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EIPC Update

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February 16, 2015

EIPC Study Approach: Non-DOE Work

- 2013 Work
  - Create roll-up case of the Eastern Interconnection (2018, 2023)
  - Perform gap analysis, identify any needed upgrades
  - Increase transfers to test robustness of the system as planned
- 2014 Work: Scenario analysis
  - Scenario A: Updated base case
  - Scenario B: Heat Wave and Drought

EIPC Results: Non-DOE Work

- Scenario A: Updated Base Case
  - Assumptions included significant transmission additions in NY and updates from other Planning Coordinators
  - "Gap analysis" identified potential constraints in MISO,PJM, TVA; they identified needed solutions
  - Transfer analysis identified significant change in transfer capability in only one instance

Table 3: Changes in Transfer Limits

Source	Sink	Previous		New		
		FCITC (MW)	Lim. PA	FCITC (MW)	Lim. PA	Delta
A FRCC	E SERC	1600	DEF	1700	DEF	100
B MISO	C NPCC	3400	PENELEC-PJM	3100	PENELEC	-300
B MISO	D PJM	>5000	N/A	>5000	N/A	0
B MISO	E SERC	>5000	N/A	>5000	N/A	0
B MISO	F SPP	650	EES	650	EES	0
C NPCC	B MISO	1800	NYISO	1750	NYISO	-50
C NPCC	D PJM	1500	NYISO	1200	NYISO	-300
D PJM	B MISO	1600	ALTW-MISO	1650	ALTW	50
D PJM	C NPCC	2100	PENELEC-PJM	2850	NYISO	750
D PJM	E SERC	>5000	N/A	>5000	N/A	0
E SERC	A FRCC	1900	SBA/FRCC	1900	SBA/FRCC	0
E SERC	B MISO	>5000	N/A	>5000	N/A	0
E SERC	D PJM	1900	BREC-MISO	4800	DVP	2900
E SERC	F SPP	550	SWPA-SPP	500	SWPA-SPP	-50
F SPP	B MISO	850	WERE-SPP	800	WERE	-50
F SPP	E SERC	950	WERE-SPP	950	WERE	0

Source: http://www.eipconline.com/uploads/Final_EIPC_2014_Study_Report_01-23-15.pdf, p. 18

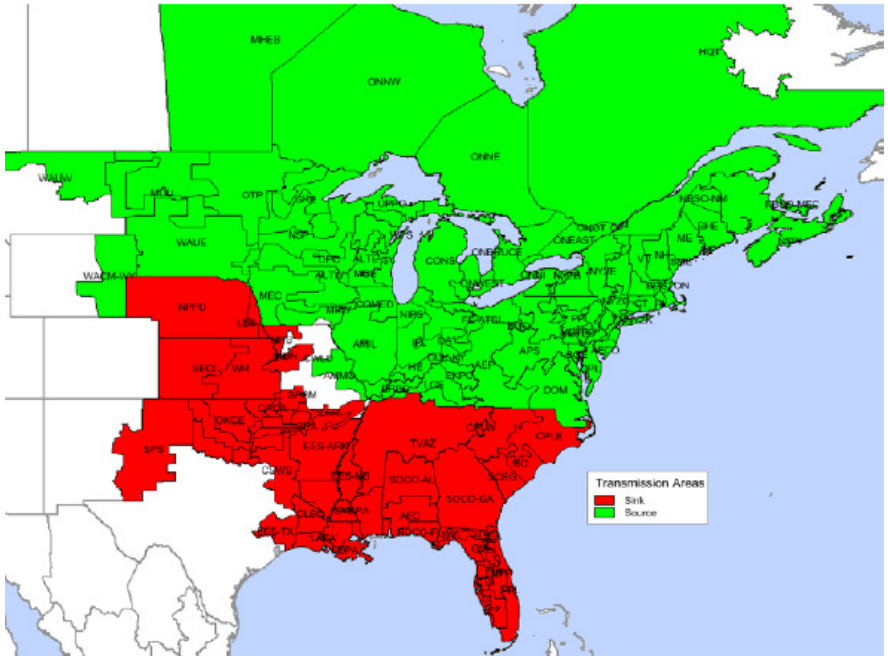
EIPC Results: Non-DOE Work

Scenario B: Heat Wave & Drought
Additional 30,000 MWs from Source to Sink

Source Regions

- ISO New England
- New York ISO
- IESO (Ontario)
- PJM
- MISO North/Central
- Louisville Gas & Electric/KU
- MAPP

Figure 1 – Source and Sink Transmission Areas



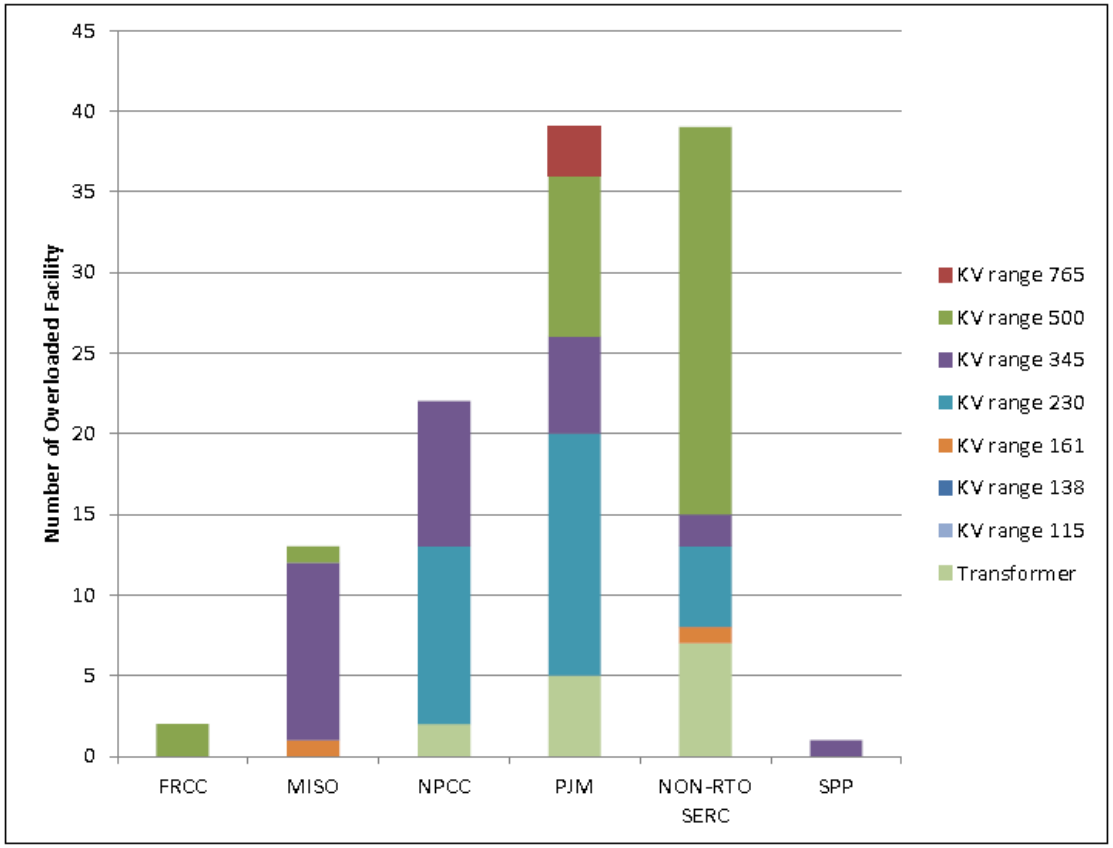
Sink Regions

- MISO South
- Duke Energy: Carolinas, Progress and Florida
- SC Electric & Gas
- Santee Cooper
- TVA
- Power South Elec Cooperative
- Alcoa Power Generating
- Electric Energy, Inc.
- Florida Power and Light
- JEA
- SPP

EIPC Results: Non-DOE Work

- Majority of constraints in the SERC and PJM regions
- 77% of overloaded facilities internal to the regions; 23% tie lines
- MISO: ~90%/10% split – internal to tie lines

Figure 2: Overloaded Facilities by Study Area and kV



EIPC Gas-Electric Coordination Study

- Background
  - Post Phase II of the original EIPC study
  - DOE requested that EIPC look at gas-electric coordination issues due to low gas prices and increased gas generation
- Participating Planning Coordinators
  - ISO New England
  - New York ISO
  - PJM Interconnection
  - MISO
  - TVA
  - Ontario's IESO

EIPC Gas-Electric Coordination Study

- Study years: 2018 and 2023
- Study targets
  1. Develop baseline of the electric and natural gas systems, including planning, operation and interactions
  2. Determine adequacy of regional gas systems for next 5-10 years
  3. Identify contingencies on the gas and electric systems that could negatively affect the other
  4. Examine the pros and cons of dual fuel capability for generation versus expanding gas system

EIPC Gas-Electric Coordination Study Results: Target 1

- Target 1: Baseline assessment – qualitative assessment of gas/electric interface
  - Addressed for each Planning Coordinator
  - Considered bulk power security and resource adequacy issues

Gas-Electric Study – Target 1 Results

Qualitative Assessment Matrix

	Criterion	PJM	MISO	NYISO	ISO-NE	TVA	IESO
Natural Gas Supply	Gas Supply Portfolio Diversity						
	Pipeline Connectivity Level						
	Conventional Storage Deliverability						
	LNG Storage Capability						
Electric-Gas Interface	Firm Transportation Entitlements						
	Direct Pipeline Connectivity						
Gas Tariff Impact on Electric Market	Pipeline or LDC Penalties						
	LDC Provision of Flexible Service						
	Active Secondary Market						

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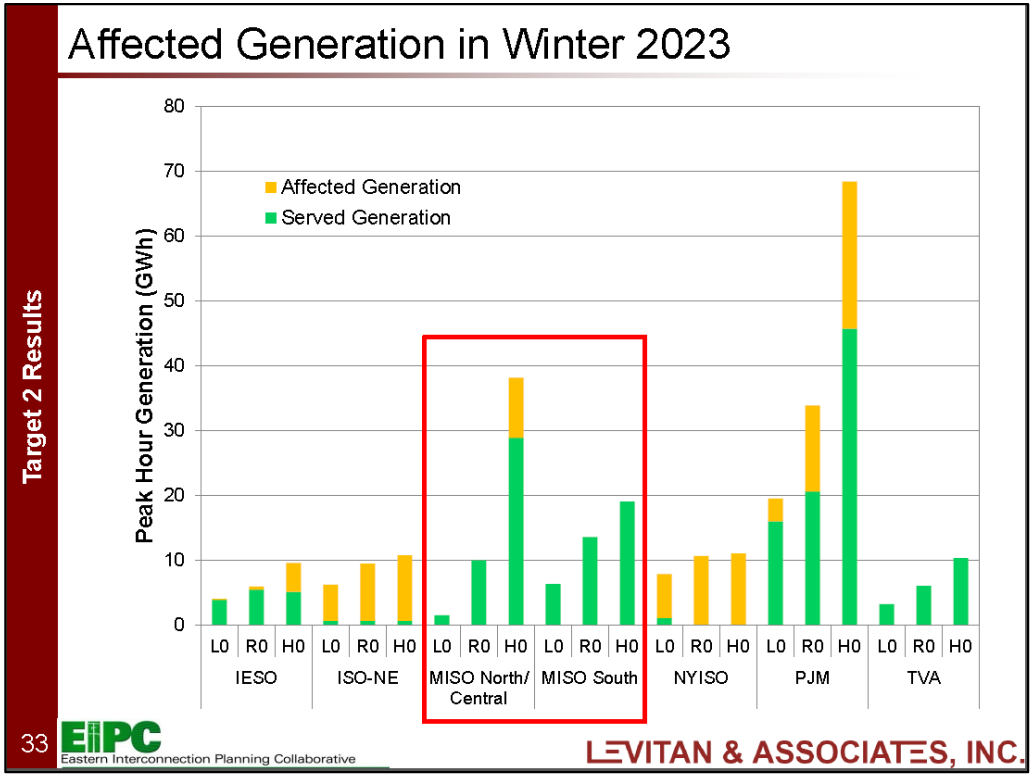
EIPC Eastern Interconnection Planning Collaborative

LEVITAN & ASSOCIATES, INC.

EIPC Gas-Electric Coordination Study Results: Target 2

- Target 2: Determine adequacy of regional gas systems for next 5-10 years
- MISO
  - Gas infrastructure adequate under almost all market/generation conditions
  - Small transportation deficit in N/C when coal replaced by gas
  - Anticipated LNG commercialization in Gulf of Mexico does not increase constraints

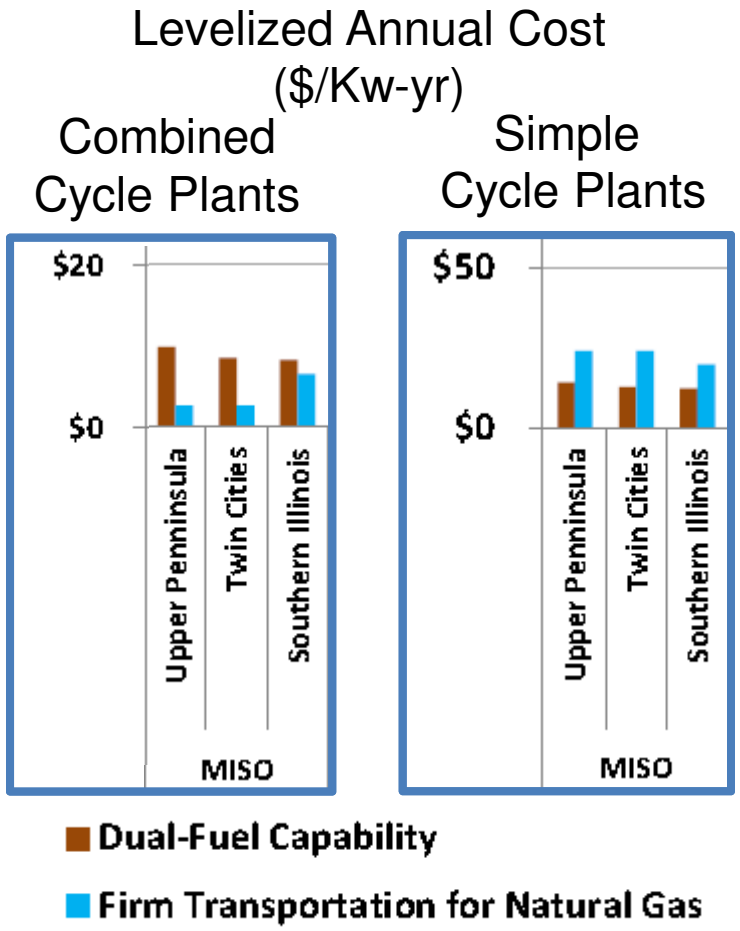


EIPC Gas-Electric Coordination Study Results: Target 3

- Target 3: Electric and gas contingency identification
  - Identify contingencies on the natural gas and electric systems
- Approach
  - Hydraulic modeling of selected areas
  - Identification of gas contingencies for study
    - Loss of supply, storage or compression and line breaks
  - Identification of electric contingencies for study
    - Bulk power system outage or loss of electric-drive compression
  - Identify top three to five gas and electric contingencies
    - Each Planning Coordinator area and study region as a whole
  - Identify possible mitigation measures
- Results available end of February 2015

EIPC Gas-Electric Coordination Study Results: Target 4

- Target 4: Pros and Cons of Dual Fuel
- Primary findings
  - New gas-fired plants expected to use ultra low sulfur diesel (ULSD) as back-up fuel
  - USLD supply chain is robust but this represents a major change in the distillate oil market
  - Air permits typically cap oil use to 720 hours; some have lower limits
  - At most locations (not MISO), dual fuel is less expensive than firm natural gas transportation



EIPC Gas-Electric Coordination
Next Steps

- Target 2 report: comments due 2/27/15
- Target 3 report: draft public version available 2/27/15
- SSC webinar 3/3/15
- Final draft Target 2 report to DOE 3/13/15
- Target 3 report: comments due 3/13/15
- Final draft Target 3 report to DOE 3/27/15
- Draft revision to Phase II report and discussion: May 2015
- Phase II revised report: comments due 6/3/15
- Phase II revised report to DOE and comments: June 2015
- End of project: 7/17/15

More EIPC Information

http://www.eipconline.com/

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Appendix – EIPC Gas-Electric Coordination Study: Target 4 Results