Contrast & Compare Planning Process
NCStakeholders - PWG

CALENDAR			
Planning Calendar	**Duke**	**Progress**	**Comments**
Modeling/ Assessment/ Solutions/ Budget	Dec-Jan: Finalize models Feb-Mar: Perform screen Apr-Jun: Develop solutions Jul-Aug: Prioritize projects & develop budget September: Finalize budget Oct-Nov: Compile input data & develop models	Dec-Jan: Finalize models Feb-Mar: Perform Near-term(NT) project review Apr-Jun: Prioritize projects & submit budget Jul-Aug: Perform Long-term(LT) screen Sep-Nov: Develop solutions Oct-Nov: Compile input data & develop models Oct-Mar: Develop estimates for LT projects Dec: Budget approved - plan released	

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CASE DEVELOPMENT	Duke	Progress	Comments
Reduced External Area Model			
Database cycle	January to June (VSTE Data Bank Process) Companies within VSTE combine new reduced models of their areas coordinating data within VSTE areas. June to December (MMWG Process) Regions combine reduced models of their areas to develop an eastern interconnection model. SERC provides the VSTE Data Bank Cases to the MMWG for this effort. Data is coordinated among regions.	January to June (VSTE Data Bank Process) Companies within VSTE combine new reduced models of their areas coordinating data within VSTE areas. June to December (MMWG Process) Regions combine reduced models of their areas to develop an eastern interconnection model. SERC provides the VSTE Data Bank Cases to the MMWG for this effort. Data is coordinated among regions.	Same
Assumptions	Model long-term firm transmission in model. No partial path reservations modeled.	Model long-term firm transmission in model. No partial path reservations modeled.	Same
Detailed Internal Model ("on-the-shelf cases")			
Cases developed	Summer Peak (for current and next 10 years) Winter Peak (for current and next 10 years) Spring/Fall Peak (for current and next 2 years) Spring Valley (for current and next 3 years)	Summer Peak (for current and next 10 years) Winter Peak (for current and next 10 years)	
Loads	Utilize data from EMS. Loads plus losses at the transmission level will be scaled to match the system forecast for each load level. If conditions warrant, additional cases may be generated to examine the impact of other load levels. Load is not reduced by load management.	Corporate provides PEC load forecast data. PEC distribution organization provides NCPs for all PEC substations for model. Obtains Network Customer's CP forecasts via Network Operating Agreement. Scales PEC area to meet annual forecast without scaling Network Customer data. Load is not reduced by load management.	
Interchange	Long term firm transmission and LSE's DNR projections are modeled in the base case	Models all firm transmission reservations on its OASIS including partial path reservations.	
Behind Meter Gen	Netted with load.	Netted with load.	Same
Duke/PEC Generation	Modeled in detail. Duke's resources dispatched economically. External area dispatch is generally left as in MMWG. All on line generation resources are scaled in the affected control area if interchange adjustments are needed	Modeled in detail. PEC's resources dispatched economically. External area dispatch is generally left as in MMWG. Load of external area is scaled if PEC import adjustments are needed.	
Network Customer Resources	Network customers provide dispatch priority for use in dispatching their resources to their load.	On system generation is modeled based on transmission reservation. Imports are modeled based on transmission reservation.	
Other Non-Duke/PEC Generation	Modeled in detail. IPPs must have an LGIA executed to be in model and they are dispatched at level of approved firm transmission service.	Modeled in detail. IPPs must have an LGIA executed to be in model and they are dispatched at level of approved firm transmission service.	Same
Future Generation	Uses dummy generation in future cases only when additional load serving resources are needed. Dummy generation generally modeled based on generator interconnection queue locations.	Uses dummy generation in future cases only when additional load serving resources are needed. Dummy generation typically modeled on Wake 500 kV bus and named DUMGEN .	
Ratings	Use several different continuous and time-limited emergency line ratings. Rate A - Continuous rating Rate B - 12 hour emergency rating Rate C - Long term emergency rating (based on acceptable loss of life)	Rate A = Rate B = Continuous rating Lines modeled at continuous conductor rating unless ground clearence limited or other equipment (switches, traps, etc.) Transformers modeled at 55 deg rise rating.	

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ASSESSMENT PRACTICES			
	Duke	Progress	Comments
Limits Voltage			
500kV	Maintain minimum of 100%	Maintain minimum of 100%	Same
230kV	Maintain minimum of 95%	Maintain minimum of 90%	
Allowed Contingency Drop	5%	8%	
Limits Thermal			
Lines Transformers	Do not exceed 100 % of: Rate A for continuous loading, (Category A below.) Rate B for line or 500/230 kV transformer contingencies, (Subset of Category B below.) Rate C for all other transformer, generator and capacitor contingencies. (Remainder of Category B below.)	Do not exceed 100 % of line rating. (Rate A=Rate B) under normal or contingency conditions (Category A, B, & C below) Do not exceed 100 % transformer 55 deg rise rating (Rate A=Rate B) unless a 65 deg rise rating is available under normal and contingency conditions (Category A, B, & C below.) . Will allow 109% loading of the 55 deg rating under Category B & C conditions if a 65 degree rise rating is available and the bank is determined to be in good condition.	
Other Limits			
Phase Angle	Criteria under evaluation.	Do not exceed 30 degrees phase angle difference across an open terminal.	
Cases Developed			
Years	Screen 3 years out & develop and assess transmission projects.	Assess projects 3 years out to support budget process. Screen 6 years out & develop and assess transmission projects.	
Cases	All generation available (Genration up) base case Generation maintenance (Gm) cases with a large unit out of service for maintenance and the remainder of Duke's reseources dispatched economically to maintain supply / demand balance	All generation available (Genration up) base case.	
TRM/CBM			
TRM	VACAR reserve sharing amounts reserved	Total of all VACAR reserve sharing plus parallel path bias is reserved (approx 182 MW). PEC interconnects with all VACAR utilities and studies the import of the full reserved amount on top of other import obgliations.	
CBM	CBM equals 0, therefore none reserved	CBM equals 0, therefore none reserved	Same
NERC Table I			
Cat A	Generation up base case and Gm cases	Generation up	
Cat B	Gm + generator contingency (Gc) with the amount of Gc lost MW's imported equally among 6 interfaces with appropriate adjustments to Net Interchanges Gm + line outage Gm + transformer outage Gm + capacitor outage	Generation up + line outage or transformer Generator contingency (Gc) with import of TRM (representative of the Gc along with other unit derations) divided in accordance to TRM allocations to individual interfaces with appropriate adjustments to Net Interchanges	
Cat C	Beyond scope of CTPP	Generation up + common tower outages Gc with TRM (as above) + line or transformer outage Gc with TRM (as above) + common tower line outages	
Cat D	Beyond scope of CTPP	Beyond scope of CTPP	Same
Transient/Dynamic Stability , Short Circuit, Voltage Stability			
Stability	Typically, Duke will complete the list of studies scheduled for the year. This list is based upon a 5 year cycle for generation stations and a 10 year cycle for tie stations. Highest priority is placed upon Duke's larger MVA generating units, followed by higher voltage interconnections and then higher voltage tie stations. At a minimum, applicable worst-case contingency scenarios from NERC Table 1 are assessed for each station under study.	Design for LLG Fault with delayed clearing.	
Short Circuit	Faults are evaluated for each breaker location to find the highest available fault current for worst case configuration. All generation in service. Maximum system operating voltage.	All faults considered with worst case configuration for highest available fault current. Generation in the area at full output.	
Voltage Stability	Steady-state PV analysis on near and long-term cases. Comprehensive voltage stability analysis using detailed dynamic load models.	N/A	
Tools			
Thermal	PSS/E Software	PSS/E Software	
Stability	PSS/E Software	PSS/E Software	
Short Circuit	ASPEN Software	ASPEN Software	

Comparison of Duke Energy and Progress Energy Carolinas' CBM/TRM Methodologies

		Duke Energy	Progress Energy Carolinas
CBM	Definition	Same as NERC	Same as NERC
	Value (Imports Only)	Zero on all interfaces	Zero on all interfaces
	Reason	- No significant transfer limits - TTC calculations use reduced line ratings (12 hr vs. 1 hr when operating the system) - TTC calculations are based on single worst transmission contingency and adverse generation participation	- Loss-of Load Expectation (LOLE) of 1 day in 10 years requires an emergency transfer capability between 1500 MW and 1800 MW - Required generation reserve is accounted for in TRM
TRM	Definition	Same as NERC	Same as NERC
	Value (Imports)	- Opposing control area's share of the VACAR reserve sharing requirement	- Opposing control area's share of the VACAR reserve sharing requirement [TRM (RS)] plus TRM-Additional Parallel Path Flow Impact [TRM (APPFI)]
	Value (Exports)	- Reserve obligation to meet the VACAR Reserve Sharing Agreement	- Reserve obligation to meet the VACAR Reserve Sharing Agreement
	Reason	- To declare TRM there should be a contractual obligation for reserves, such as the VACAR Reserve Sharing Agreement	- Account for variations in generator dispatch, parallel path flows, and operating reserves, such as the VACAR Reserve Sharing Agreement
	Selling	- Not sold on a firm or non-firm basis, as doing so would degrade system security	- Not sold on a firm or non-firm basis, as doing so would degrade system security
CBM/TRM	Availability to LSEs	- Not available for use on a firm basis by market entities, including Duke Energy's affiliated marketer - In response to a generation emergency, the System Operating Center uses TRM for VACAR reserve sharing purposes to benefit all control area LSEs	TRM available for: - Loss of firm resource invoking an Emergency Reserve Sharing Agreement - Declaration of an Energy Emergency Alert (EEA) due to insufficient resources - LSE has exhausted all other options and can no longer provide its customers' expected load requirements.

2005 VACAR Reserve Sharing Obligations

2005 Reserves	Adjusted Peak Load (MW)	Largest Resource (MW)	Contingency Reserve %	Contingency Reserve Commitment
Duke	17926	1135	0.2971	506
PEC	11699	900	0.2129	363
SCPSA	4781	590	0.1136	193
SCE&G	4574	636	0.1172	200
DVP	16507	925	0.2592	441
Total	55487	4186	1.0000	1703

Current Duke Energy and Progress Energy Carolina CBM/TRM Values

Control Area	From	To	CBM	TRM or TRM (RS)	TRM (APPFI)
Duke Imports	PJM	Duke	0	0	N/A
	PEC East	Duke	0	363	N/A
	PEC West	Duke	0	0	N/A
	SCE&G	Duke	0	200	N/A
	SCPSA	Duke	0	193	N/A
	TVA	Duke	0	0	N/A
	Southern	Duke	0	0	N/A
	SEPA	Duke	0	0	N/A
	Yadkin	Duke	0	0	N/A
Duke Exports	Duke	PJM	-	0	N/A
	Duke	PEC East	-	306	N/A
	Duke	PEC West	-	200	N/A
	Duke	SCE&G	-	506	N/A
	Duke	SCPSA	-	506	N/A
	Duke	TVA	-	0	N/A
	Duke	Southern	-	0	N/A
	Duke	SEPA	-	0	N/A
	Duke	Yadkin	-	0	N/A
PEC East Imports	PJM	PECE	0	441	487
	Duke	PECE	0	506	0
	SCE&G	PECE	0	200	0
	SCPSA	PECE	0	193	0
PEC East Exports	PEC East	PJM	-	363	0
	PEC East	Duke	-	363	0
	PEC East	SCE&G	-	363	0
	PEC East	SCPSA	-	363	0
PEC West Imports	PJM	PEC West	0	0	42
	Duke	PEC West	0	0	200
	TVA	PEC West	0	0	0
PEC West Exports	PEC West	PJM	-	0	0
	PEC West	Duke	-	0	0
	PEC West	TVA	-	0	0

Comparison of Duke and PEC Line Rating Assumptions and Methodologies

	Duke	PEC
Calculation Method	Not stated	Not stated
Line Altitude	700 ft.	Regional
Line Latitude	35 degrees N	35 degrees N
Line Orientation	Not stated	Not stated
Coefficient of Emissivity	0.7	0.5
Coefficient of Absorption	0.9	0.5
Atmospheric Quality	Clear (100%)	Clear (100%)
Time of Day	14:00 EDT	12:00 EDT
Ambient Air Temperature	40^{o} C (104^{o} F)	35^{o} C (95^{o} F)
Ambient Wind Speed	5.0 ft/sec	2.0 ft/sec 3.0 ft/sec Coastal
Relative Wind Conductor Angle	45^{o}	90^{o}