TAG Meeting
December 15, 2014

NCEMC Office
Raleigh, NC

TAG Meeting Agenda

1. Administrative Items – Rich Wodyka
2. FERC Order No. 1000 - Rule on Transmission Planning and Cost Allocation – Sam Waters
3. 2014 Collaborative Plan Report – Mark Byrd
4. Joint Inter-regional Study Scope and Study Activities – Bob Pierce
5. 2015 Study Scope – Orvane Piper
6. Operations Reliability Coordination Agreement (ORCA) Report – Bob Pierce
7. Regional Studies Update – Bob Pierce
8. 2014 TAG Work Plan Update – Rich Wodyka
9. TAG Open Forum – Rich Wodyka

FERC Order No. 1000 Rule on Transmission Planning and Cost Allocation Compliance Update

Sam Waters – Duke Energy Carolinas

on behalf of the North Carolina Transmission Planning Collaborative

For the 12/15/14 TAG Meeting

FERC Process

- Through the FERC Order No. 1000 compliance process:
  - the NCTPC has been approved for the “local” transmission planning process
  - the SERTP has been approved for the “regional” transmission planning process
- FERC accepted the tariff provisions for the NCTPC “local” planning process in their June 19th order related to the SERTP’s 2nd regional compliance filing.
- The SERTP continues to make some additional changes in the regional compliance areas with their 3rd regional compliance filing that was submitted on August 18th.
- The effective date for the SERTP regional implementation was June 1st.

Transmission Planning Stakeholder Participation

- NCTPC – NCTPC will continue to function as the local transmission planning venue.
- SERTP – The regional planning process for Order No. 1000 purposes is through the SERTP.
  - SERTP website link: http://www.southeasternrtp.com
  - Sign-up for SERTP email updates: http://www.southeasternrtp.com/email_signup.asp
  - December 18th – SERTP Stakeholder Meeting
    - Note: The RSVP date for this meeting was December 8th.

Transitional Notes on Order No. 1000

- The NCTPC has begun a process to update the NCTPC website information and the NCTPC documents to conform the wording to the approved local transmission planning tariff language.
- In that the local transmission planning process has been approved by FERC, this will be the last Order No. 1000 presentation provided in the TAG meetings.
- Starting in 2015, the SERTP activity review will become part of the regular transmission study review that is provided in other NCTPC presentations.

Questions ?

NCTPC
2014 Collaborative Plan Report

Mark Byrd

Duke Energy Progress

Studies for 2014

- **Annual Reliability Study**
  - **Assess DEC and DEP transmission systems' reliability and develop a single Collaborative Transmission Plan**
- **Economic Study**
  - **Thermal analysis of transferring 250 MW from TVA to CPLW**
- **Special Request from NCUC**
  - **Assess potential impact of external transfers on the transmission grid in North Carolina**

Steps and Status of the Study Process

Completed

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

Study Assumptions Selected

- **Study Years for reliability analyses:**
  - **Near-term: 2019 Summer, 2019/2020 Winter**
  - **Longer-term: 2024 Summer**
- **LSEs provided:**
  - **Input for load forecasts and resource supply assumptions**
  - **Dispatch order for their resources**
- **Interchange coordinated between Participants and neighboring systems**

Technical Analysis
Base Reliability

- Conducted thermal screenings of the 2019 and 2024 base cases
- No new issues were observed that do not have planned mitigation

Technical Analysis
Economic Study

- A 250 MW transfer from TVA to CPLW was studied but additional transmission needed to mitigate overload issues was not determined
- The first limit was reached at an import level of 58 MW. Four other import limits were reached below 250 MW
- These limits represent five different transmission facilities that would have contingency overloads before the proposed 250 MW import was reached

MUST Transfer Analysis Results

From	To	Transfer Level
TVA_EXPORT	DEP_WEST_IMPORT	250.0

AC FCITC	Limiting Constraint	Contingency	PreShift	Rating	AC TDF
58.0	L:306190 PISGAH 100 308711 BLANTYRERET 100 2		131.0	138.0	0.12088
	Rugby 100 kV - White	C:ASHVL-PISGAH230_CKTS_1&_2			
		Open 304803 6ASHVLE230 T 230 306108 6PISGAH 230 1			
		Open 304803 6ASHVLE230 T 230 306108 6PISGAH 230 2			
127.3	L:304750 3PISGAH 115 305196 3E8-CRADLE 115 1		181.4	200.0	0.14609
	Canton - Pisgah - 115	C:ASHVL-PISGAH230_CKTS_1&_2			
		Open 304803 6ASHVLE230 T 230 306108 6PISGAH 230 1			
		Open 304803 6ASHVLE230 T 230 306108 6PISGAH 230 2			
174.5	L:304750 3PISGAH 115 306190 PISGAH 100 2		91.6	104.0	0.06867
	Pisgah 115/100 Transformer 2	C:ASHVL-PISGAH230_CKTS_1&_2			
		Open 304803 6ASHVLE230 T 230 306108 6PISGAH 230 1			
		Open 304803 6ASHVLE230 T 230 306108 6PISGAH 230 2			
197.7	L:304750 3PISGAH 115 306190 PISGAH 100 1		113.5	138.0	0.12308
	Pisgah 115/100 Transformer 1	C:ASHVL-PISGAH230_CKTS_1&_2			
		Open 304803 6ASHVLE230 T 230 306108 6PISGAH 230 1			
		Open 304803 6ASHVLE230 T 230 306108 6PISGAH 230 2			
216.6	L:306164 HORSESHO 100 306190 PISGAH 100 1		89.1	104.0	0.06635
	Rugby 100 kV - Black	C:ASHVL-PISGAH230_CKTS_1&_2			
		Open 304803 6ASHVLE230 T 230 306108 6PISGAH 230 1			
		Open 304803 6ASHVLE230 T 230 306108 6PISGAH 230 2			

Technical Analysis
Economic Study

- **The case was not set up for worst case import conditions as would be done for a Transmission Service Request (TSR)**
- **Only a thermal analysis was performed which did not consider voltage collapse issues.**
- **The results provided should not be construed to be a complete set of issues that would have to be mitigated to confirm an actual TSR**

2014 Collaborative Transmission Plan

- **2** DEC projects and 5 DEP projects were placed in-service
- **2** DEP projects added (Harlowe & Piney Green)
- **1** DEP project removed (BR1-Jacksonville 230 kV)
- Total Reliability Project Cost changed from $223M to $209M and Merger Projects Cost changed from $67M to $73M (Kinston Dupont-Wommack 230 kV added)

Reliability Projects in 2014 Plan		
Reliability Project	TO	Planned I/S Date
Harris-RTP 230 kV line	DEP	May 23, 2014
Brunswick 1 - Jacksonville 230 kV Line Loop - in to Folkstone 230 kV substation	DEP	Removed
Greenville-Kinston Dupont 230 kV line	DEP	May 12, 2014
Raeford 230 kV substation, Loop-In Richmond – Ft Bragg Woodruff St 230 kV Line and add 3rd bank	DEP	June 2018

Reliability Projects in 2014 Plan (continued)		
Reliability Project	TO	Planned I/S Date
Durham-RTP 230kV Line, Reconductor	DEP	June 2023
Reconductor Caesar 230 kV Lines (Pisgah Tie-Shiloh Switching Station)	DEC	December 3, 2013
Jacksonville-Piney Green 230 kV Line and Piney Green 230/115 kV Substation	DEP	June 2020
Newport-Harlowe 230 kV Line, Newport SS and Harlowe 230/115 kV Substation	DEP	June 2020

Merger Projects in 2014 Plan		
Merger Project	TO	Planned I/S Date
Lilesville-Rockingham 230kV Line #3 – Construct new line	DEP	December 22, 2013
Person-(DVP) Halifax 230kV Line – Reconductor DVP section (DVP work)	DEP	April 30, 2014
Antioch 500/230kV Substation – Replace Two Transformer Banks	DEC	May 1, 2014
Kinston Dupont-Wommack 230 kV Line - Reconductor	DEP	May 12, 2014

Questions ?

Joint MISO-NCTPC-PJM Reliability and Economic Study

Bob Pierce

Duke Energy Carolinas

Joint Study

- MISO, NCTPC, and PJM performed this joint interregional study to address a request from the NCUC.

- The NCUC noted that in May of 2013, PJM conducted a Base Residual Capacity Auction (BRA) for its 2016/2017 delivery year and that PJM subsequently stated that an unprecedented amount of the capacity that cleared in that auction is from generation resources outside of PJM, primarily within the MISO footprint.

Joint Study

- The NCUC requested the study participants to study whether or not these imports from MISO into PJM could reasonably be expected to exacerbate loop flows on the transmission grid of North Carolina.

- Specifically, the NCUC requested the study to determine whether the planned imports would be likely to cause DUKE (DEC) and CPL-E (DEP) to alter their joint generation dispatch in a manner that increases costs for NC customers and whether the planned imports would reduce the reliability of the NC transmission grid.

Joint Study

Study Scope

- Required both a reliability and economic study to satisfy the NCUC request.
- The economic study was informed by the results of the reliability study.
- The final report will include reliability & economic study results.
- **Preliminary report results are being reported today.**

Joint Study

Reliability Study

- Base model - 2016S peak load based on 2013 series MMWG model with detailed internal models of participants included
- MISO & PJM market dispatch incorporated including resources from PJM's 2016/2017 Base Residual Capacity Auction
- Contingency analysis was run and impacts evaluated
- Final report will include reliability & economic study results

Joint Study

"Merged Case" – 2013 series 2015 Summer Peak MMWG power flow where PJM, MISO, and NC systems were replaced by 2016 versions of each region. Interchanges were preserved as of the MMWG case with exception of the addition of a new transaction from Manitoba into MISO on the order of 673 MW.

"Base Case" – using the Merged Case, modeled the *BRA units with confirmed firm transmission service* sending power to PJM (4,889 MW).

"Changed Case" – using the Base Case, modeled additionally the *MISO BRA units that have not yet secured firm transmission service* sending power to PJM (1,940 MW).

"Sensitivity" – using the Changed Case, modeled additional *remaining BRA units that have not yet secured transmission service (All BRA units)* sending power to PJM (834 MW).

Joint Study

Reliability Study Methodology

- A full AC Contingency Analysis was performed using the PSS®MUST and PSS®E software.

- The study analyses were conducted in a coordinated effort by MISO, NCTPC, and PJM technical staffs, to the extent allowable under the PJM non-disclosure terms and conditions. Sharing of information that would explicitly reveal the generating units that participated in the PJM 2016/2017 BRA was not allowed under PJM's governing documents and code of conduct.

Joint Study

Reliability Study Methodology

- The contingency analysis methods that DEC and DEP use for their internal planning purposes were applied to the Base Case, Merged Case, Change Case, and Sensitivity Case.

- NERC standards are the minimum standards that ensure system reliability and allow for companies to implement additional criteria for planning. This evaluation included NERC category B N-1 contingency analysis, under scenarios of full generator availability as well as generation maintenance conditions.

- The analysis included scenarios that modeled generator forced outages, making up power from the Virginia-Carolina (VACAR) Reserve Sharing agreements along with a simultaneous additional single contingency.

Joint Study

Economic Study

- Performed by Duke Energy Resource Planning and PJM Interregional Planning Department using production costing models
- Shared/coordinated data for generation, load forecast, resource plan, transaction assumptions, fuel prices….
- Duke performed pipe & bubble type analysis of production cost utilizing FCITC results from the reliability study model
- PJM performed various scenario analyses using a nodal analysis with a fully detailed transmission model of the Eastern Interconnection

Joint Study

Economic Study

- The reliability study phase of the analysis quantified a range of possible impacts on the bidirectional capability of the DEC/DEP transmission system with and without the BRA unit flows.

- BRA units impacts on transmission limits between DEC and DEP were quantified during the reliability study for the same set of BRA units considered for the Base, Change, and Sensitivity cases.

- Production cost simulations were performed to quantify a range of potential impacts of an estimated range of potential transmission capabilities.

Joint Study

Economic Study

- Duke Energy performed a production cost analysis of the specified pipe limits as described above. Production cost impact varied between $3 M and $9 M for the year 2016.

- These results should be considered approximate and will vary with changes to fuel price assumptions.

- The impact of the 2016/17 BRA on DEC/DEP's overall production cost of ~$4.2 B is expected to be negligible.

Joint Study

Reliability Study

PJM 2016/2017 BRA Cleared Resources by Scenario

Region	Base Case	Change Case	Sensitivity Case
South	580	-	834
West 1	1,620	1,076	-
West 2	2,689	864	-
Total:	4,889	1,940	834

PJM CIL Zone Definitions

PSS/E Area #	PSS/E Area Name	PJM CIL Zone	16/17 BRA MW Cleared	Base Case	Change Case	Sensitivity Case
347	TVA	South				
363	LGEE	South				
340	CPLE	South				
341	CPLW	South				
342	DUK	South				
343	SCEG	South				
344	SCPSA	South				
			1414	580	0	834

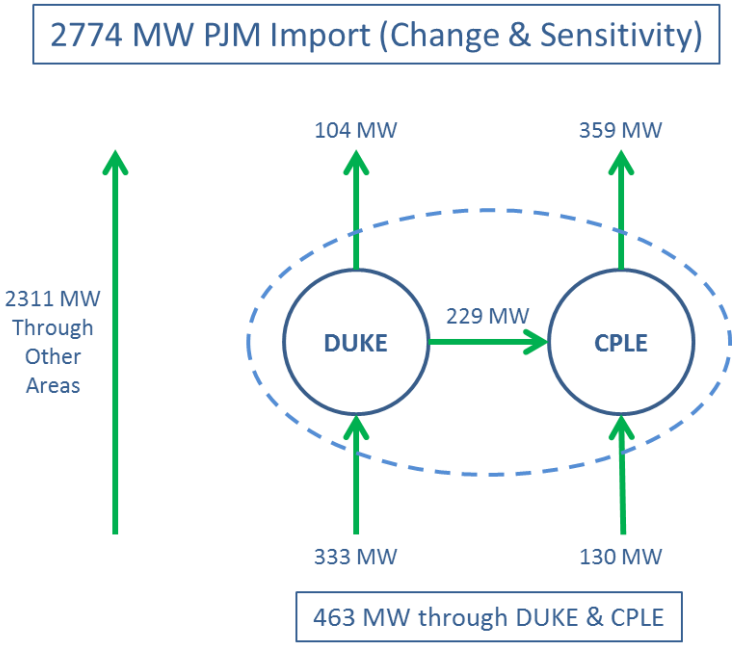
PSS®E Area #	PSS®E Area Name	PJM CIL Zone	16/17 BRA MW Cleared	Base Case	Change Case	Sensitivity Case
219	ITCT (aka DECO)	West 1				
218	METC (aka CONS)	West 1				
217	NIPS	West 1				
694	ALTE	West 1				
680	DPC	West 1				
615	GRE	West 1				
627	ITCM (aka ALTW)	West 1				
697	MGE	West 1				
635	MEC	West 1				
608	MP	West 1				
661	MDU	West 1				
633	MPW	West 1				
620	OTP	West 1				
613	SMMPA	West 1				
698	UPPC	West 1				
295	WEC	West 1				
696	WPS	West 1				
600	XEL (aka NSP)	West 1				
652	WAPA (aka WAUE)	West 1				
206	OVEC	West 1				
			2696	1620	1076	0

PSS®E Area #	PSS®E Area Name	PJM CIL Zone	16/17 BRA MW Cleared	Base Case	Change Case	Sensitivity Case
357	AMIL	West 2				
356	AMMO	West 2				
314	BREC	West 2				
360	CWLP	West 2				
333	CWLD	West 2				
208	DEI (aka CIN)	West 2				
207	HE	West 2				
216	IPL	West 2				
361	SIPC	West 2				
210	SIGE	West 2				
331	BCA	West 2				
336	BUBA	West 2				
502	CLEC	West 2				
339	DENL (aka NLR)	West 2				
338	DERS	West 2				

PSS®E Area #	PSS®E Area Name	PJM CIL Zone	16/17 BRA MW Cleared	Base Case	Change Case	Sensitivity Case
335	CONWAY (aka CWAY)	West 2				
351	EES	West 2				
327	EES-EAI	West 2				
326	EES-EMI	West 2				
503	LAFA	West 2				
504	LEPA	West 2				
332	LAGN	West 2				
337	PUPP	West 2				
349	SMEPA	West 2				
334	WESTMEMP (aka WMU)	West 2				
325	BRAZ	West 2				
329	OMLP	West 2				
328	PLUM	West 2				
			3553	2689	864	0
Total:			7663	4889	1940	834

Reliability Study

Incremental Flow Impact on CPLE and DUKE Areas from PJM 2016/2017 BRA Generation



PTDF - DEC (12%), DEP (13%), Aggregate (17%)

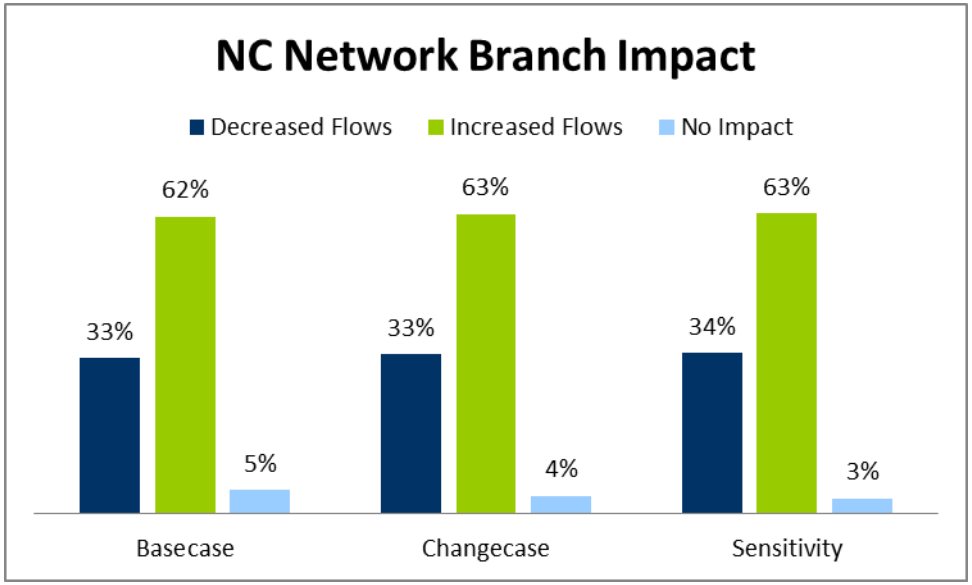
Reliability Study

Incremental Flow Impact on CPLE and DUKE Areas from PJM 2016/2017 BRA Generation

	Incremental Base Flow Impact		Incremental Change Flow Impact		Incremental Sensitivity Flow Impact		Change & Sensitivity		Base, Change, & Sensitivity	
Area	**MW**	**DF**	**MW**	**DF**	**MW**	**DF**	**MW**	**DF**	**MW**	**DF**
CPLE	530	11%	232	12%	130	16%	359	13%	892	12%
DUKE	393	8%	204	11%	129	15%	333	12%	726	9%
CPLE & DUKE	622	13%	289	15%	177	21%	463	17%	1088	14%
Total Transfer	4889		1940		834		2774		7663	

Reliability Study

2016/2017 PJM BRA Unit Impact on DEC and DEP Network Branches (normal operation)



Reliability Study

Flow Impact on CPLE and DEC Individual Branches from PJM 2016/2017 BRA Generation

	Incremental Base Flow Impact		Incremental Change Flow Impact		Incremental Sensitivity Flow Impact		Change & Sensitivity		Base, Change, & Sensitivity	
Area	**MW**	**PTDF**	**MW**	**PTDF**	**MW**	**PTDF**	**MW**	**PTDF**	**MW**	**PTDF**
Branch 1	277.6	5.7%	107.3	5.5%	59.7	7.2%	167.0	6.0%	444.6	5.8%
Branch 3	199.3	4.1%	91.2	4.7%	41.6	5.0%	132.8	4.8%	332.1	4.3%
Total Transfer	4889		1940		834		2774		7663	

Reliability Study

Flow Impact on CPLE and DUKE Individual Branches from Individual PJM BRA Generators

Branch	KV	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Line 1	500																															
Line 2	500																															
Line 3	500																															
Line 4	500																															
Line 5	500																															
Line 6	500																															
Line 7	500																															
Line 8	500																															
Line 9	500																															
Line 10	500																															
Line 11	500																															
Line 12	500																															
Line 13	230																															
Line 14	500																															
Line 15	500																															
Line 16	500																															
Line 17	500																															
Line 18	230																															
Line 19	230																															
Line 20	230																															
Line 21	230																															
Line 22	230																															
Line 23	230																															
Line 24	230																															
Line 25	500																															
Line 26	230																															
Line 27	230																															
Line 28	230																															
Line 29	230																															

Joint Study

DEC RESULTS – Gm Cases + N-1 contingencies

Overloaded Branch										Case Loading				Loading Increase	OTDF (Sensitivity – Base)		
From Bus	Name	To Bus	Name		Circuit	Rating	Case	Contingency		Merged	Base	Change	Sensitivity	(Sensitivity – Base)	Aggregate	Individual Unit (Highest)	Comment [7]
										%	%	%	%	%	%	%	
339003	HIGH RCK	100.00	339005	TUCKERTN	100.00	1	103	BEL1GM	GODBEY_W_REA	113.1	116.2	118.6	120.1	3.9	0.1	0.2	OG
306881	ENO	100.00	306897	GLEN RVN	100.00	1	66	OCO3GM	PARKWOOD	99.3	110	115.6	118.7	8.7	0.2	0.3	conductor
306949	PL GARDN	100.00	308766	HOLTRTAP	100.00	1	105	DRCCGM	PARKWOOD	96.4	101.9	104.9	106.7	4.8	0.2	0.2	conductor
339001	BADIN	100.00	339005	TUCKERTN	100.00	1	116	BEL1GM	GODBEY_W_REA	100.5	103.4	105.5	106.7	3.3	0.1	0.2	OG
308766	HOLTRTAP	100.00	308942	SWEPSNVW	100.00	1	105	DRCCGM	PARKWOOD	96.3	101.8	104.8	106.6	4.8	0.2	0.2	conductor
306004	6CENTRAL	230.00	306104	6SHADYTB	230.00	1	464	CLI5GM	FISHERW	98.5	100.7	102.5	103.6	2.9	0.5	0.9	conductor
306004	6CENTRAL	230.00	306105	6SHADYTW	230.00	2	464	CLI5GM	FISHERB	98.5	100.7	102.5	103.6	2.9	0.5	0.9	conductor
306847	6PARKWOD	230.00	306849	8PARKWOD	500.00	5	840	OCO3GM	PARKWOD_TX6	88.8	95.2	98.6	100.5	5.3	1.6	2.2	OG
306848	6PL GRDN	230.00	306850	8PL GRDN	500.00	5	1499	BEL1GM	PARKWOOD	92.1	95.9	97.9	99.6	3.7	2.0	2.5	AEU
306881	ENO	100.00	306897	GLEN RVN	100.00	2	85	OCO3GM	PARKWOOD	-	90.2	94.8	97.4	7.2	0.2	0.3	conductor
306847	6PARKWOD	230.00	306849	8PARKWOD	500.00	6	919	OCO1GM	PARKWOD_TX5	82	87.9	91	92.8	4.9	1.6	2.2	OG

Joint Study

DEC RESULTS – VRS Cases + N-1 contingencies

Overloaded Branch								Case	Contingency	Case Loading				Loading Increase	OTDF (Sensitivity – Base)		Comment [2]
										Merged	Base	Change	Sensitivity	(Sensitivity – Base)	Aggregate	Individual Unit (Highest)	
From Bus	Name		To Bus	Name		Circuit	Rating			%	%	%	%	%	%	%	
306881	ENO	100.00	306897	GLEN RVN	100.00	1	66	STUDYROX4VRS	PARKWOOD	113.1	124.2	130.1	133.5	9.3	0.2	0.3	conductor
306881	ENO	100.00	306897	GLEN RVN	100.00	2	85	STUDYROX4VRS	PARKWOOD	92.8	101.9	106.7	109.5	7.6	0.2	0.3	conductor
306847	6PARKWOD	230.00	306849	8PARKWOD	500.00	5	840	STUDYROX4VRS	PARKWOD_TX6	96.6	102.7	105.9	107.6	4.9	1.5	2.2	OG
339003	HIGH RCK	100.00	339005	TUCKERTN	100.00	1	103	STUDYROX4VRS	GODBEY_W_REA	95.9	99	101.2	102.6	3.6	0.1	0.2	OG
306004	6CENTRAL	230.00	306104	6SHADYTB	230.00	1	464	STUDYASH1VRS	FISHERW	96.8	99.2	100.9	102	2.8	0.5	0.9	conductor
306004	6CENTRAL	230.00	306105	6SHADYTW	230.00	2	464	STUDYASH1VRS	FISHERB	96.8	99.2	100.9	102	2.8	0.5	0.9	conductor
306841	6BOBWH B	230.00	306848	6PL GRDN	230.00	1	416	STUDYHAR1VRS	GODBEY_W_REA	92.2	96.7	99.1	100.4	3.7	0.6	0.5	AEU
306842	6BOBWH W	230.00	306848	6PL GRDN	230.00	2	416	STUDYHAR1VRS	GODBEY_W_REA	92.2	96.7	99.1	100.4	3.7	0.6	0.5	AEU
306949	PL GARDN	100.00	308766	HOLTRTAP	100.00	1	105	STUDYROX4VRS	PARKWOOD	89.4	95.2	98.5	100.4	5.2	0.2	0.2	conductor
308766	HOLTRTAP	100.00	308942	SWEPSNVW	100.00	1	105	STUDYROX4VRS	PARKWOOD	89.5	95.2	98.4	100.3	5.1	0.2	0.2	conductor
306847	6PARKWOD	230.00	306849	8PARKWOD	500.00	6	919	STUDYROX4VRS	PARKWOD_TX5	89.2	94.8	97.8	99.3	4.5	1.5	2.2	OG
306857	BURL T B	100.00	306897	GLEN RVN	100.00	1	305	STUDYROX4VRS	ALAMANCEW	91.8	95.5	97	98.1	2.6	0.3	0.3	conductor
306858	BURL T W	100.00	306897	GLEN RVN	100.00	1	305	STUDYROX4VRS	ALAMANCEB	91.8	95.5	97	98.1	2.6	0.3	0.3	conductor
306844	6ENO	230.00	306848	6PL GRDN	230.00	1	464	STUDYROX4VRS	PARKWOOD	-	89.7	94.1	96.6	6.9	1.2	1.4	conductor
306844	6ENO	230.00	306848	6PL GRDN	230.00	2	464	STUDYROX4VRS	PARKWOOD	-	89.7	94.1	96.6	6.9	1.2	1.4	conductor

Joint Study

DEP RESULTS – Non-TRM case + N-1 contingencies

Monitored Branch ** From bus ** ** To bus ** CKT	Rating	Case	Contingency Description	Case Loading				Loading Increase (Sensitivity – Base)	OTDF (Sensitivity – Base)		Comment [2]
				Merged	Base	Change	Sensitivity		Aggregate	Individual Unit (Highest)	
				%	%	%	%	%	%	%	
304532 VISTA 115 304545 CASTLEH115TT 115 1	179	Non-TRM	304550 CASTLEH230TT 230 304564 SCOTT TAP 230 1	91	93.4	94.9	95.8	2.4	0.2	0.2	conductor
304543 FOLKSTN115TT 115 305061 E9-DAWSON 115 1	152	Non-TRM	304540 GEIGER TAP 230 304542 FOLKSTN230TT 230 1	87.8	91.1	93	94.1	3.0	0.2	0.2	conductor
304532 VISTA 115 305063 E9-HUGHBATTS 115 1	179	Non-TRM	304550 CASTLEH230TT 230 304564 SCOTT TAP 230 1	85.8	88.3	89.7	90.6	2.3	0.2	0.2	conductor
304348 ROCKHAM230TT 230 304638 WADSBOR TAP1 230 1	542	Non-TRM	304348 ROCKHAM230TT 230 304360 WEST END SUB 230 1	<85	86.7	88.8	89.9	3.2	0.6	0.9	OG
304024 ROXSEP230 TT 230 304070 PERSON230 TT 230 2	797	Non-TRM	304024 ROXSEP230 TT 230 304070 PERSON230 TT 230 1	<85	80.1	<85	87	6.9	2.0	2.2	conductor

Joint Study

DEP RESULTS – TRM cases + N-1 contingencies

Monitored Branch ** From bus ** ** To bus ** CKT	Rating	Case	Contingency Description	Case Loading Merged %	Base %	Change %	Sensitivity %	Loading Increase (Sensitivity – Base) %	OTDF (Sensitivity – Base) Aggregate %	Individual Unit (Highest) %	Comment [2]
304632 MARION115 TT 115 304653 DILLON TAP 115 1	97	TRM Br1 Down	304663 LATTA SS TT 230 304682 DILLONMP TAP 230 1	97	109.7	114.8	117.8	8.1	0.3	0.5	OG
304348 ROCKHAM230TT 230 304638 WADSBOR TAP1 230 1	542	TRM Har Down	304348 ROCKHAM230TT 230 304360 WEST END SUB 230 1	96.4	101.4	103.4	104.7	3.3	0.6	0.9	OG
304361 WESTEND230TT 230 305024 E3-CNTR CRCH 230 1	542	TRM Har Down	304377 RICHMON500TT 500 304391 CUMBLND500TT 500 1	86	94.8	98.6	100.9	6.1	1.2	1.5	OG
304327 ELLERBE 230 304638 WADSBOR TAP1 230 1	512	TRM Har Down	304348 ROCKHAM230TT 230 304360 WEST END SUB 230 1	90.8	96.1	98.3	99.6	3.5	0.7	0.9	OG
304373 SAN GARD TAP 230 305024 E3-CNTR CRCH 230 1	542	TRM Har Down	304377 RICHMON500TT 500 304391 CUMBLND500TT 500 1	<85	92.5	96.4	98.6	6.1	1.2	1.5	OG
304327 ELLERBE 230 304361 WESTEND230TT 230 1	512	TRM Har Down	304348 ROCKHAM230TT 230 304360 WEST END SUB 230 1	86.7	91.9	94.1	95.5	3.6	0.7	0.9	OG
304357 SANFORD US#1 230 304373 SAN GARD TAP 230 1	512	TRM Har Down	304377 RICHMON500TT 500 304391 CUMBLND500TT 500 1	<85	88.9	92.9	95.3	6.4	1.2	1.5	OG
304305 SPRING TAP 115 304307 BISCOFNDRY T 115 1	199	TRM Har Down	304333 PITTSBORO 230 304340 SILERCT230TT 230 1	<85	87.1	90.1	91.9	4.8	0.3	0.4	conductor
304408 BEARD 115 304427 SLOCOMB TAP 115 1	119	TRM Har Down	304183 WAKE 500 TT 500 304391 CUMBLND500TT 500 1	<85	84.5	89.2	91.9	7.4	0.3	0.4	conductor
304630 MULLINS 115 304632 MARION115 TT 115 1	179	TRM Br2 Down	304631 MARION230 TT 230 305001 E1-CHAD PEA 230 1	<85	85.9	89.4	91.4	5.5	0.4	0.6	OG
304348 ROCKHAM230TT 230 304355 HAMLET 230 1	512	TRM Br2 Down	304377 RICHMON500TT 500 304391 CUMBLND500TT 500 1	<85	86.8	89.5	91	4.2	0.8	0.9	conductor
304196 ERWIN230 TT 230 304389 FAYEAST230TT 230 1	478	TRM Har Down	304183 WAKE 500 TT 500 304391 CUMBLND500TT 500 1	<85	82.2	87.4	90.5	8.3	1.4	1.9	conductor
304411 RAEFORD115TT 115 304429 RED SPR TAP 115 1	133	TRM Br1 Down	FAY-HAMLET230_&_RAEFORD-ROCKFISH230	86.2	88.1	89	89.6	1.5	0.1	0.0	conductor
304024 ROXSEP230 TT 230 304070 PERSON230 TT 230 2	797	TRM Br1 Down	304024 ROXSEP230 TT 230 304070 PERSON230 TT 230 1	<85	80.5	85	87.4	6.9	2.0	2.2	conductor
304378 RICHMON230TT 230 304415 RAEFORD230TT 230 1	797	TRM Br1 Down	304377 RICHMON500TT 500 304391 CUMBLND500TT 500 1	<85	83.9	86.2	87.4	3.5	1.0	1.1	AEU

Joint Study

Reliability Study Results – Duke Energy Perspective

- Not having access to the modeling data makes it virtually impossible for Duke Energy's transmission planners to fully understand any identified issues or to determine appropriate corrective actions.

- Duke Energy believes that its Transmission Planners have a right and necessity, due to their responsibilities under FERC and NERC rules, to obtain detailed information on all activities that may affect the reliability of Duke Energy's Bulk Electric System.

- Duke Energy's Transmission Planners operate under FERC's Standards of Conduct which forbid sharing of market information and should have complete access to BRA related information.

Joint Study

Reliability Study Results – Duke Energy Perspective

- Notwithstanding the foregoing concerns, Duke Energy believes that PJM performed the analysis accurately and conscientiously.

- As large BA's such as PJM & MISO grow ever larger and less geographically compact, and as they pull resources from the far reaches of North America, traditional interface arrangements among utility neighbors may no longer be sufficient. What are traditional interface arrangements? Is that the next bullet reference?

- When utilities were more compact, shared allowance of loop flows was possible. As large balancing areas' resources expand widely, loop flows become unbalanced, with the larger entities making significant use of others transmission systems without an equivalent level of loop flows in the other direction.

Joint Study

Study Results – Duke Energy Perspective

- Common distribution factor (DF) cutoffs of 3-5% make sense for the study of individual transmission service requests and generation interconnection requests, but they are less appropriate for larger, wider-spread groupings of resources analyzed as a single resource.

- Having such low DF's limits the likelihood that calling Transmission Loading Reliefs (TLRs) on BRA related generators will be a viable means of relieving congestion in real time. Evaluating all of the PJM BRA generation as a group spreads out the power on a percentage basis, making DF's on individual lines smaller.

- However, the aggregate MW impact of the BRA flows can still be significant on individual lines. Duke Energy does not believe that the small DF's seen in this analysis make the impacts on its transmission facilities any less relevant.

Joint Study

Reliability Study Results – Duke Energy Perspective

- The study found that 463 MW of the 2774 MW of PJM 2016/2017 BRA resources that do not have transmission service will flow through DEC and DEP transmission systems.

- There is a good probability that some or all of these resources will use a transmission service path that does not include Duke Energy, resulting in no means to deny service through the NCTPC footprint or receive compensation.

- The study did not find any DEP transmission facilities that will need immediate upgrades due to the PJM 2016/2017 BRA.

- There were DEC transmission facilities that were identified as not meeting transmission planning requirements that cannot be alleviated by upgrades by 2016.

Joint Study

Reliability Study Results – Duke Energy Perspective

- PJM has implemented a Capacity Import Limit into their BRA process and has indicated that the next BRA, 2017/2018, has fewer resources located outside the PJM footprint.

- These facts lead to the conclusion that follow-up joint operating horizon studies must be performed to more accurately identify impacts and to determine solutions to the identified problems in the DEC area.

- The BRA resources are based on firm energy contracts and firm transmission service. The NCTPC footprint can incur real time negative reliability impacts without further investigation of the identified issues. Duke Energy is concerned about the reliability impacts on its transmission systems from the growth in large magnitude, long distance power transfers from and to large, geographically diverse balancing areas. Since the BRA resources change from year to year, it may be necessary to repeat this analysis on an annual basis.

Joint Study

- PJM Comments
- MISO Comments

Questions ?

Reliability Study

Branch	From				To				Circuit
	Area	Bus Num	Bus Name	KV	Area	Bus Num	Bus Name	KV	
Line 1	DUK	306008	8OCONEE	500	SOCO	380011	8S HALL	500	1
Line 2	AEP	242520	05J.FERR	500	DUK	306719	8ANTIOCH	500	1
Line 3	DEP_EAST	304183	WAKE 500 TT	500	DVP	314902	8CARSON	500	1
Line 4	DUK	306719	8ANTIOCH	500	DUK	306546	8MCGUIRE	500	1
Line 5	DUK	306337	8NEWPORT	500	DUK	306008	8OCONEE	500	1
Line 6	DUK	306113	8JOCASSE	500	DUK	308788	8CLFSDTAP	500	1
Line 7	DUK	308788	8CLFSDTAP	500	DUK	306546	8MCGUIRE	500	1
Line 8	DEP_EAST	304183	WAKE 500 TT	500	DEP_EAST	304391	CUMBLND500TT	500	1
Line 9	DUK	306113	8JOCASSE	500	DUK	306008	8OCONEE	500	1
Line 10	DEP_EAST	304377	RICHMON500TT	500	DEP_EAST	304391	CUMBLND500TT	500	1
Line 11	DEP_EAST	304377	RICHMON500TT	500	DUK	306337	8NEWPORT	500	1
Line 12	DUK	306337	8NEWPORT	500	DUK	306546	8MCGUIRE	500	1
Line 13	DEP_EAST	304070	PERSON230 TT	230	DVP	314697	6HALIFAX	230	1
Line 14	DUK	306546	8MCGUIRE	500	DUK	306836	8WOODLF	500	1
Line 15	DUK	306836	8WOODLF	500	DUK	306850	8PL GRDN	500	1
Line 16	DUK	306849	8PARKWOD	500	DUK	306850	8PL GRDN	500	1
Line 17	DUK	306008	8OCONEE	500	DUK	306007	6OCONEE	230	A1
Line 18	DEP_EAST	304451	GREENVILE TT	230	DVP	314574	6EVERETS	230	1
Line 19	DEP_EAST	304417	MCCOLL TAP	230	DEP_EAST	304424	LAURINB230TT	230	1
Line 20	DEP_EAST	304417	MCCOLL TAP	230	DEP_EAST	304708	BENNET SS TT	230	1
Line 21	DEP_EAST	304018	ROB2 230 TT	230	DEP_EAST	304338	CHERAW TAP1	230	1
Line 22	DEP_EAST	304338	CHERAW TAP1	230	DEP_EAST	304348	ROCKHAM230TT	230	1
Line 23	DEP_EAST	304024	ROXSEP230 TT	230	DEP_EAST	304070	PERSON230 TT	230	2
Line 24	DUK	306333	6NEWPORT	230	SCEG	371112	6VCS1_2	230	1
Line 25	DEP_EAST	304054	DURHAM500 TT	500	DEP_EAST	304056	DURHASTR	1	1
Line 26	DEP_EAST	304117	DURHAM230 TT	230	DEP_EAST	304056	DURHASTR	1	1
Line 27	DEP_EAST	304046	WSPOON230 TT	230	DEP_EAST	304682	DILLONMP TAP	230	1
Line 28	DEP_EAST	304663	LATTA SS TT	230	DEP_EAST	304682	DILLONMP TAP	230	1
Line 29	DEP_EAST	304222	ROCKYMT230TT	230	DEP_EAST	304226	PA-RMOUNT#4	230	1

2015 Study Scope Discussion

Orvane Piper

Duke Energy Carolinas

Study Process Steps

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

Collaborative Study Assumptions

- **Study years**
  - **Short term (5 yr) and long term (10 yr) base reliability analysis**
  - **Alternate model scenarios**
- **Thermal power flow analysis**
  - **DEP and DEC contingencies**
  - **DEP and DEC monitored elements**
    - **Internal lines**
    - **Tie lines**

Study Inputs

- **LSEs provide:**
  - **Inputs for load forecasts and resource supply assumptions**
  - **Dispatch order for their resources**
- **Area interchange coordinated between Participants and neighboring systems**

Economic Study Requests

- TAG request to be distributed in early February, 2015
- Requests can include in, out and through transmission service

2015 Study

- **Base reliability case analysis – 2020 summer and winter and 2025 summer**
  - **An "All Firm Transmission" Case(s) will be developed which will include all confirmed long term firm transmission reservations with roll-over rights applicable to the study year(s)**
  - **DEC and DEP generation down cases will be created from the common Base Case**

- **Alternate scenarios/sensitivities – 2020 / 2025 summer**

Past Studies' Alternate Scenarios

- **Hypothetical Imports/Exports re-evaluated every other year**
  - **Increased from 600 MW to 1000 MW**
- **Hypothetical NC Generation**
  - **Fossil Fuel**
  - **Wind Energy**
    - **Off-shore – NCTPC only and NCTPC-PJM Joint Study**
- **Retirement of Coal Units**

TAG Input Request

- **TAG is requested to provide any additional input to the OSC on the proposed 2015 Study Scope and any additional suggested study scenarios**
- **Provide input by January 6, 2015 to Rich Wodyka – Administrator (rawodyka@aol.com)**

Questions ?

MISO/Entergy Integration Operations Reliability Coordination Agreement (ORCA)

Bob Pierce

Duke Energy Carolinas

MISO/Entergy Integration

MISO South

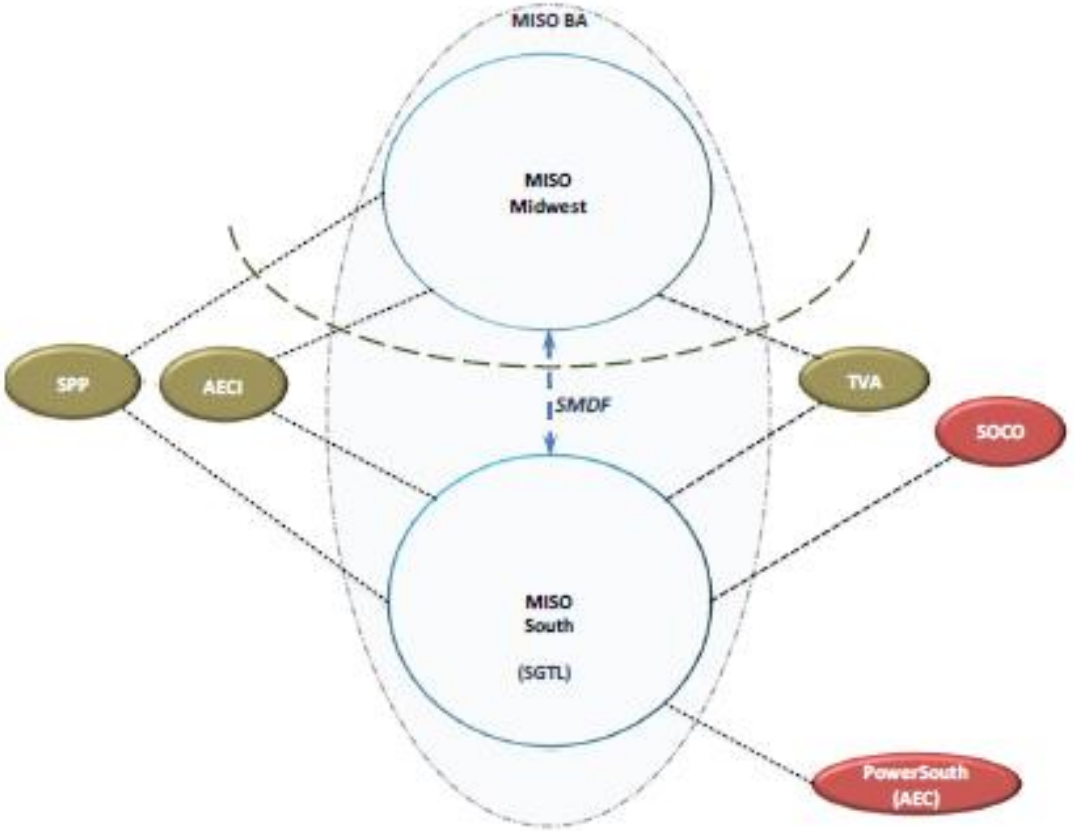
- Entergy Operating Companies (including, but not limited to, Entergy Arkansas, Inc., Entergy Gulf States Louisiana, L.L.C., Entergy Louisiana LLC, Entergy Mississippi, Inc., Entergy New Orleans, Inc. and Entergy Texas, Inc.),
- Louisiana Energy and Power Authority,
- Lafayette Utilities System,
- South Mississippi Electric Power Association,
- Cleco Corporation,
- NRG/Louisiana Generating, LLC (including West Memphis, North Little Rock and Conway)

MISO/Entergy Integration

- The Joint Parties (SPP, TVA, Southern, AECI, PowerSouth, Louisville Gas and Electric, and Kentucky Utilities) entered into an Operating Reliability Coordination Agreement (ORCA) with MISO.

- The ORCA provides a long term road map for coordination and study between the Parties to ensure reliability in the consolidated MISO BA that stretches from the gulf coast through middle America to the US Canadian border.

MISO/Entergy Integration



ORCA Phase Description

Phase 1	Phase 2	Phase 3
Through April 19 2014*	**Through Oct. 01 2014***	**Through April 01 2015**
2000MW Dispatch Flow Limit	Dispatch Flow limit set with two day ahead process*	Dispatch Flow limit set with one day ahead process*
MISO adjusts Dispatch Flow between 1500MW and 2000MW for congestion	Respect 2 day ahead Dispatch Flow limit	Respect 1 day ahead dispatch flow limit
If Dispatch Flow < 1500MW, use pre-existing congestion management processes (TLR)	If Dispatch Flow < 2 DA Limit, use pre-existing congestion management processes (TLR)	If Dispatch Flow < 1 DA Limit, use pre-existing congestion management processes (TLR)
Use Intra-day adjustment process to increase limit*	Use Intra-day adjustment process to increase limit*	Use Intra-day adjustment process to increase limit*
Develop Phase 2 process	Develop Phase 3 process	Develop Seams Agreement

* or upon completion of testing and validation

- **Purpose**
  - Provide an update on performance of the Sub-Regional Power Balance Constraint (SPRBC)
- **Time Period Evaluated**
  - July 17th, 2014 through November 20th, 2014
- **Key Takeaways**
  - A dramatic change in the behavior of the Real-Time calculated Intra-Regional flow was noted, mostly during early November
    - Increased South to North flows
  - Decreased overall binding November to-date
    - Greater percentage bound South to North in both markets
  - The SRPBC demand curve for transmission service agreements (Hurdle Rate) remains at $9.57/MWh for November and December
    - Discuss methodology for adjusting the hurdle rate

MISO

5-Minute Real-Time Constraint Performance

- Real-Time calculated Intra-Regional flows
  - North to South direction 73.7% of the time;
  - South to North direction 26.3% of the time, 6.1% increase over last reporting period
  - Percentage of November to-date South to North flow increased 20.0% from October
    - 60% of November to-date S-N flow intervals were observed from November 2nd – November 8th
      - High generation and transmission outages in the Central Region
      - Increased load in the North and Central Regions, lower load in the South Region
      - Increased export-limited wind generation in the North Region

July 17th - November 20th	July++: 4320 Intervals		August: 8928 Intervals		September: 8640 Intervals		October: 8928 Intervals		November: 5760 Intervals		Total: 36576 Intervals	
CONSTRAINT_NAME	Average Flow (MW)	Number of Intervals	Average Flow (MW)	Number of Intervals	Average Flow (MW)	Number of Intervals	Average Flow (MW)	Number of Intervals	Average Flow (MW)	Number of Intervals	Average Flow (MW)	Number of Intervals
SO_MW_Rev_Transfer (North to South)	904.02	3548 (82.1%)	886.99	7594 (85.1%)	683.07	6871 (79.5%)	666.83	6144 (68.8%)	584.91	2810 (48.8%)	755.64	26967 (73.7%)
SO_MW_Transfer (South to North)	498.66	772 (17.9%)	515.14	1334 (14.9%)	599.68	1769 (20.5%)	558.59	2784 (31.2%)	702.28	2950 (51.2%)	599.42	9609 (26.3%)
Grand Total	831.58	4320 (100%)	831.43	8928 (100.0%)	665.99	8640 (100.0%)	633.08	8928 (100.0%)	645.02	5760 (100.0%)	714.60	36576 (100.0%)

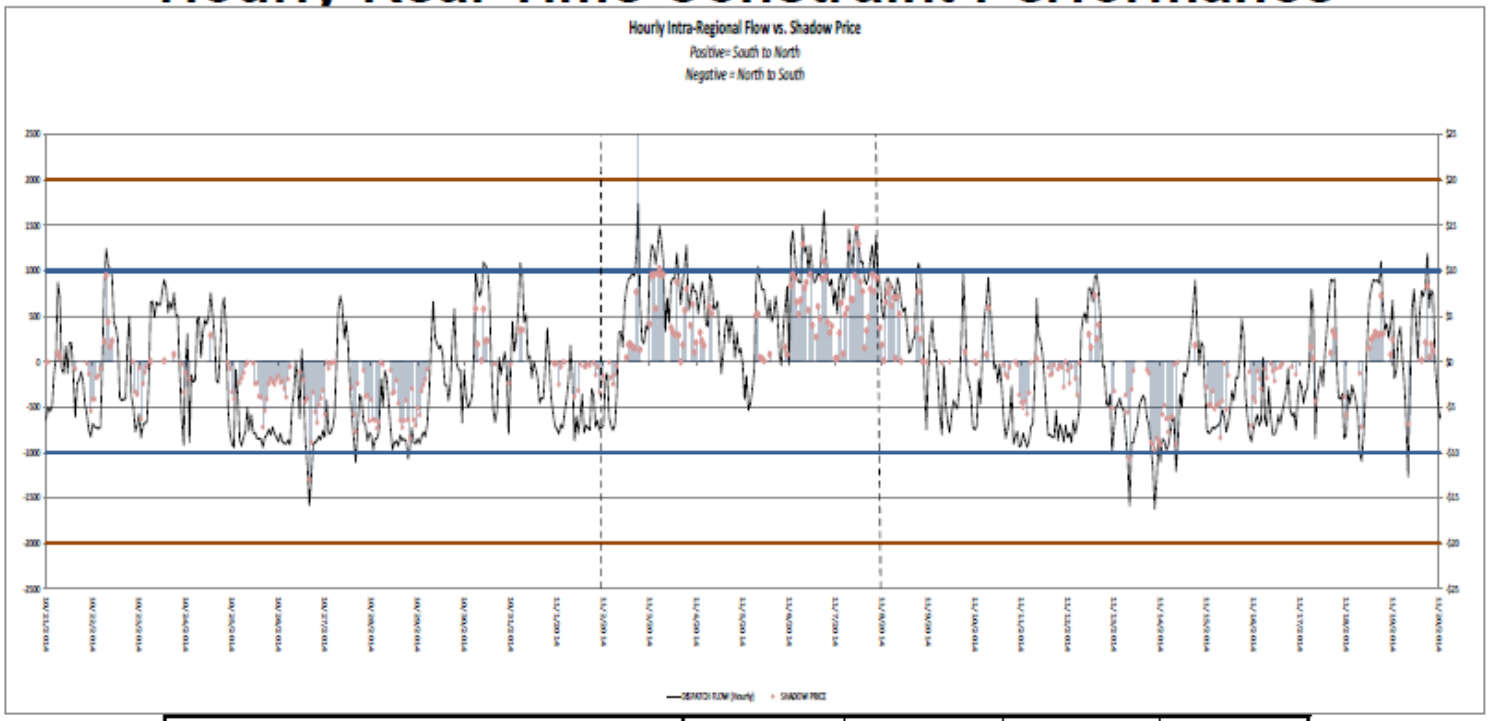
*Percents based on total intervals in the month

++Hurdle Rate implemented on July 17, 2014

[1] Defined as the total number of hours equal to the hurdle rate divided by the total number of hours bound

MISO

Hourly Real-Time Constraint Performance



Intra-Regional Flow October 21st - November 20th	Periods	Periods <1000	Periods >1000	Periods>2000
North to South	412 (55.4%)	396 (53.2%)	16 (2.2%)	0 (0.0%)
South to North	332 (44.6%)	286 (38.4%)	46 (6.2%)	0 (0.0%)
Shadow Price October 21st - November 20th	**Average ($/MW)**	**Periods < $9.57**	**Periods = $9.57**	**Periods> $9.57**
North to South	-$2.94	223 (30.0%)	0 (0.0%)	3 (0.4%)
South to North	$4.57	145 (19.5%)	6 (0.8%)	8 (1.1%)

*Percents based on total intervals in time period
*Shadow Price is sum of SRPBC and ORCA

Questions ?

Regional Studies Reports

Bob Pierce - Duke

SERC Long Term Study Group Update

SERC Long Term Study Group

- Building 2014 series of MMWG cases

- Final report for 2016 Summer study has been approved. Will be publicly available with FERC 715 submittals – April 2015

Carolinas Transmission Coordination Arrangement (CTCA)

CTCA

- Study of 2018S and 2021S jointly developed models
- Shared contingency files and generation down cases
- Effort to ensure simultaneous feasibility of the CTCA participants' transmission plans.

TABLE A
DUKE ENERGY PROGRESS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2018 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
P01	Marion-Dillon Tap 115 kV Line 1 (Weatherspoon Plant-Marion)	Brunswick 1 Gd (TRM) Latta-Dillon Maple 230 kV Line 1	Loading (103.4%)	Existing Operating Procedure to Open Marion Terminal [2016]
P02	Rockingham-Wadesboro Tap 230 kV Line 1 (Rockingham-West End West)	Harris Gd (TRM) Rockingham-West End 230 kV East Line 1	Loading (101.6 %)	Existing Operating Procedure to Open West End Terminal [2017]
P03	Vista-Castle Hayne 115 kV Line 1 (Castle Hayne-Folkstone)	Castle Hayne-Scott Tap 230 kV Line 1	Loading (92.1%)	Existing Operating Procedure to Open Castle Hayne Terminal [2024]
P04	Darlington-South Bethune (SCPSA) 230 kV Line 1 (Darlington Plant-SCPSA South Bethune)	Robinson 2 Gd (TRM) SCPSA Kingstree 230 kV Bus Outage	Loading (91.1 %)	Replace Ancillary Equipment at Darlington Plant [2025]

TABLE A (continued)
DUKE ENERGY PROGRESS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2018 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
P05	Sumter-Wateree (SCE&G) 230 kV Line 1 (Sumter-SCE&G Wateree)	Robinson 2 Gd (TRM) SCE&G VCS1-SCPSA Winnsboro and SCE&G VCS1-SCPSA Blythewood 230 kV Lines	Loading (90.9 %)	Replace Ancillary Equipment at Sumter [2025]
P06	West End-Central EMC Center Church 230 kV Line 1 (Cape Fear-West End)	Cumberland-Richmond 500 kV Line 1	Loading (90.9%)	Existing Operating Procedure to Open West End Terminal [2025]

TABLE B
DUKE ENERGY PROGRESS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2021 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
P07	Chestnut Hills-Milburnie 115 kV Line 1 (Chestnut Hills-Milburnie)	Harris Gd (TRM) Falls-Honeycutt and Falls-Neuse 230 kV Lines	Loading (96.7 %)	Relocate Neuse 115 kV Substation to Falls-Method 115 kV Line [2024]
P08	Camden-Ind099 115 kV Line 1 (Camden-Wateree DEC)	Harris Gd (TRM) Camden Tap-Camden 115 kV Line	Loading (94.7 %)	Future Operating Procedure to Open Camden Terminal [2025]
P09	Goldsboro-E13Arba 115 kV Line 1 (Goldsboro-Kinston Dupont)	Wommack-Ind047 230 kV Line	Loading (91.9 %)	Future Operating Procedure to Open Goldsboro Terminal [2027]
P10	Delco-Ind068 115kV Line 1 (Sutton Plant-Delco)	Brunswick 1 Gd (TRM) Sutton Plant-Ind064 115 kV Line	Loading (91.3 %)	Replace Ancillary Equipment [2027]

TABLE B (continued)
DUKE ENERGY PROGRESS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2021 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
P11	Camden Tap-Camden 115 kV Line 1 (Camden-Camden Junction)	Harris Gd (TRM) Camden-Ind099 115 kV Line	Loading (90.2 %)	Future Operating Procedure to Open Camden Terminal [2028]
P12	Florence 230/115 kV Transformer 2	Florence 230/115 kV Transformer 1	Loading (90.0 %)	Replace Ancillary Equipment [2028]

TABLE C
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2018 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D01	Eno-Glen Raven 100 kV Line 1/2 (Orange)	Roxboro 4 Gd (Non-TRM) Parkwood-Pleasant Garden 500 kV Line 1 (Parkwood)	Loading (109.1 %)	DEC and DEP are jointly evaluating potential solutions
D02	Parkwood 500/230 kV Transformer 5	Roxboro 4 Gd (TRM) Parkwood 500/230 kV Transformer 6	Loading (102.9 %)	New Operating Procedure [2018] Trip Parallel Bank or Open 500 kV line Accelerated 9 Years
D03	Tiger Tie-Springs Lyman Tap-Lelia Retail Tap 100 kV Line 1 (Tiger)	Cliffside 5 Gm Peach Valley 230/100/44 kV Transformer 3 Close 44kV Bank 1	Loading (98.4 %)	5.27 miles 266.8 ACSR Reconductor [2020] Accelerated 7 Years
D04	Monroe-Roughedge-Mini Ranch Retail 100 kV Line 1 (Monroe)	Harris Gd (TRM) Morning Star 230/100 kV Transformer 4, Morning Star-Newport 230 kV Line 1 (Sandy Ridge)	Loading (94.9 %)	14.71 miles 2/0 Cu Reconductor [2022] Accelerated 8 Years

TABLE C (continued)
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2018 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D05	Ashe St-Durham 100 kV Line 1 (Ashe St White)	Harris Gd (TRM) Parkwood-Pleasant Garden 500 kV Line 1 (Parkwood)	Loading (92.1 %)	3.26 miles 477 ACSR Reconductor [2024] Accelerated 7 Years
D06	Pleasant Garden-Holt Retail-Swepsonville 100 kV Line 1 (Swepsonville)	Dan River CC Gm Parkwood-Pleasant Garden 500 kV Line 1 (Parkwood)	Loading (98.7 %)	6.04 miles 336 ACSR Single Circuit [2019] Accelerated 3 Years
D07	Morning Star-Union EMC 9 100 kV Line 1 (Indian Trail Black)	Robinson 2 Gd (TRM) Monroe-Monroe City 4 100 kV Line 1 (Indian Trail White)	Loading (93.9 %)	5.40 miles 2-336 ACSR Reconductor [2023] Accelerated 2 Years
D08	Great Falls-Wateree 100 kV Line 1/2 (Wateree)	Fishing Creek Gm Great Falls-Wateree 100 kV Line 2/1 (Wateree)	Loading (110.8 %)	Existing Operating Procedure [2018]

TABLE C (continued)
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2018 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D09	Sadler-Ernest 230 kV Line 1 (Sadler)	Dan River CC Gm Sadler 230/100/44 kV Transformer 3	Loading (106.5 %)	New Operating Procedure Open Ernest Ring Bus or Redispatch Rockingham [2018]
D10	Sadler 230/100/44 kV Transformer 4	Dan River CC Gm Sadler 230/100/44 kV Transformer 3	Loading (99.6 %)	New Operating Procedure Open Ernest Ring Bus or Redispatch Rockingham [2020]

TABLE D
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2021 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D11	Winecoff-Brantley Rd Retail 100 kV Line 1 (Buck)	Belews Creek 1 Gm Buck 230/100 kV Transformer A4	Loading (96.1 %)	2.91 miles 477 ACSR Reconductor [2024] Accelerated 5 Years
D12	Peach Valley-Riverview 230 kV Line 1/2 (London Creek)	Oconee 1 Gm Peach Valley-Riverview 230 kV Line 2/1 (London Creek)	Loading (97.2 %)	Installing Switchable Line Reactors in 2016 [2023] Accelerated 5 Years
D13	China Grove-Swink Tap 100 kV Line 1 (Collins)	Belews Creek 1 Gm Buck 230/100 kV Transformer A4	Loading (93.1 %)	4.85 miles 477 ACSR Reconductor [2026] Accelerated 4 Years
D14	Rural Hall-RJR-Walnut Cove 100 kV Line 1 (Walnut Cove B&W)	Dan River CC Gm Sadler 230/100/44 kV Transformer 4	Loading (97.7 %)	10.33 miles 2-336 ACSR (Six-wired) Reconductor [2026] Accelerated 2 Years

TABLE D (continued)
DUKE ENERGY CAROLINAS
SUMMARY OF POTENTIAL RELIABILITY ISSUES
2021 SUMMER PEAK

	Element	Contingency	Potential Issue	Potential Solution
D15	Oakvale-Shady Grove 230 kV Line 1/2 (Oakvale)	Cliffside 5 Gm Oakvale-Shady Grove 230 kV Line 2/1 (Oakvale)	Loading (97.0 %)	4.09 miles 2-477 ACSR Reconductor [2026] Accelerated 2 Years
D16	Morning Star-Newport 230 kV Line 1 (Sandy Ridge)	McGuire 1 Gm Woodlawn 230/100/44 kV Transformer 5, Morning Star-Newport 230 kV Line 1 (Steelberry)	Loading (96.4 %)	33.59 miles 954 ACSR Add Second Circuit [2024] Accelerated 2 Years
D17	Beckerdite 230/100 kV Transformer 3	Dan River CC Gm Beckerdite 230/100 kV Transformer 1	Loading (100.0 %)	Replace Existing Bank 2 or 3 with New 400 MVA [2021] Accelerated 2 Years

Eastern Interconnection Planning Collaborative (EIPC)

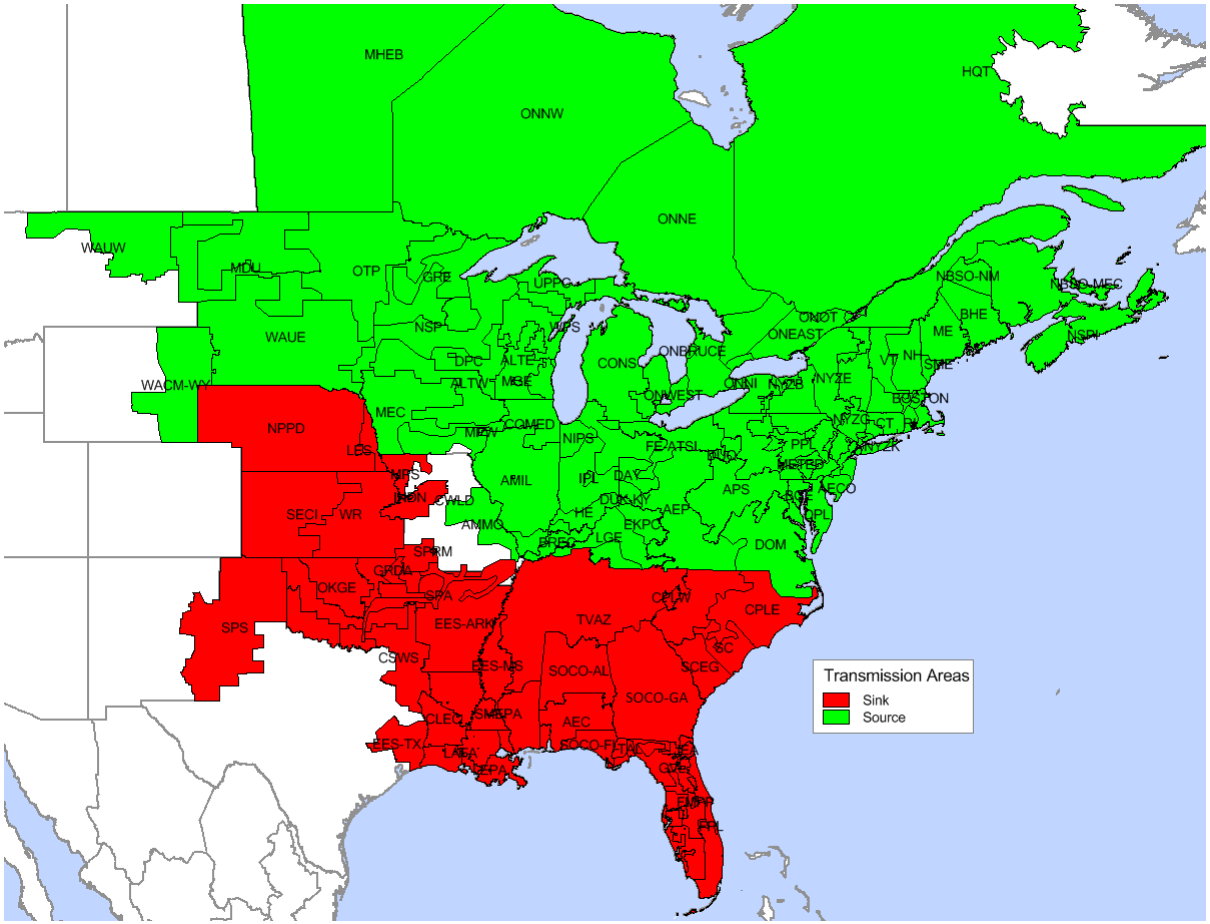
EIPC

Planning Activities

- Working on linear transfer analysis and drought study report
- Linear transfer analysis will identify changes in inter-regional constraints from planned upgrades that have been added to the model.

EIPC

Summary of Transfer Results



http://www.eipconline.com/

SERTP

SERTP

- **SERTP Annual Transmission Planning Summit on 12/18/14**
- **Will present 2014 SERTP Regional Transmission Plan**

http://www.southeasternrtp.com/

NERC Reliability Standards Update

- **CIP-014 Physical Security**

Questions ?

2014 TAG Work Plan

Rich Wodyka
Administrator

2014 NCTPC Overview Schedule

Reliability Planning Process

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

Economic Planning Process

- Propose and select Economic scenarios and interface
- Perform analysis, identify problems, and develop solutions
- Review Economic Study Results

Coordinated Plan Development

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

FERC Order 1000 Updates

TAG Meetings

2014 TAG Work Plan

January – February

- **2014 Study – Finalize Study Scope of Work**
  - ✓ **Receive final 2014 Reliability Study Scope for comment**
  - ✓ **Review and provide comments to the OSC on the final 2014 Study Scope**
  - ✓ **Receive request from OSC to provide input on proposed Economic Planning scenarios and interfaces for study**
  - ✓ **Provide input to the OSC on proposed Economic Planning scenarios and interfaces for study**

March 11, 2014

TAG Meeting

- **2014 Study Update**
  - ✓ **Receive a progress report on the Reliability and Economic Planning study activities**
- **Order 1000 Update**
  - ✓ **Receive an update on the NCTPC activities as they relate to Order 1000 compliance**
- **Operations Reliability Coordination Agreement (ORCA)**
  - ✓ **Receive an update on the ORCA activities**

April - May - June

TAG Meeting – June 16, 2014

- **2014 Study Update**
  - ✓ **Receive a progress report on the Reliability and Economic Planning study activities**
- **Joint Inter-Regional Study Update**
  - ✓ **Receive a progress report on the Joint Inter-Regional study activities**
- **Order 1000 Update**
  - ✓ **Receive an update on the NCTPC activities as they relate to Order 1000 compliance**
- **Operations Reliability Coordination Agreement (ORCA)**
  - ✓ **Receive an update on the ORCA activities**

July - August - September

- **2014 Study - Technical Analysis, Problem Identification, and Solution Development**
  - ✓ **TAG will be requested to provide input to the OSC and PWG on the technical analysis performed, the problems identified as well as proposing alternative solutions to the problems identified.**
  - ✓ **TAG will be requested to provide input to the OSC and PWG on any proposed alternative solutions to the problems identified through the technical analysis.**

July - August - September

- **2014 Study Update**
  - ✓ **Receive a progress report on the Reliability and Economic Planning study activities**
  - ✓ **Receive update status of the upgrades in the 2013 Collaborative Plan**

July - August - September

TAG Meeting – September 18,2014

- **2014 Study Update**
  - ✓ **Receive a progress report on the Reliability and Economic Planning study activities**
- **Joint Inter-Regional Study Update**
  - ✓ **Receive a progress report on the Joint Inter-Regional study activities**
- **Order 1000 Update**
  - ✓ **Receive an update on the NCTPC activities as they relate to Order 1000 compliance**
- **Operations Reliability Coordination Agreement (ORCA)**
  - ✓ **Receive an update on the ORCA activities**

October - November - December

- **2014 Study - Technical Analysis, Problem Identification, and Solution Development**
  - ✓ **TAG will be requested to provide input to the OSC and PWG on the technical analysis performed, the problems identified as well as proposing alternative solutions to the problems identified**
  - ✓ **TAG will be requested to provide input to the OSC and PWG on any proposed alternative solutions to the problems identified through the technical analysis**

October - November - December

- **2014 Study Update**
  - ✓ **Receive a progress report on the Reliability and Economic Planning study activities and preliminary results**
  - ✓ **Receive and comment on final draft of the 2014 Collaborative Transmission Plan report**
  - ✓ **Discuss potential study scope for 2015 studies**

- **2014 Selection of Solutions**
  - ✓ **TAG will receive feedback from the OSC on any alternative solutions that were proposed by TAG members**

October - November - December

- **Joint Inter-Regional Study Update**
  - ✓ **Receive a progress report on the Joint Inter-Regional study activities**
- **Order 1000 Update**
  - ✓ **Receive an update on the NCTPC activities as they relate to Order 1000 compliance**
- **Operations Reliability Coordination Agreement (ORCA)**
  - ✓ **Receive an update on the ORCA activities**

October - November - December

TAG Meeting – December 15, 2014

- **2014 Study Update**
  - ✓ **Receive presentation on the draft report of 2014 Collaborative Transmission Plan**
  - – **Discuss potential study scope for 2015 studies**
- **Joint Inter-Regional Study Update**
  - ✓ **Receive a progress report on the Joint Inter-Regional study activities**
- **Order 1000 Update**
  - ✓ **Receive an update on the NCTPC activities as they relate to Order 1000 compliance**
- **Operations Reliability Coordination Agreement (ORCA)**
  - ✓ **Receive an update on the ORCA activities**

Questions ?

2015 TAG Work Plan

Rich Wodyka

Administrator

2015 NCTPC Overview Schedule

Reliability Planning Process

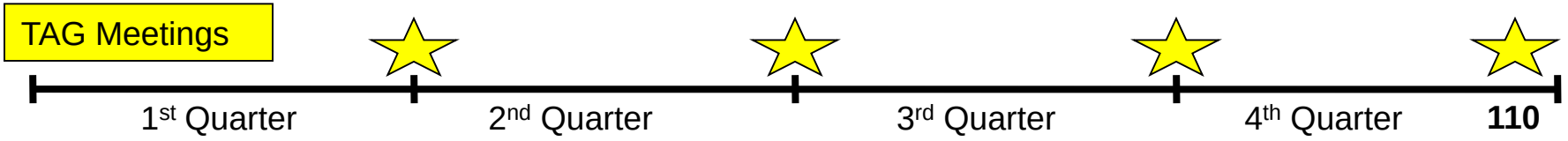
- Evaluate current reliability problems and transmission upgrade plans
- Perform analysis, identify problems, and develop solutions
- Review Reliability Study Results

Economic Planning Process

- Propose and select economic scenarios and interface
- Perform analysis, identify problems, and develop solutions
- Review Economic Study Results

Coordinated Plan Development

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



2015 TAG Work Plan

January – February

- **2015 Study – Finalize Study Scope of Work**
  - **Receive final 2015 Reliability Study Scope for comment**
  - **Review and provide comments to the OSC on the final 2015 Study Scope**
  - **Receive request from OSC to provide input on proposed Economic Study scenarios and interfaces for study**
  - **Provide input to the OSC on proposed Economic Study scenarios and interfaces for study**

March

TAG Meeting

- **2015 Study Update**
  - **Receive a progress report on the Reliability Planning study activities and preliminary results**
  - **Receive a report on the Economic Study scope, if applicable**

- **Operations Reliability Coordination Agreement (ORCA)**
  - **Receive an update on the ORCA activities**

April - May - June

- **2015 Study - Technical Analysis, Problem Identification, and Solution Development**
  - **TAG will be requested to provide input to the OSC and PWG on the technical analysis performed, the problems identified as well as proposing alternative solutions to the problems identified**
  - **TAG will be requested to provide input to the OSC and PWG on any proposed alternative solutions to the problems identified through the technical analysis**

April - May - June

TAG Meeting

- **2015 Study Update**
  - **Receive a progress report on the Reliability and Economic Planning study activities and preliminary results**
  - **Receive update status of the upgrades in the 2014 Collaborative Plan**

- **Operations Reliability Coordination Agreement (ORCA)**
  - **Receive an update on the ORCA activities**

July - August - September

- **2015 Study Update**
  - **Receive a progress report on the Reliability and Economic Planning study activities and preliminary results**
- **2015 Selection of Solutions**
  - **TAG will receive feedback from the OSC on any alternative solutions that were proposed by TAG members**

July - August - September

TAG Meeting

- **2015 Study Update**
  - **Receive a progress report on the Reliability and Economic Planning study activities and preliminary results**

- **Operations Reliability Coordination Agreement (ORCA)**
  - **Receive an update on the ORCA activities**

October - November - December

- **2015 Study Update**
  - **Receive and comment on final draft of the 2015 Collaborative Transmission Plan report**
  - **Discuss potential study scope for 2016 studies**

October - November - December

TAG Meeting

- **2015 Study Update**
  - **Receive presentation on the draft report of 2015 Collaborative Transmission Plan**
  - **Discuss potential study scope for 2016 studies**

- **Operations Reliability Coordination Agreement (ORCA)**
  - **Receive an update on the ORCA activities**

Questions ?

TAG
Open Forum Discussion

Comments or Questions ?