

## MISO PJM IPSAC

December 11, 2015







- Michigan Interface Study Initial Results
  - Reliability
  - Economic
- Metrics Analysis (carryover from November meeting)
- IPSAC Schedule













- Identify causes of significant historical congestion on MI Interface
  - Cook Palisades
  - Benton Harbor Palisades
  - Michigan City LaPorte
- Evaluate how future configuration & interconnection changes impact congestion
- Develop and evaluate solutions as required









- Three joint Michigan transfer power flows reference, high import, high export
- Reliability analysis is underway
  - Single contingency with PJM and MISO contingencies
  - Generation delivery analysis





IPSAC Meeting, December 11, 2015









- Verified online units & capacity in targeted area
- Coordinated load and fuel price assumptions
- Applied MISO benchmark "lessons learned"
  - PAR modeling, economic max capacity, forced outage rates, etc.
- Verified branch facility ratings in study area
- PJM and MISO performed coordinated, parallel analyses that support common conclusions
  - Slides 10-16 are PJM results
  - Slides 17-18 are MISO results







### Historical Michigan Flows



- In 2013 and early 2014 Michigan (METC & DECO) imported a significant amount of energy from the rest of MISO. These historical data were the basis of the "quick hit" analysis performed in 2015
- Michigan imports reduced significantly and reversed after mid-late 2014





- Identified as two of the top historical constraints in the Quick Hit analysis
- Congestion may also have been aggravated by construction outages in the area



- High historical MISO imports into Michigan reduced significantly in mid-late 2014, and continued at these low levels through 2015
- This trend correlated with drastically reduced congestion in the Palisades area







www.pjm.com

• PJM developed high and low Michigan import scenarios to evaluate the impact of these flows on the targeted facilities



#### **Michigan Flows - PROMOD Result**







- This correlation between low Michigan imports and relieved congestion was verified by our PROMOD model.
- Given current topology, we would expect the Palisades area congestion to continue if Michigan returned to being a heavy importer.

Congested Element	High Michigan Import Case	Low Michigan Import Case
Benton Harbor – Palisades 345kV	\$ 80,081	\$ 0
Cook – Palisades 345kV	\$ 13,881,810	\$ 0





- Covert combined cycle plant (1,100 MW) is located in Michigan, ~1 mile east of Palisades Nuclear plant
- Currently dispatches to the MISO system
- Joins PJM market as a capacity resource in June 2016
- Tapping PJM owned portion of Cook Palisades and Benton Harbor – Palisades (to be complete by June 2016)
- New switchyard called Segreto



\*See PJM Interconnection Facilities Study Report - Queue Position T-094 for additional details





 The Covert generator integration into PJM (and associated topology changes) significantly relieved the Cook – Palisades and Benton Harbor -Palisades congestion even under the high Michigan import scenario.

Congested Element	High Michigan Import, Covert in MISO	High Michigan Import, Covert in PJM
Benton Harbor – Palisades 345kV	\$ 80,081	\$ 0
Cook – Palisades 345kV	\$ 13,881,810	\$ 0





- Topology included the AEP Bosserman upgrade, which went in service this spring
  - Decreased congestion on Michigan City LaPorte
  - Increased congestion on Michigan City Trail Creek and Michigan City – Dune Acres
  - See September 28 IPSAC meeting materials for additional details
- Assumed implementation of recommended quick hit projects (Michigan City to LaPorte reconfigured as Michigan City to Bosserman and sag limits addressed)





- Congestion in the Michigan City area for the first ten months of 2015
- ~\$ 10 Million

Congested Element	Historical Congestion Cost
Bosserman – LaPorte	\$ 7,468,441
Michigan City – Trail Creek	\$ 2,600,820
Michigan City – Maple	\$ 141

\* Congestion for January – October 2015





- Michigan City area congestion results are consistent with (but significantly higher than) recent historical conditions.
- Michigan City area
  congestion decreased
  approximately 20% in
  the low Michigan import
  scenario compared to
  the high import scenario.

Congested Element	High Michigan Import	Low Michigan Import
Michigan City – Trail Creek 138kV	\$ 41,416,736	\$ 35,366,343
Dune Acres – Michigan City 138kV	\$ 17,502,512	\$ 12,406,792

The Covert unit move to PJM dispatch, and the associated topology change, did not materially impact congestion in the Michigan City area





- MISO developed a PROMOD model intended to reflect 2015 operations
  - Based on the MTEP16 Market Congestion Planning Study Model
  - Utilizes actual 2015 load, coal and Henry Hub gas values
  - Incorporated MISO benchmark "lessons learned"



### 2015 Operations Model Results

#### Michigan Flows - MISO PROMOD Result



Michigan Flows - MISO PROMOD Result



- Michigan flows in this model are reflective of actual 2015 flows, i.e. Michigan is a net exporter
- Minimal congestion occurs in the Palisades Area
- Congestion on Michigan City-related flowgates (Bosserman, Dune Acres, Trail Creek) total ~\$12M in congestion cost





- Based on the study assumptions, including resource mix, fuel prices, and dispatch patterns, PJM & MISO do not expect severe congestion on Benton Harbor – Palisades or Cook – Palisades to continue
- PJM & MISO will continue to monitor the area and renew focus as historical or projected conditions indicate the need





- Michigan City area congestion is an ongoing issue in day ahead and real time operations and is expected to continue.
- Analysis did not reveal issues expanding beyond the local 138kV system
  - Local 138kV upgrades may be effective and cost efficient
- Will look at issues and specific upgrades in Quick Hit study in first half of 2016
- Challenge: Quick hit process requires complex joint model assessments to develop projected benefits, *or* election of upgrades by historically affected parties *or* a new method for allocation of upgrade costs







# Metric Analysis







21

- How do multi-party transactions (both between PJM & MISO, and with other pools) impact the benefit metric?
- How do APC and NLP work together? Is 70/30 a reasonable split?
- How does the process for interpolating between and extrapolating beyond the three modeled years impact the benefit calculations?





- Ran the JOA IMEP benefit metric for a few hypothetical upgrades using the old JOA planning study models from 2013/14 timeframe
- Reported APC and NLP components separately by pool
- Re-Ran analysis without multi-parties
  - Replaced PJM-MISO multi-party with a bi-lateral transaction based on hourly profile of multi-party
  - Replaced other significant multi-party transactions with load modifier transactions







### Example Project 1 – Each graph represents the difference with and without the upgrade

24

contradictory

www.pjm.com





### Example Project 2 – Each graph represents the difference with and without the upgrade

No Multi-Parties

**Original Run** 



APC:

٠

٠

٠

-PJM

MISO

Sum

- PJM small, similar benefit with or without MP
- MISO MP drives negative year 10 and positive year 15
- NLP similar result with and without MP but magnitudes lower with MP. Also magnitude of NLC benefits much greater than APC benefits
- Inconsistent trend in APC and NLP from year to year
- APC and NLP can be contradictory







### Example Project 3 – Each graph represents the difference with and without the upgrade



- APC similar result with and without MP for PJM and MISO
- NLP similar for PJM with and without MISO different trend
- Inconsistent trend in APC and NLP from year to year
- NLP magnitudes much larger than APC

٠





26

- Different results in all regions with and without multi-parties. It may or may not drive a benefit and is affected by:
  - Different market solution domino effect (who's "benefiting"?)
  - changes in transactions far from seam and targeted congestion
  - Resource assumptions
  - Methods to adjust production cost
- The direct desired benefit of transmission is congestion relief on targeted lines, which is not directly measured by the metrics.





- Current metric does not target desired PJM-MISO benefits on the seam
- Elimination of MP eliminates the need for the production cost adjustment
- Saw tooth effect can create trending issues
- Does it make sense to combine APC and NLP when they produce contradictory benefit results?
- Any metric involving LMP is likely to produce negative "benefits" in some areas
- The magnitude of NLC benefits are typically significantly larger than APC benefits
- NLC usually drives split metric result, even at 30% weighting
  - Difference in outcome between 70/30 and 50/50 will likely be minimal in many cases





- Benefits are calculated from project in service date, and can thus be driven by a single, distant year result and trend effectively ignoring the first 14 years of results
- Extrapolation requires high confidence in out year results if 5 and 10 year models show little benefit, but 15 year model shows significant benefit, current trending method will show to be very beneficial
- Extrapolation often results in negative benefits for near in years; likely unrealistic







# **IPSAC Work Schedule**







December 2015

- JOA revised to remove \$20 million cost threshold
  - Redline document complete
  - PJM & MISO working on joint filing letter
  - Will be submitted by December 18<sup>th</sup>
- Annual issues review
  - PJM & MISO are reviewing:
    - Approved RTEP/MTEP projects near the border
    - Planned but not approved projects, or planning underway
    - Identified issues (e.g. M2M constraints)





## January 2016

- Provide summary of annual issues review to stakeholders
  - Opportunity for stakeholder comments on issues review
- Complete Michigan Interface reliability analysis
  O1 2016
- Complete Quad Cities analysis
- Identification of facilities & model development for 2016 Quick Hit study
- Continue metrics & process discussion with Stakeholders





## Q3 2016

- Complete Quick Hit analysis and recommend projects as appropriate
- Conclude metrics & process review activities and file changes as needed
- Identify potential interregional issues from regional processes; solicit projects from stakeholders

See timeline attached to September 28 IPSAC meeting for complete two year evaluation cycle









# **Open Discussion**







34



- Chuck Liebold
  <u>chuck.liebold@pjm.com</u>
- Adam Solomon
  <u>asolomon@misoenergy.org</u>





