



MISO / PJM Inter-Regional Planning
Stakeholder Advisory Committee (IPSAC)

July 25, 2006



Agenda

- **Review of MISO-PJM Coordinated System Plan Scope of Work**
- **Discussion of Preliminary Results**
- **Timeline for Remainder of Analysis and Report**

Joint RTO Planning Committee (JRPC)

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- Sub-committee of the Inter-RTO Steering Committee (ISC)
- Members are MISO and PJM planning staff - Scott Gass (Chair), Mark Sims, Mahendra Patel, Jeff Webb, Ron Arness, John Lawhorn
- **Responsibilities include:**
 - **Develop common power system model**
 - **Coordinated generation interconnection studies**
 - **Coordinated system plans**
 - **Provide for review by stakeholders through the Inter-regional Planning Stakeholder Advisory Committee (IPSAC)**



MISO-PJM

Coordinated System Plan Scope of Work



Model Development

- **2011 Peak Summer Base System Model**
 - Includes all interconnection projects with an executed ISA and associated network upgrades
 - Includes all currently identified enhancements included in the MISO / PJM regional transmission expansion plans
 - Includes approved long term firm interchange
- **The model is available at the following web site**

<http://www.pjm.com/committees/stakeholders/inter-regional-planning-adv/irpsac.html>

MISO Generator Deliverability Analysis

- **Complete generator deliverability analysis on 2011 base system model**
 - **MISO generator deliverability impacts to PJM facilities**
 - Analysis involves simulating N-0 and N-1 contingencies under a defined dispatch pattern to determine if the delivery of MISO resources within the MISO footprint has an impact on PJM facilities
 - Identify any PJM facilities that are impacted
 - Identify extent of impact to deliverability
 - Identify preliminary solutions

MISO Generator Deliverability Analysis

- **Preliminary results indicate the following PJM circuits may be impacted by MISO generator deliverability**
 - **Pontiac – Wilton Center 345kV for the single contingency loss of Pontiac – Dresden 345kV**
 - **Kincaid – Pana 345kV for the single contingency loss of the Clinton 1055 MW Generator in IP**

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PJM Generator Deliverability Analysis

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PJM Generator Deliverability Analysis

- **Preliminary results indicate the following MISO circuits may be impacted by PJM generator deliverability**
 - Lanesville 345/138 kV Transformer (CILC)
 - Marktown - Inland 138kV (NIPSCO)
 - Lakeview – Greenfield 138 kV (FE)

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Common Generator Deliverability Analysis

- **Complete common generator deliverability analysis on 2011 base system model**
 - **Evaluate Potential for Deliverability of Combined Network Resources to a common (both MISO and PJM) market**
 - Determine reasonable regions of deliverability
 - Identify Network Resources that would be deliverable in a common market
 - Identify constraints and potential preliminary solutions
 - **Preliminary studies are expected to be completed in August.**

Baseline Reliability Analysis – N-2 Analysis

- **Study N-2 Contingencies for 345 kV and Greater Facilities**
 - Analysis performed on the 2011 coordinated system model
 - All MISO and PJM 345 kV contingencies were simulated
 - Facilities 230 kV and greater were monitored in MISO and PJM
 - This involved approximately 1.9 million contingency pairs

Baseline Reliability Analysis – N-2 Analysis

- **The following MISO facilities will require additional analysis to determine if system adjustments can be completed to resolve the identified overload**
 - Noblesville 345/230 kV TR (CIN)
 - Bloomington - Denois Creek 230 kV (CIN)
 - Cayuga -Veedersburg – Attica 230 kV (CIN)
 - Petersburg – Thompson 345 kV (IPL)

*PJM & MISO are continuing to evaluate several questionable contingencies

Baseline Reliability Analysis – N-2 Analysis

- **The following PJM facilities will require additional analysis to determine if system adjustments can be completed to resolve the identified overload**
 - **Canton Central – Tidd 345 kV**
 - Loss of the Kammer - South Canton 765 kV circuit, South Canton 765/345 kV TR, and South Canton 345/138 kV TR combined with numerous contingencies in MISO
 - **Stuart – Spurlock 345 kV**
 - Numerous N-2 contingencies in Cinergy

*PJM & MISO are continuing to evaluate several questionable contingencies



MISO-PJM Market Performance Analysis

Market Performance Analysis

- **Complete a market simulation of the combined MISO/PJM systems**
- **Identify Areas of Highest LMP Spreads**
- **Identify Facilities Producing Highest Projected Congestion**
- **Identify Preliminary Solutions**

Market Performance Analysis

- **PJM and MISO recently completed a production cost simulation based on a 2006 system representation**
- **The 2006 model will be updated to a 2011 model by incorporating the following system changes:**
 - **Load growth**
 - **Generator retirements**
 - **System upgrades**
 - **New generation additions (limited to generation with a signed ISA).**

Overview of 2006 Study

- Study Description
- GE-MAPS and PROMOD Benchmark
- Cases Performed
- Production Cost Benefits – Options and Results
- Sensitivity Run Results

Study Description

- Study conducted using commercially available production cost/power flow analysis tools. (PJM uses GE-Maps, MISO uses PROMOD®)
- Annual simulation using security-constrained unit commitment and economic dispatch algorithm with full transmission modeling
- Base Case: each market area separated by inter-market hurdle rates, re-dispatch for market-to-market constraints possible
- Change Case: Remove hurdle rates between MISO and PJM
- Single Market Benefit: Reduction in production cost between Base Case and Change Case
- Sensitivity runs for different fuel prices are done to verify the stability of the results.

Benchmarks

There are several key variables that can be used to perform a benchmark of forecast models to historical system performance, including:

- Interchange between Pools
- LMPs at Hubs
- Capacity Factor of generating units

Primary Benchmark – Scheduled Interchange

Both PJM and MISO performed their own independent model benchmarks. The scheduled interchange benchmark served as the primary metric to determine the dispatch hurdle rate to be used for the base case:

- 1.5 \$/MWH
 - 2.5 \$/MWH
 - 5 \$/MWH
- All cases used a \$10/MWH Commitment Hurdle Rate

The hourly MISO/PJM interchange from these cases are compared to the 2005 actual MISO/PJM scheduled interchange values. The interchanges matched very closely.

PROMOD Benchmark: Hub LMP

MISO performed additional benchmarks using PROMOD to investigate LMP performance at various Hubs.

- Hub LMPs from PROMOD case with \$2.5/MWh PJM/MISO dispatch hurdle rate and \$10/MWh commitment hurdle rate is used to benchmark the DA market data (Jan 2006)
- Used Statistical Indices to check the benchmark

PROMOD Benchmark: Conclusion

- The benchmark of MISO/PJM scheduled interchange indicates the range from \$1.5/MWh - \$5.0/MWh produces solid benchmarks with the \$2.5/MWh rate level viewed as the preferred dispatch hurdle rate for use between MISO and PJM.
- The PROMOD hub LMPs benchmarked well to DA Market LMPs in multiple hubs.

Cases Performed

PJM and MISO performed independent assessments using the same assumptions”

- Dispatch Hurdle Rate in pre single market case is set at \$1.5/MWh, \$2.5/MWh and \$5.0/MWh
- Commitment Hurdle Rate is set at \$10/MWH
- Dispatch and Commitment Hurdle Rates are set to \$0/MWh in the single market dispatch case

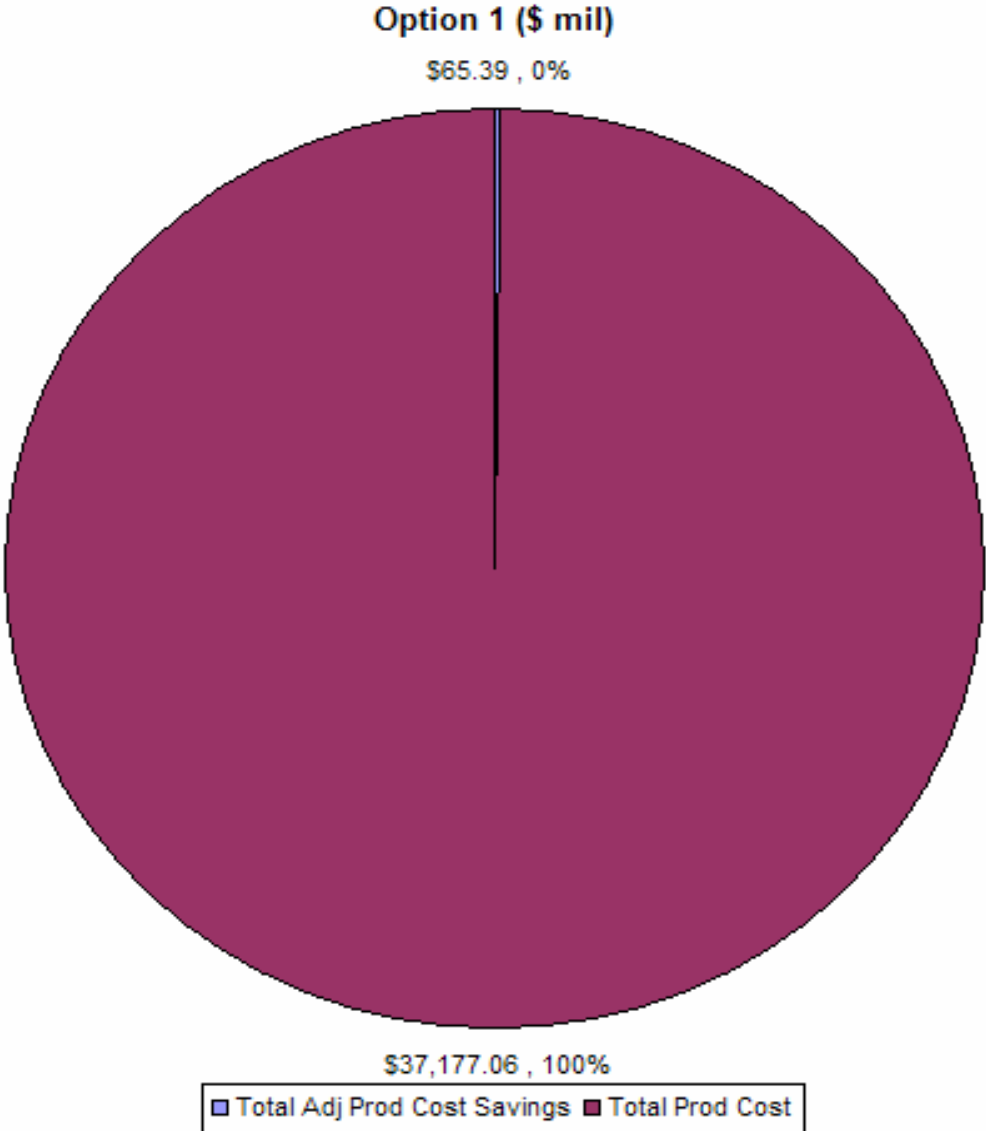
Adjusted Production Cost is used as the measurement metric

- Differing approaches to the calculation of purchases and sale (which are used in the adjusted production cost metric) provides for three separate options for comparison

Production Cost Analysis – Observations

- MAPS results show higher total savings than the PROMOD results for a comparable case.
- MAPS results indicated MISO receives no benefit from the single market dispatch.
- PROMOD results indicate PJM companies receive two-thirds of the benefits and the MISO companies receive a one-third benefit. The MISO results at the \$1.5/MWh dispatch hurdle rate also showed negative MISO benefits.
- Results are sensitive to the method used to price the purchase and sale transactions.
- Savings are limited compared to the total production costs of the combined footprint.

Savings as a Percent of Production Cost





Sensitivity Analysis

Sensitivity Analysis

- **Perform sensitivities, as required, based on cross-border operability issues identified over the previous year**



Coordinated System Plan Schedule

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- **August 2006**
 - Finalize any cross border impacts of MISO generator deliverability, PJM generator deliverability and N-2 analysis
 - Complete preliminary cross border impacts of a common MISO/PJM generator deliverability study.
- **September 2006**
 - Develop system upgrades to address any cross border impacts of MISO generator deliverability, PJM generator deliverability and N-2 analysis.
 - Complete preliminary market performance analysis
- **October 2006**
 - Finalize all study work and develop draft report.
- **November 2006**
 - IPSAC meeting to discuss results of 2006 coordinated system plan.



Stakeholder Comments