

PJM MISO Joint Common Market Initiative Meeting

Modeling Interface between PJM and MISO

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PJM IMM Position

- **PJM IMM recommends**
 - **a two-day meeting of technical experts and decision makers from MISO, PJM, ISO-NE, NYISO, SPP and their market monitors to discuss best solutions for a coordinated dispatch and pricing model**
 - **any long term solution should reflect the locational marginal pricing that would result from a single LMP dispatch over the entire multi-RTO/ISO area**
 - **in the short term, PJM and MISO adopt PJM's proposal to redefine the MISO and PJM interfaces to a common set of buses close to the border**

Load Weighted Reference

- **MISO IMM claims**
 - **“the Reference Bus (weighted by load) is a reasonable interface definition” since marginal generators are distributed “consistent with the distribution of load and generation”**
- **Not all marginal generators have the same impact on every transmission constraint**

Load Weighted Reference

- **PJM IMM calculates marginal generator sensitivity factor (unit participation factors) for every transmission constraint and pricing node**
- **Marginal generator sensitivities tend to vary across the PJM footprint**
- **The generator located in PSEG region tends to have a very small sensitivity factor to a transmission constraint located in the COMED region**

One Alternative: Marginal Unit Method*

- **Converges towards a dispatch solution that would have resulted if both RTOs were to be jointly dispatched**
- **Minimal exchange of information between RTOs**
- **Avoids sharing of generator bids**
- **No need for transactions**

* Zhao et. al., "A marginal equivalent decomposition method and its application to multi-area optimal power flow problems," *IEEE Transactions on Power Systems*, vol. 29, no. 1, pp. 53-61, Jan. 2014.



One Alternative: Marginal Unit Method*

PJM/MISO Dispatch Problem

Minimize Cost of Generation

Subject to:

Total Generation = Load

Flow \leq Limit

Generation \leq Capacity

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One Alternative: Marginal Unit Method*

PJM Dispatch Problem

Minimize Cost of Generation + Cost of MISO Marginal Gen

Subject to:

$$\text{PJM Generation} + \text{MISO Non Marginal Gen} + \text{MISO Marginal Gen} = \text{PJM Load} + \text{MISO Load}$$

$$\text{PJM Flow} + \text{MISO Non Marginal Flow} + \text{MISO Marginal Flow} \leq \text{Limit}$$

$$\text{Generation} \leq \text{Capacity}$$

MISO Dispatch Problem

Minimize Cost of Generation + Cost of PJM Marginal Gen

Subject to:

$$\text{MISO Generation} + \text{PJM Non Marginal Gen} + \text{PJM Marginal Gen} = \text{PJM Load} + \text{MISO Load}$$

$$\text{MISO Flow} + \text{PJM Non Marginal Flow} + \text{PJM Marginal Flow} \leq \text{Limit}$$

$$\text{Generation} \leq \text{Capacity}$$

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One Alternative: Marginal Unit Method*

- **Information Exchange between RTOs**
 - **Network information (shift factors)**
 - **Binding Constraints**
 - **Marginal Units and Marginal Prices**
 - **Contribution of non marginal units to power balance and transmission constraints**

* Zhao et. al., "A marginal equivalent decomposition method and its application to multi-area optimal power flow problems," *IEEE Transactions on Power Systems*, vol. 29, no. 1, pp. 53-61, Jan. 2014.



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