologies are considered in the SERTP Sponsors' Transmission Planning processes. The following is a list of ATTs that were enumerated under FERC Order 1920 and is not an exhaustive list that is considered by each individual Sponsor:

- dynamic line ratings
- advanced power flow control devices
- advanced conductors
- transmission switching

Are Voltage Conversions an Option?

- **115 kV to 230 kV?**
- **230 kV to 500 kV?**

- **Higher voltages require**
  - higher spacing between phases,
  - higher clearances above ground, and
  - higher right-of-way widths.
- **ROWs may have buildings or other infrastructure close to the edge.**
- **Property owners may not want to give up any more width.**

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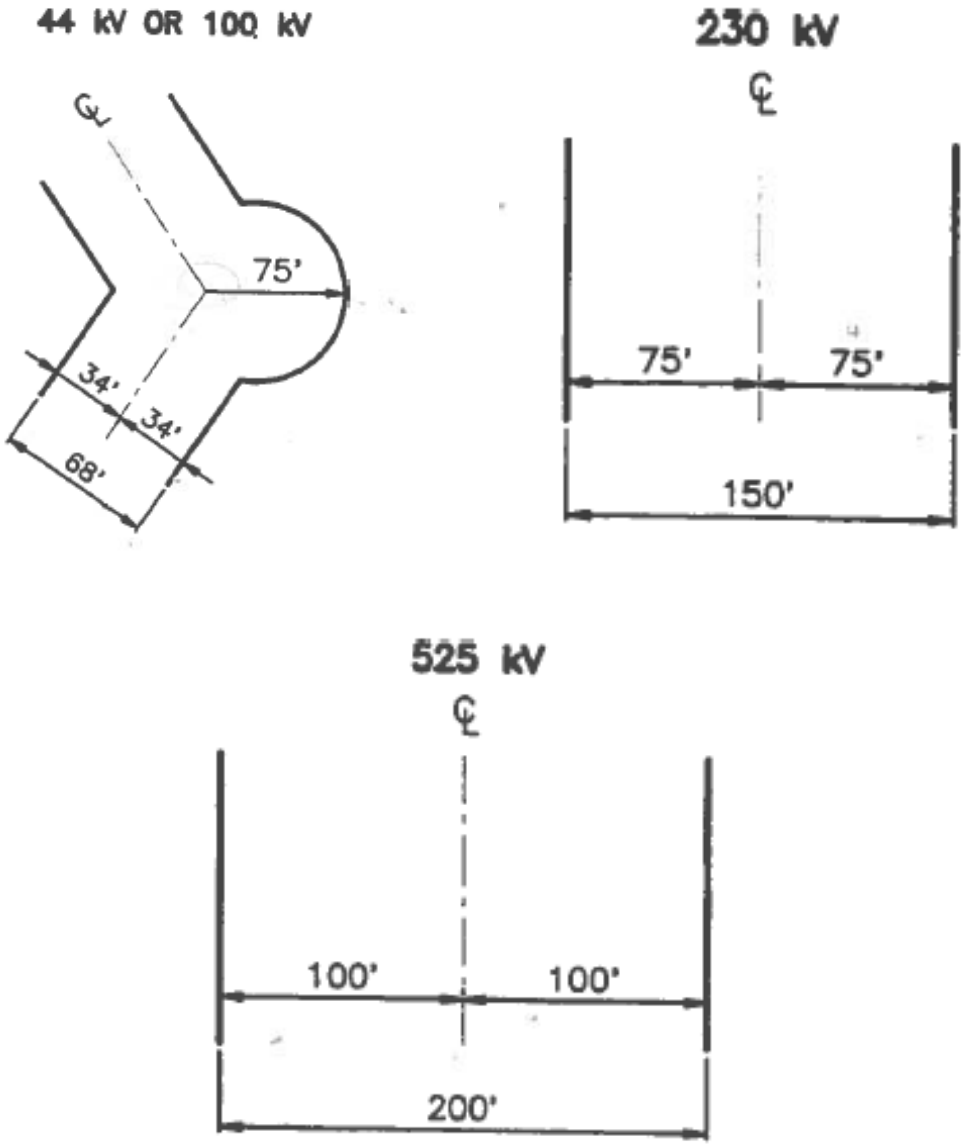
VOLTAGE CONVERSION

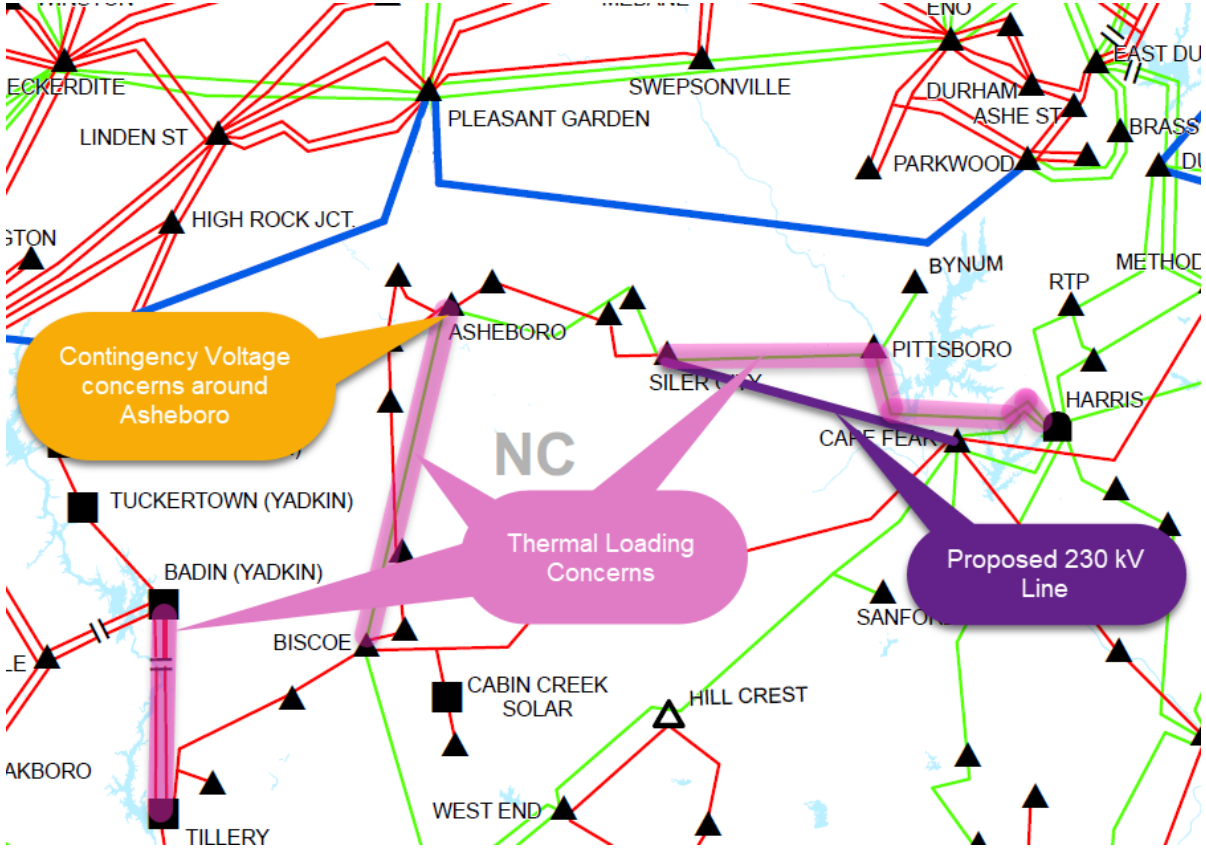
- Right of way is different in each voltage class (DEC example to the right). Voltage conversions will require additional right of way



Southeastern Regional TRANSMISSION PLANNING

DUKE Example Alternative Project Proposal from NCTPC (Now Known as CTPC).

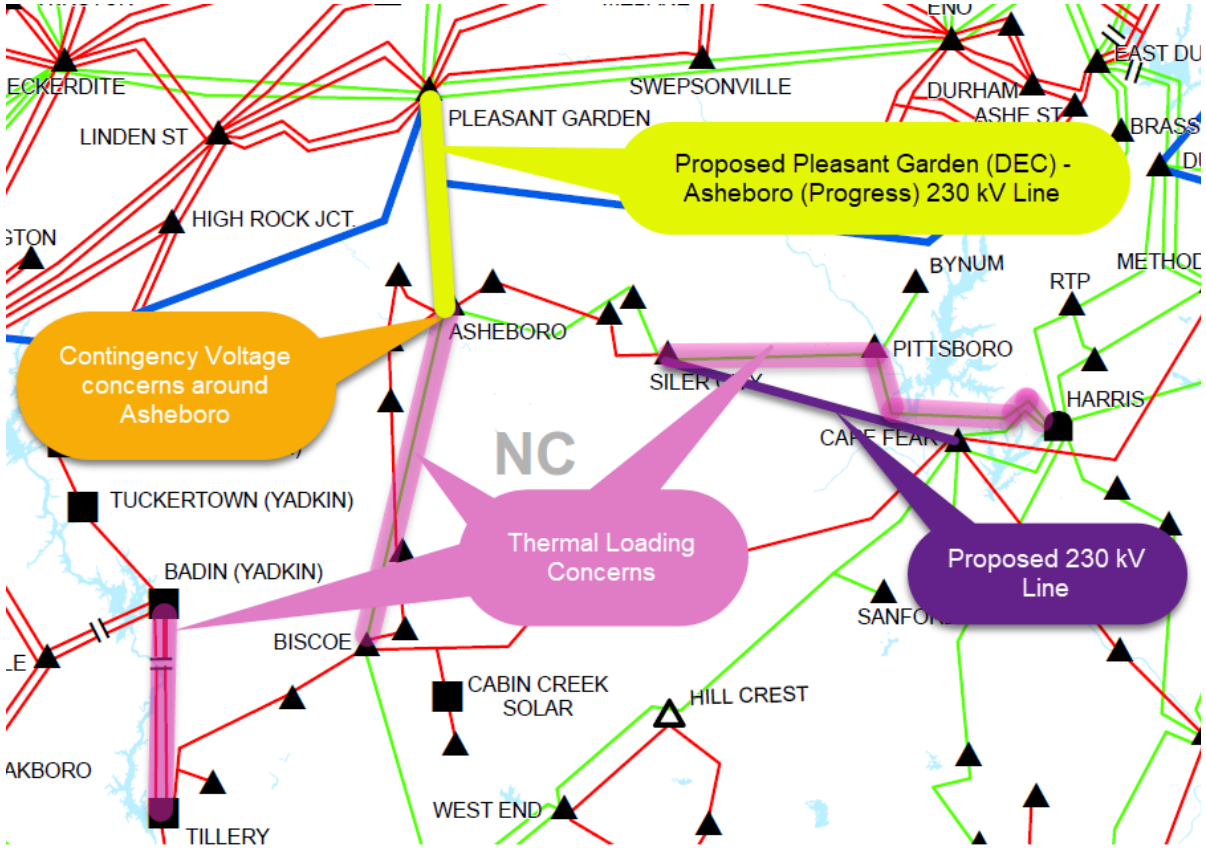
- In the early 2000s, Progress Energy was seeing several thermal and voltage problems around Asheboro. There was a proposal for a new 230 kV line between Cape Fear and Siler City to help address these.



Southeastern Regional TRANSMISSION PLANNING

DUKE Example Alternative Project Proposal from NCTPC (Now Known as CTPC).

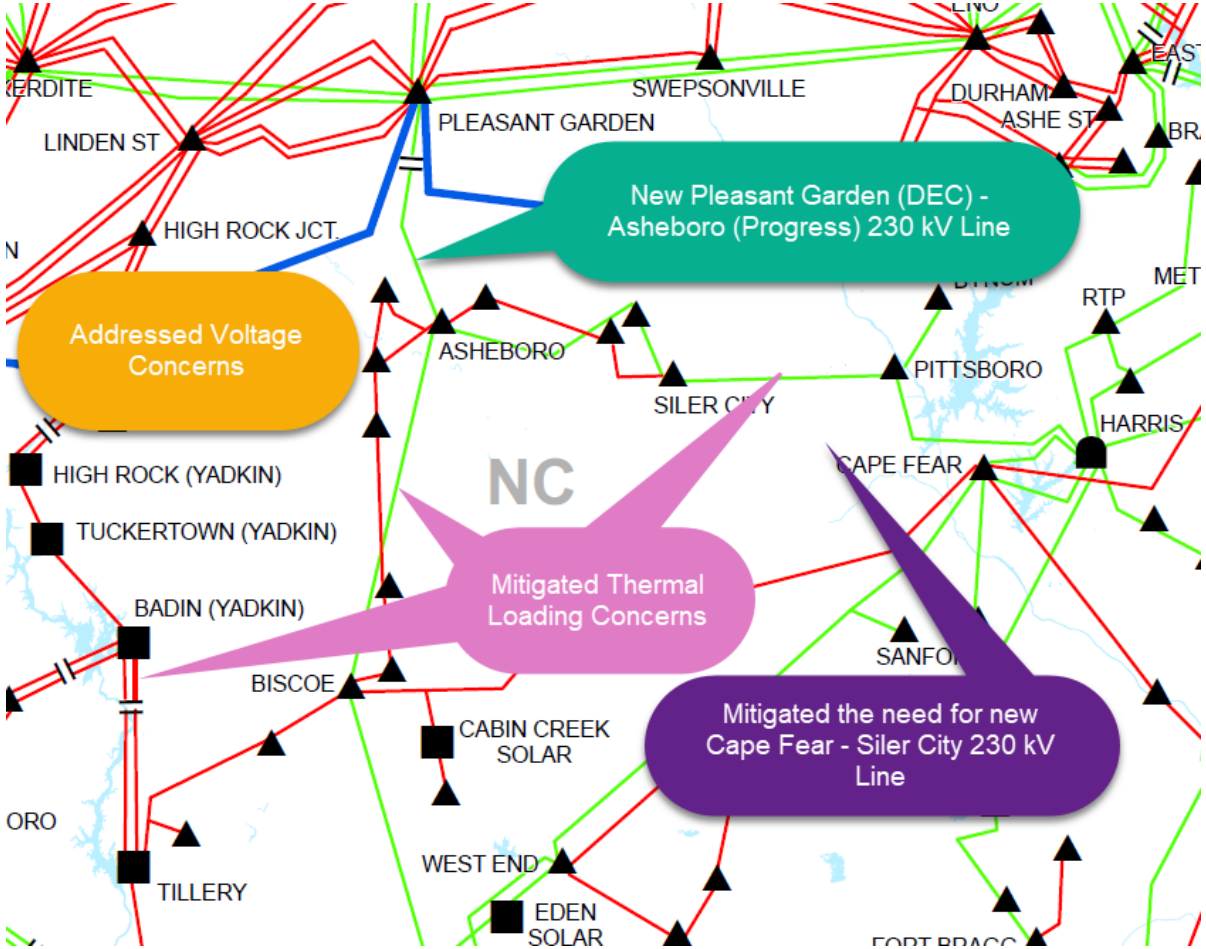
- Existing solution (New Cape Fear – Siler City 230 kV Line) helped address the worst, but not all issues in the area
- Stakeholders proposed a Pleasant Garden (DEC) – Asheboro (PEC) 230 kV Line.
- NCTPC studied the proposed line and eventually accepted it as an alternative to exiting plans



Southeastern Regional TRANSMISSION PLANNING

DUKE Example Alternative Project Proposal from NCTPC (Now Known as CTPC).

- This removed the need for the Proposed Siler City – Cape Fear 230 kV line as well as addressed loading and voltage concerns in the Asheboro area



QUESTIONS?

SERTP

Regional Planning Stakeholder Group (RPSG)

The SERTP Regional Planning Stakeholder Group

Serves Two Primary Purposes

- Determines and proposes up to five (5) Economic Planning Studies annually
- Serves as stakeholder representatives for the eight (8) industry sectors in interactions with the SERTP Sponsors

Sector Representation Requirements

- Maximum of two (2) representatives per sector
- Maximum of sixteen (16) total Sector Members
- A single company* is limited to participating in a single sector

Annual Reformation of Sector Members

- Reformed annually through *election by the Stakeholders present at the 1st Quarter SERTP Meeting*
- Elected for a term of approximately one year, ending at start of subsequent 1st Quarter SERTP Meeting
- May serve unlimited one-year terms

Simple Majority Voting

- RPSG decision-making that will be recognized by the SERTP Sponsors for purposes of Order 1000 Compliance shall be those authorized by a simple majority vote by then-current Sector Members
- Voting by written proxy is allowed

* Including all of its affiliates, subsidiaries, and parent company

RPSG Committee Structure

RPSG Sector Representation

1. Transmission Owners / Operators
2. Transmission Service Customers
3. Cooperative Utilities
4. Municipal Utilities
5. Power Marketers
6. Generation Owner / Developers
7. Independent System Operators (ISOs) / Regional Transmission Operators (RTOs)
8. Demand Side Management / Demand Side Response

RPSG Formation

- 2024 SERTP RPSG Sector Members
- 2025 SERTP RPSG Sector Members
- 2026 SERTP RPSG Sector Members
  - to be uploaded to the General Documents > “2026 March 25th - 1st Quarter SERTP Meeting” section following 2026 1st Quarter SERTP Meeting

RPSG Schedule of Events

- Formed at Q1 Meeting
  - Selects up to 5 scenarios for the Economic Planning Studies
  - Additional EPS scenarios may be selected *if funded by Stakeholders*
- Scoping Meeting typically held in April/May
- Selected Economic Study Request Reports are posted on the SERTP Website in the General Documents section of the Reference Library tab
  - Q3 posting is the preliminary results
  - Q4 posting is the final results

SERTP

Formation of the RPSG and Selection of the 2026 Economic Planning Studies

2026 SERTP Regional Models

- SERTP will develop 6 regional models
- Models include latest transmission planning model information within the SERTP region
- Will be available on the Secure Area of the SERTP website

SERTP 2024 Model Development Training

No.	Season	Year
1	Summer (S)	2028
2		2031
3		2036
4	Shoulder (H)	2031
5	Winter (W)	2031
6		2036

RPSG Actions

- **List of Sectors and Sector Members**
- **List of Economic Planning Study (EPS) requests**
- **Date for EPS Scoping Meeting**
  - Typically held in April/May

Next Meeting Activities

- **2026 Economic Planning Study Scoping Meeting**
  - **Date: TBD at Q1 Meeting or shortly thereafter**
  - **Held Virtual**
  - **Purpose:**
    - Review Study Assumptions for each Selected Economic Planning Study
    - RPSG Input & Feedback for Study Assumptions

- **2026 SERTP 2nd Quarter Meeting**
  - **Date: June 24th, 2026**
  - **Hosted by LG&E/KU in Louisville, KY**
  - **Purpose:**
    - Review Modeling Assumptions
    - Discuss Preliminary 10 Year Expansion Plan
    - Stakeholder Input & Feedback Regarding the Plan

Next Meeting Activities

- **2026 SERTP 3rd Quarter Meeting**
  - **Date: September 22nd, 2026**
  - **Held Virtual**
  - **Purpose:**
    - Preliminary Results of the Economic Studies
    - Stakeholder Input & Feedback Regarding the Study Results
    - Discuss Previous Stakeholder Input on the Expansion Plan

- **2026 SERTP 4th Quarter Meeting**
  - **Date: December 15th, 2026**
  - **Hosted by MEAG in Atlanta, GA**
  - **Purpose:**
    - Final Results of the Economic Studies
    - Regional Transmission Plan
    - Regional Analyses
    - Stakeholder Input on the 2027 Transmission Model Input Assumptions

2026 SERTP

Questions?

www.southeasternrtp.com
southeasternrtp@southernco.com