



IMO Interface Definition Methodology Report

February 11, 2015

[Energy Scheduling Issue Tracking details](#)

On page 3 of the Quarterly State of the Market Report for PJM: January through September 2014, the MMU states that “The MMU recommends that PJM eliminate the IMO interface pricing point, and assign the transactions that originate or sink in the IESO balancing authority to the MISO interface pricing point. (Priority: Medium. First reported 2013.)” Additionally, on page 286 of the same report, the MMU states that “The IMO interface pricing point with the IESO was created to reflect the fact that transactions that originate or sink in the IMO balancing authority create flows that are split between the MISO and NYISO interface pricing points, so a mapping to a single interface pricing point does not reflect the actual flows. PJM created the IMO interface pricing point to reflect the actual power flows across both the MISO/PJM and NYISO/PJM Interfaces.” This proposed inconsistency in market pricing by the MMU is also a component of the Energy Scheduling issue that is current issue being discussed as part of PJM’s Market Implementation Committee (MIC).

Both IMO to PJM and PJM to IMO transaction paths are heavily impacted by the Michigan-Ontario interface which consists of 4 parallel PAR paths (2 PARs at Lambton, 2 PARs in series at Buns Creek and 1 PAR at Keith). For this reason, the Michigan-Ontario PAR control performance should be evaluated when PJM develops the IMO interface price. At this time, due to the aforementioned impact of the Michigan-Ontario PARs, PJM believes a combination of the MISO and NYISO interface prices should contribute to the IMO interface price depending on the relationship between the scheduled and actual flows over the PARs when the PAR interface is operational.

Executive Summary

As mentioned previously, PJM’s Proposal to calculate the IMO interface price will be based on the Michigan-Ontario PAR control performance. When PARs are operational PAR control is established using 3 states: 1) optimal control = $\text{abs}(\text{actual flows}) \geq \text{abs}(\text{scheduled flows})$ and the flows are in the same direction, 2) sub optimal control = $\text{abs}(\text{actual flows}) \leq \text{abs}(\text{scheduled flows})$ and the flows are in the same direction, and 3) no control = actual flows and scheduled flows are in the opposite direction. PJM will assign 100% of the MISO price to the IMO price when the PAR control is in state 1, a combination of the MISO and NYISO prices when the PAR control is in state 2 and 100% of the NYISO price when the PAR control is in state 3. When ALL the PARs used to calculate the IMO interface price are by passed (PARs are non-regulating and the PAR paths are equivalent to AC tie lines) and the Michigan-Ontario Tie flow is not zero, PJM will utilize power flow study results (60% MISO and 40% NYISO) to develop the IMO price. When Michigan-Ontario Tie flow is zero PJM will assign 100% of the NYISO price to the IMO price.

Proposal

When the Michigan-Ontario PARs are operational ($\text{abs}(\text{PAR Actual})$ and $\text{abs}(\text{PAR Schedule}) > 0$ and the scheduled flow is less than or equal to the actual flow over the PARs in the direction from IMO to MISO)



then the IMO interface price would be assigned the MISO interface price. Otherwise, if the scheduled flow is greater than the actual flow over the PARs in the direction from IMO to MISO then the IMO interface price would be assigned a portion of both the NYISO and MISO interface prices where the portion was determined based on the scheduled and actual flow values.

If the scheduled flow is less than or equal to the actual flow over the PARs in the direction from MISO to IMO then the IMO interface price would be assigned the MISO interface price. Otherwise, if the scheduled flow is greater than the actual flow over the PARs in the direction from MISO to IMO then the IMO interface price would be assigned a portion of both the NYISO and MISO interface prices where the portion was determined based on the scheduled and actual flow values.

If the scheduled flow over the PARs in the direction from IMO to MISO and the actual flow is in the direction of MISO to IMO then the IMO interface price will be assigned to NYISO interface price. If the scheduled flow over the PARs in the direction from MISO to IMO and the actual flow is in the direction of IMO to MISO then the IMO interface price will be assigned to NYISO interface price.

Scheduled Flow	Actual Flow	Are Scheduled Flow & Actual Flow signs the same?	If column #3 answer is yes, then is $\text{abs}(\text{Actual Flow}) \geq \text{abs}(\text{Scheduled Flow})$	Price
>0	>0	Yes	Yes	100% MISO
>0	>0	Yes	No	MISO and NYISO
<0	<0	Yes	Yes	100% MISO
<0	<0	Yes	No	MISO and NYISO
>0	<0	No	NA	100% NYISO
<0	>0	No	NA	100% NYISO

Note – Schedule and Actual flows are considered positive when they flow from IMO to MISO, they are considered negative when they flow from MISO to IMO

For example, when the Scheduled Flow and Actual Flow values are both either >0 or <0, if the $\text{abs}(\text{Scheduled Flow}) \leq \text{abs}(\text{Actual Flow})$ then

IMO Interface Price = MISO Interface Price

Else



IMO Interface Price = [MISO Interface Price * (Par Adjustment Factor)] + [NYISO Interface Price * (1 - Par Adjustment Factor)]

Where Par Adjustment Factor = abs (Actual Flow) / abs (Scheduled Flow)

Scheduled Flow	Actual Flow	MISO LMP	NYISO LMP	Proposed IMO LMP
1000	600	\$45	\$30	\$39
1000	800	\$45	\$30	\$42
1000	1000	\$45	\$30	\$45
1000	1500	\$45	\$30	\$45
-1000	-600	\$45	\$30	\$39
-1000	-800	\$45	\$30	\$42
-1000	-1000	\$45	\$30	\$45
-1000	-1500	\$45	\$30	\$45
-1000	100	\$45	\$30	\$30
1000	-100	\$45	\$30	\$30

When the PARs are by passed, PJM will utilize power flow results that assumed PARs are free flowing or fixed tap devices in developing the IMO price. PJM observed a 60% MISO and 40% NYISO power flow distribution in this study. Utilizing this result, PJM will assign the IMO price as 60% MISO price and 40% NYISO price. PARs are considered to be by passed when either PAR interface actual or schedule flow is 0 while the tie line flows out of Lambton, Buns Creek and Keith are non-zero.

When the PARs are out of service (Tie line Flows out of Lambton, Buns Creek and Keith are 0), PJM will assign 100% of the NYISO price to the IMO price.

Forward Market Impacts

Currently, Interface pricing point definitions are consistent in the ARR/FTR, Day-Ahead, and Real-Time markets with the exception of the External Control Area Interfaces (i.e. CPLEIMP/EXP, DUKIMP/EXP, NCMPAIMP/EXP) which are defined and calculated based on the level of information provided by the external Control Area to PJM. The newly proposed approach for determining the IMO interface price will create an inconsistency in the definition for IMO since the actual flows are not known at the time the



ARR/FTR and Day-Ahead market execution times. As an alternative approach for defining IMO in ARR/FTR and Day-Ahead, PJM will determine a fixed definition for IMO that will be a composite of the NYISO and MISO definitions based on the historical scheduled and actual flows over the PARs. As mentioned previously, PJM observed a 60% MISO and 40% NYISO power flow distribution which will be the split assigned to the IMO interface in ARR/FTR and Day-Ahead. At this time, PJM proposes to evaluate the historical flows and the weighting of the NYISO and MISO definitions in regard to their contribution to the IMO interface price on a quarterly basis coincident with the quarterly network model build. Regardless of the historical weighting that is applied, when all four PARs are out of service, PJM will utilize 100% of the NYISO price for the IMO price in PJM's Day-Ahead market. The Day-Ahead market will rely on SDX and EMS information to identify this scenario. Due to the timing of ARR and FTR auctions, sufficient information to identify this scenario will not be available so the historical weightings will apply.

In order to eliminate any impacts to long-term FTR positions, PJM will create a new aggregate, ONTARIO, which the long-term FTRs can be reassigned to following the June 1, 2015 IMO Interface definition change.

Appendix I: Issue Tracking

History of this issue can be found on the Issue Tracking website at [Energy Scheduling](#).