

MISO Protocol Update

Inter-Jurisdictional Trading Standing Committee

November 10, 2009



- The following presentation will be broken down into 4 parts:
 - Background
 - Indicating the reason for creating the MISO Protocol
 - Pointing out the purpose of the MISO Protocol
 - Stating how the MISO protocol works
 - Lessons learned
 - First impressions
 - Establishing a study timeframe for post protocol analysis
 - Establishing a study timeframe for pre protocol analysis
 - Pre versus post protocol analysis
 - Transmission failures
 - Ramp failures
 - Import / Export failures
 - MISO Overview
 - Conclusion
 - Concluding remarks

- Why was the MISO Protocol created?
 - Following the final pre-dispatch run, Market Participants (MPs) who were scheduled in Ontario yet had not purchased transmission in MISO were unable to purchase any unused transmission (following transmission release) due to insufficient time.
- The MISO Protocol was meant to:
 - Allow participants who were economic in Ontario to acquire transmission that would otherwise be unused, therefore increasing trade.
- The protocol facilitation is done by:
 - Curtailing the ETAG transactions following the 2 hour out pre-dispatch run (around T-90) to match the schedule. This will release transmission early enough for MPs to acquire it.

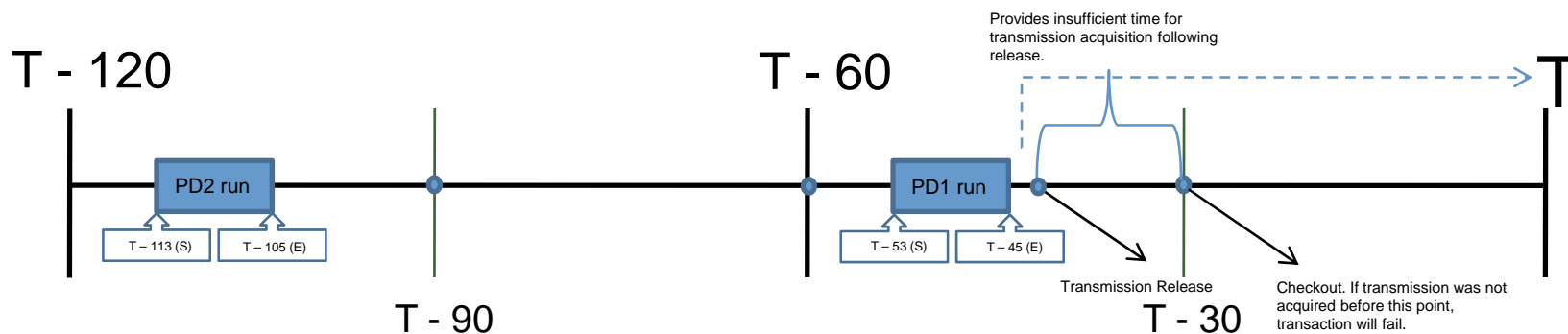
Although we had many conversations with MISO prior to implementation we have continued our dialogue with MISO and have learned the following:

- SPOT Reservation – Every MISO participant is given a TSR #.
 - Participants put their assigned TSR # in the transmission allocation portion of their E-Tag.
 - This allows them 6-NN level use of MISO transmission for all imports to MISO.
 - We should not see Ontario export failures into MISO for lack of transmission.
- Ramp reservations
 - If an E-Tag is curtailed, either as a function of a Balancing Authority, Transmission Provider or Reliability Coordinator, the associated ramp reservation is automatically updated to match the curtailed profile.
 - Curtailments are not validated for ramp, but the Reservation profile is changed automatically to reflect the profile of the E-Tag.
 - If a tag is reloaded, the reservation profile is changed automatically to reflect the profile of the E-Tag. Only if the reload causes any over usage of ramp will it be denied.

• Diagram 1 – Pre Protocol Timeline

Legend

Approximate values { (S) – Start of PD run
(E) – End of PD run



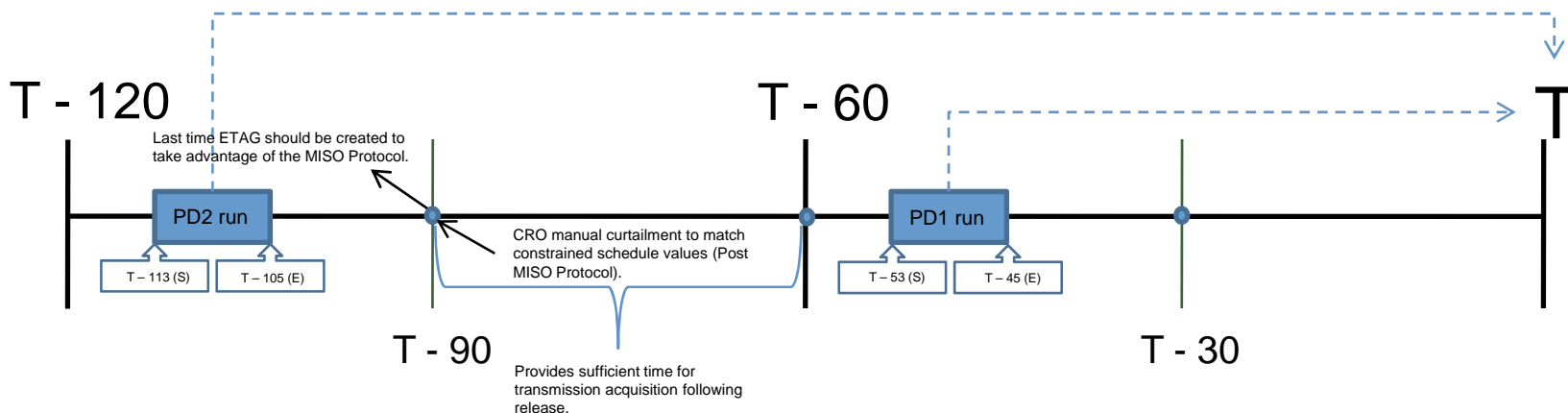
• Example 1: A world with only 2 MPs

- MP_x has acquired 500 MW of transmission and MP_y has none.
- Following final PD run, MP_y gets scheduled for 500 MW and MP_x for 0 MW.
- Transmission gets released with insufficient time for MP_y to acquire it.
- **MP_y fails due to inability to acquire transmission.**

Legend

Approximate values { (S) – Start of PD run
(E) – End of PD run

• **Diagram 2 – Post Protocol Timeline**

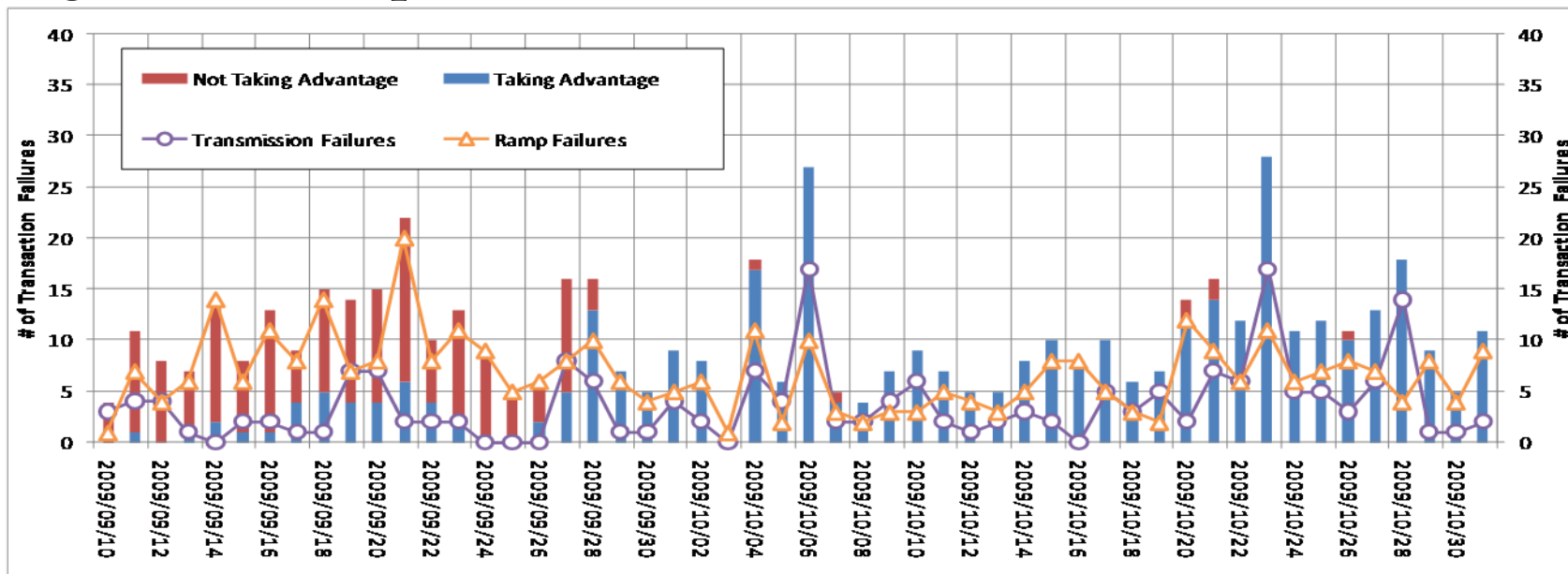


• **Example 2: A world with only 2 MPs**

- MPx has acquired 500 MW of transmission and MPy has none.
- Following PD2 run, MPx has schedule of 0 MW, MPy has schedule of 500 MW. IESO adjusts MPx's TAG to 0 MW and MPy's TAG to 500 MW.
- MISO re-assesses transmission, MPx's transmission gets released with sufficient time for MPy to acquire it.
- If MPx gets scheduled for 300 MW and MPy for 500 MW following the final PD (PD1) run, IESO will re-adjust MPx's TAG to 300 MW and MPy to 500 MW.
- MPx gets the 300 MW it was scheduled for.

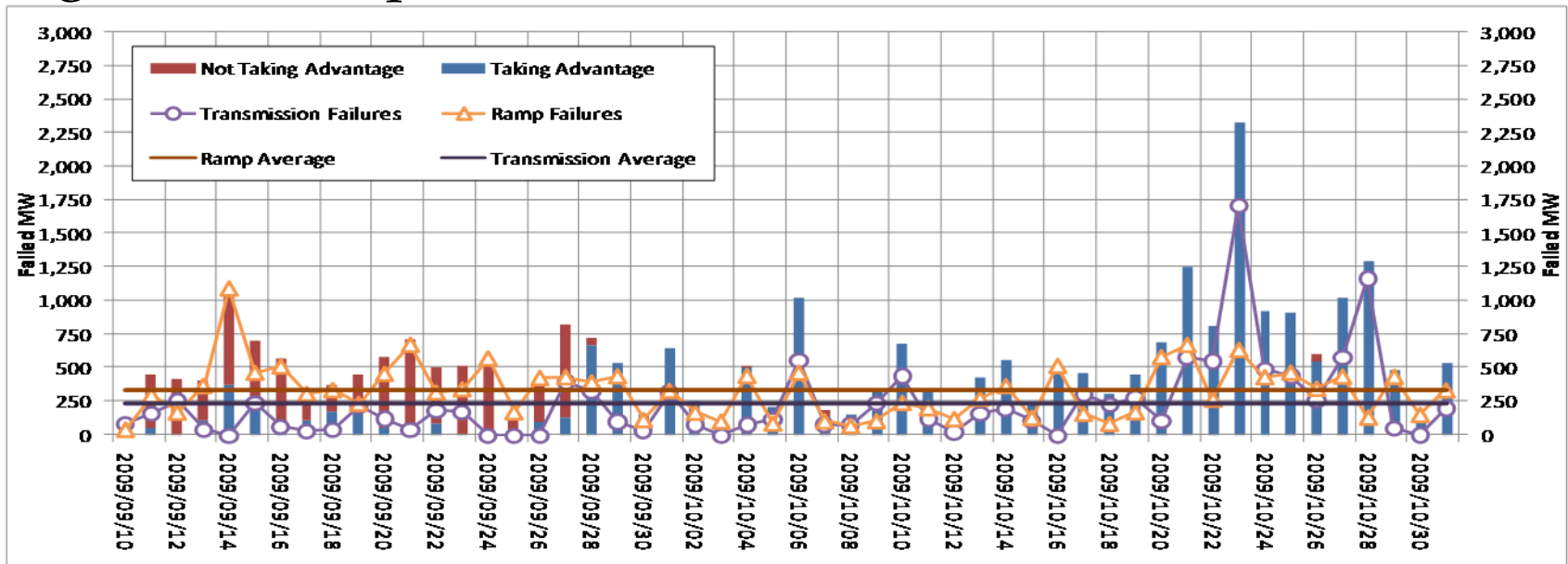
Any export failures for transmission have been removed as we believe these are outside the MISO protocol

Figure 1: Ramp + Transmission # of Failures in MISO



- Any transaction whose ETAG was created prior to 90 minutes before dispatch (T-90) was considered able to take advantage of the MISO protocol.
- Nearly all ETAGs past October 1st are created before T-90.
- There are more failed transactions for ramp than transmission, on average. 7

Figure 2: Ramp + Transmission MW Failed in MISO



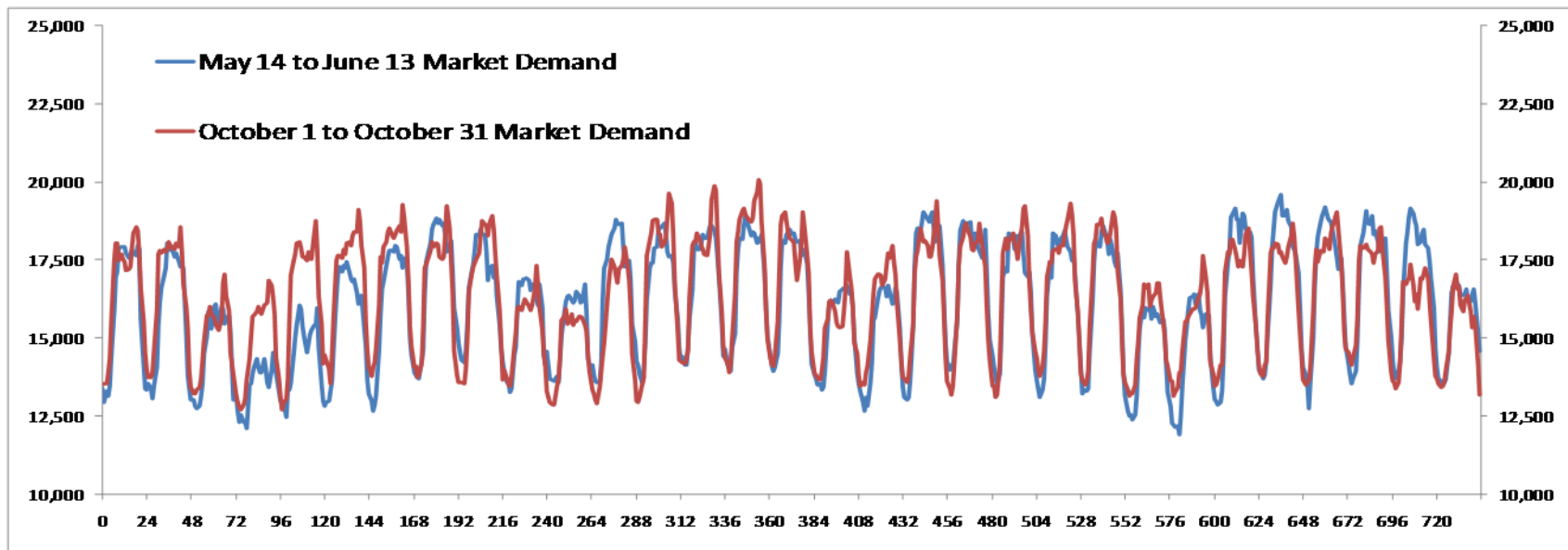
- There are more failed MW due to ramp than transmission, on average.
- The ongoing trend is that MPs are now well aware and are creating their ETAG so that the MISO Protocol is utilized. Due to this reason, the October 1 to October 31st timeframe will be utilized for post protocol analysis.

- To be able to determine the success of the MISO protocol:
 - A study period needs to be utilized that has similar system conditions as the post-protocol time frame. For this reason, the following conditions were employed to determine two suitable time frames:
 - Equal time frame (number of days).
 - Near equal average hourly market demand.
 - Coefficient of correlation between the market demand of the two time frames greater than 0.8 (Strong Correlation).
 - Similar maximum import / export capabilities across MISO tie-lines.

- After running a numerical analysis, the following conclusion was made:
 - May 14th to June 13th, 2009 will be utilized for pre protocol analysis. The table below and Figure 3 on the next slide illustrates the similarities with the post protocol study time frame (October 1st to October 31st, 2009).

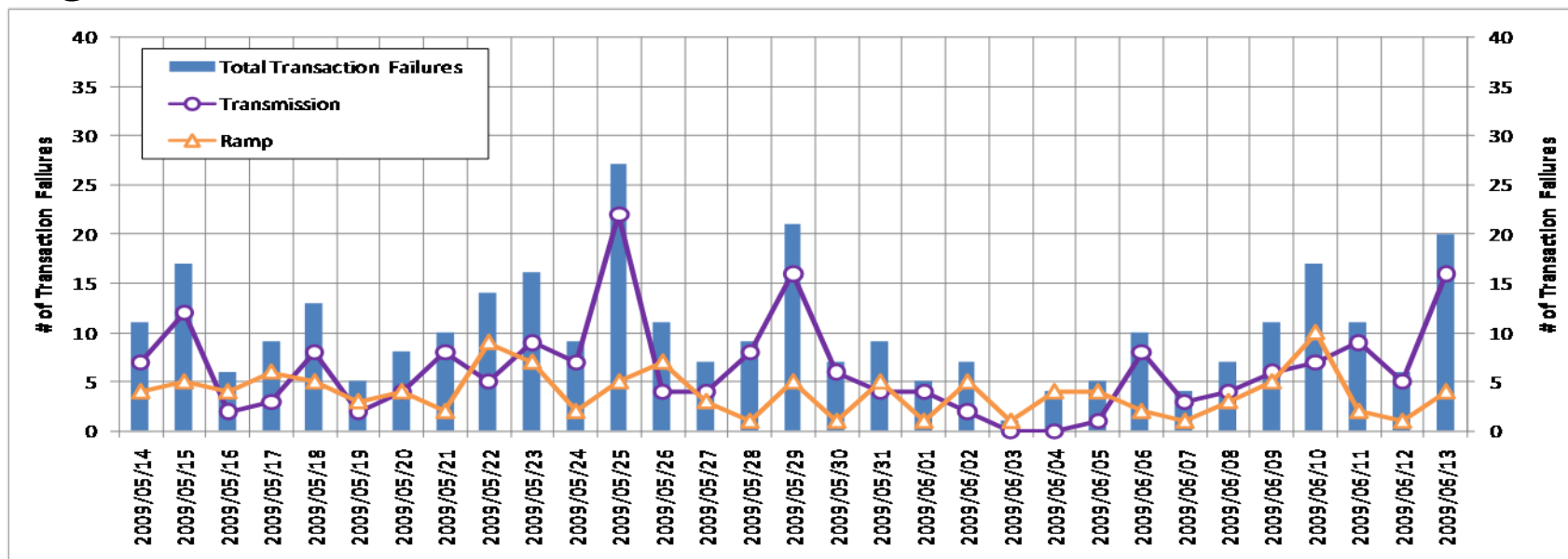
Time Frame	Average Market Demand	Number of Days
October, 2009	16,250	31
May 14 - June 13, 2009	16,052	31
Coefficient of Correlation	0.88	

Figure 3: Market Demands for Pre and Post Protocol



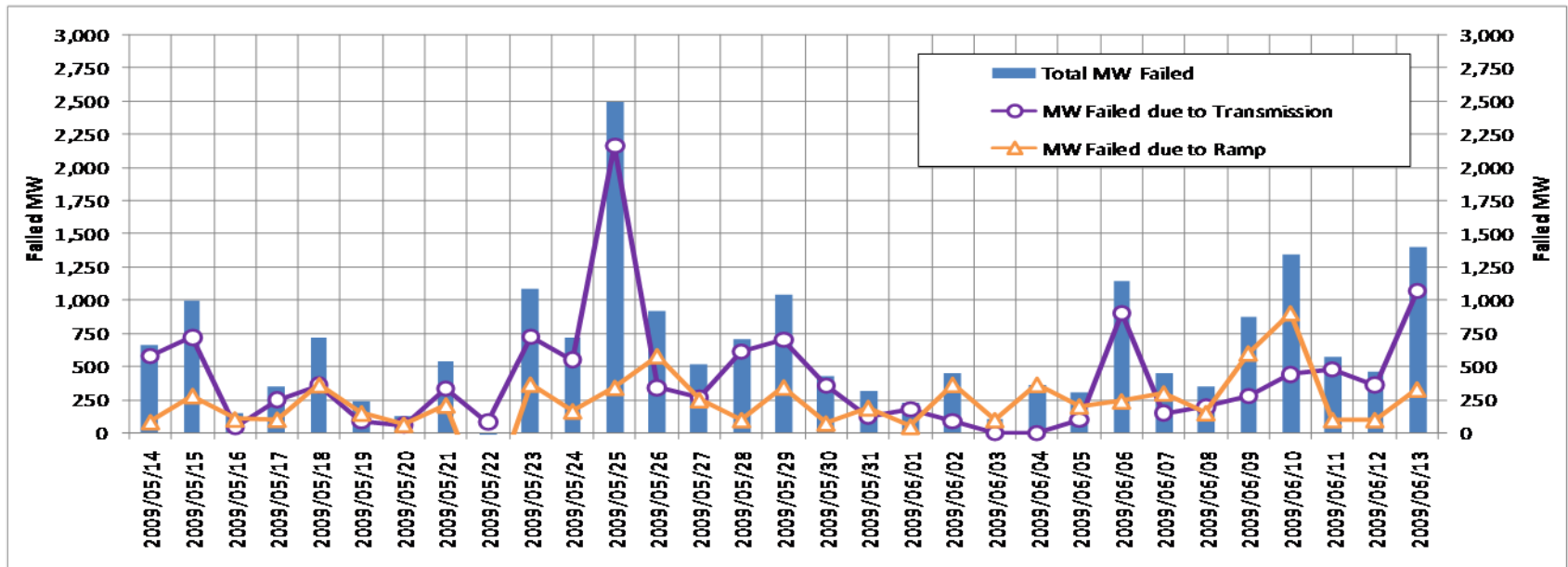
- As noted, the high degree of correlation and similarity in market demand make these two timeframes optimal for study.

Figure 4: Pre-Protocol # of Failures (MrNh) in MISO



- The number of failures due to transmission occurs more often than ramp, on average.
- It is important to note that Market Participants may not have been attempting to trade on the MISO interties due to the known seams issue.

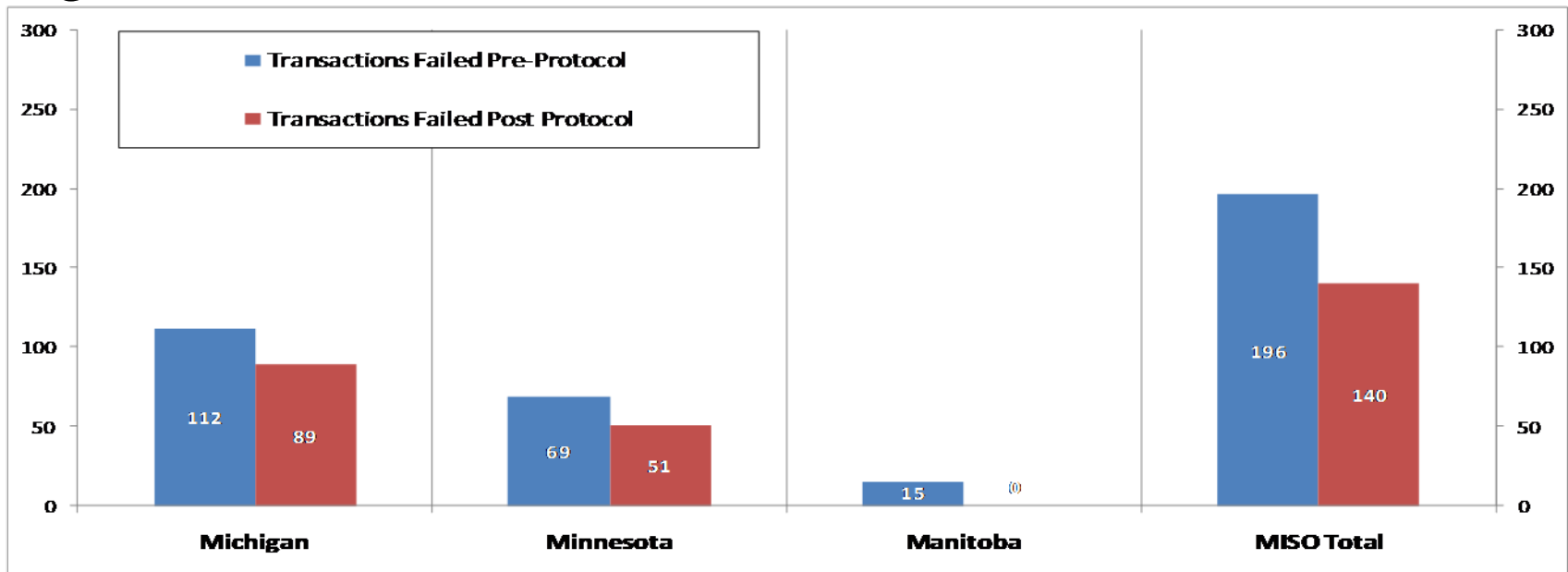
Figure 5: Pre-Protocol MW Failed (MrNh) in MISO



- The MW Failed due to transmission is greater than that of ramp, on average.

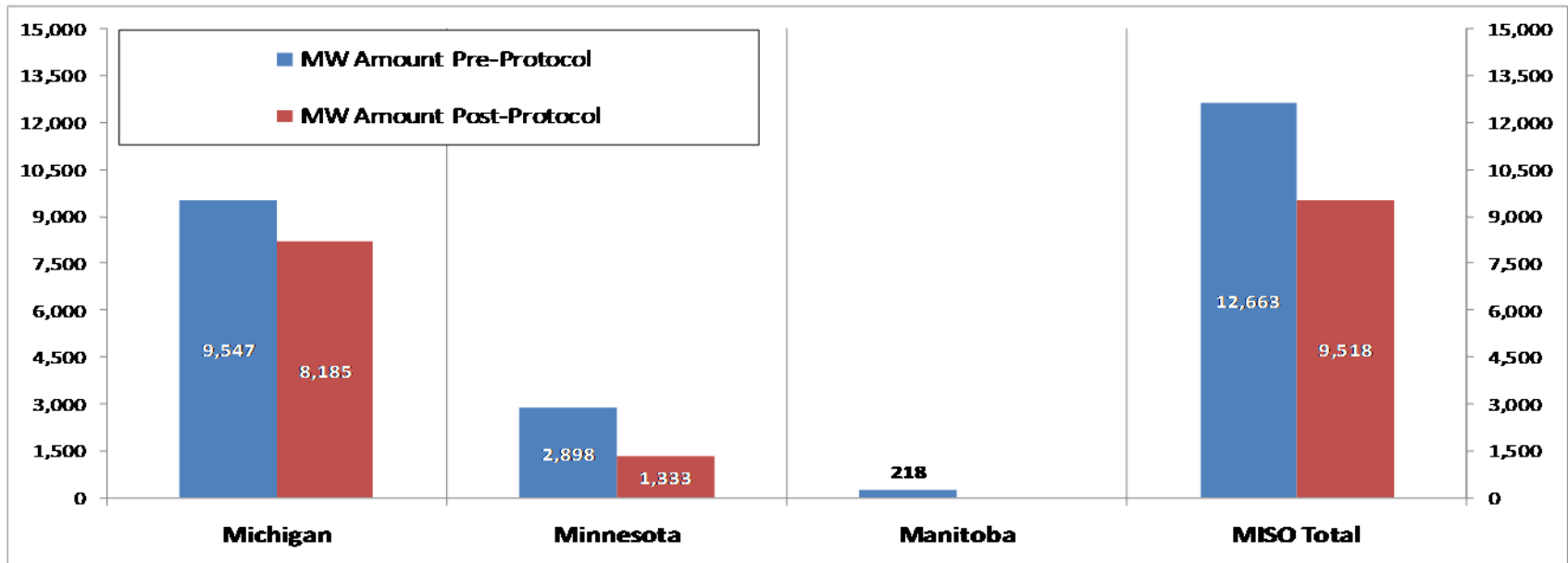
- The pre versus post-protocol analysis will be broken down into 5 parts:
 - The occurrences and MW failed by inter-tie of:
 - Transmission Failures
 - Inability to acquire Transmission
 - Ramp Failures
 - Inability to acquire Ramp
 - Import/Export Failures
 - Further broken into ramp / transmission
 - Total MISO Overview
 - MP participation
 - Increased competition?

Figure 6: Transactions Failed due to Transmission



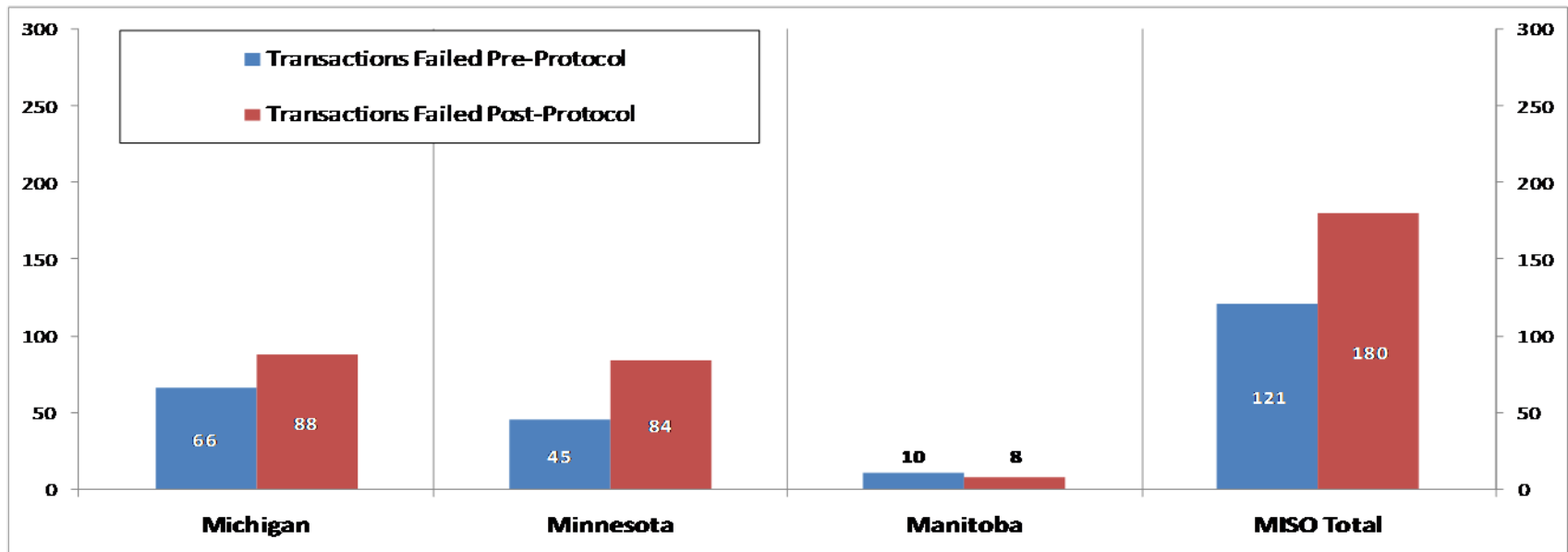
- The number of failures due to transmission decreased on all interties.
- Overall, the number of failures due to transmission post protocol decreased by 29%.

Figure 7: MW Failed due to Transmission



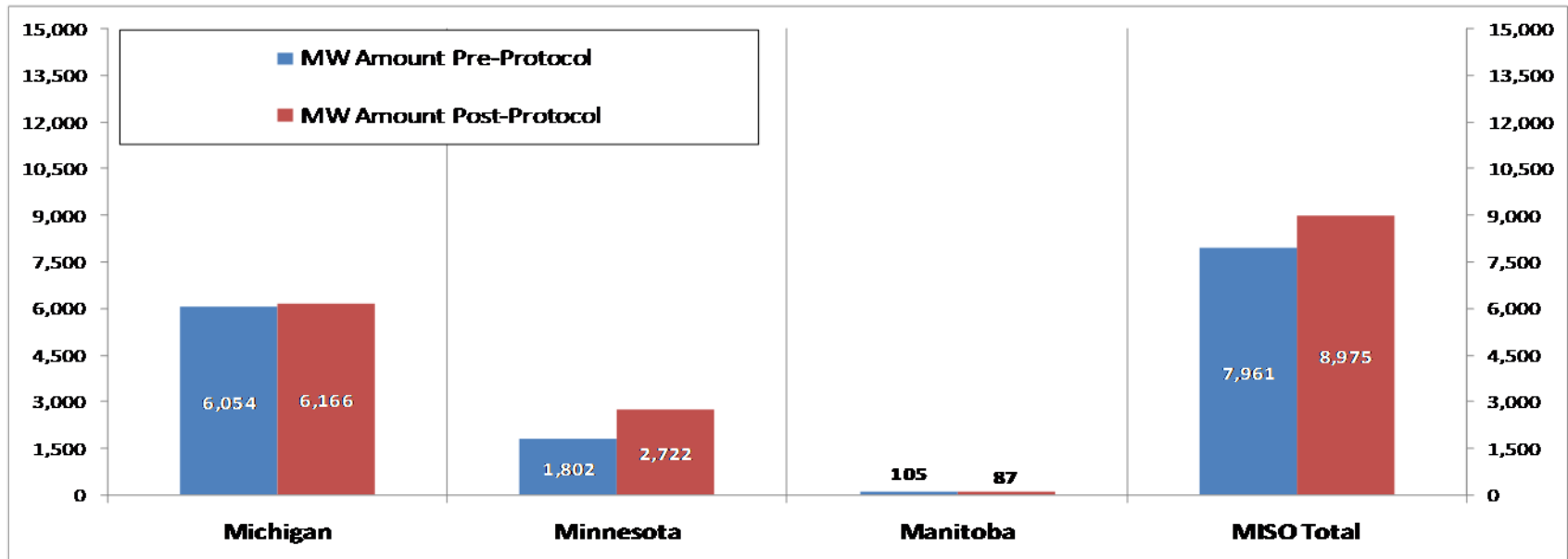
- The MW Failed due to transmission decreased on all inter-ties.
- Overall, the MW failed in MISO post-protocol *decreased* by 25%.
- We believe the MW failures are more important as this is what affects price.

Figure 8: Transactions Failed due to Ramp



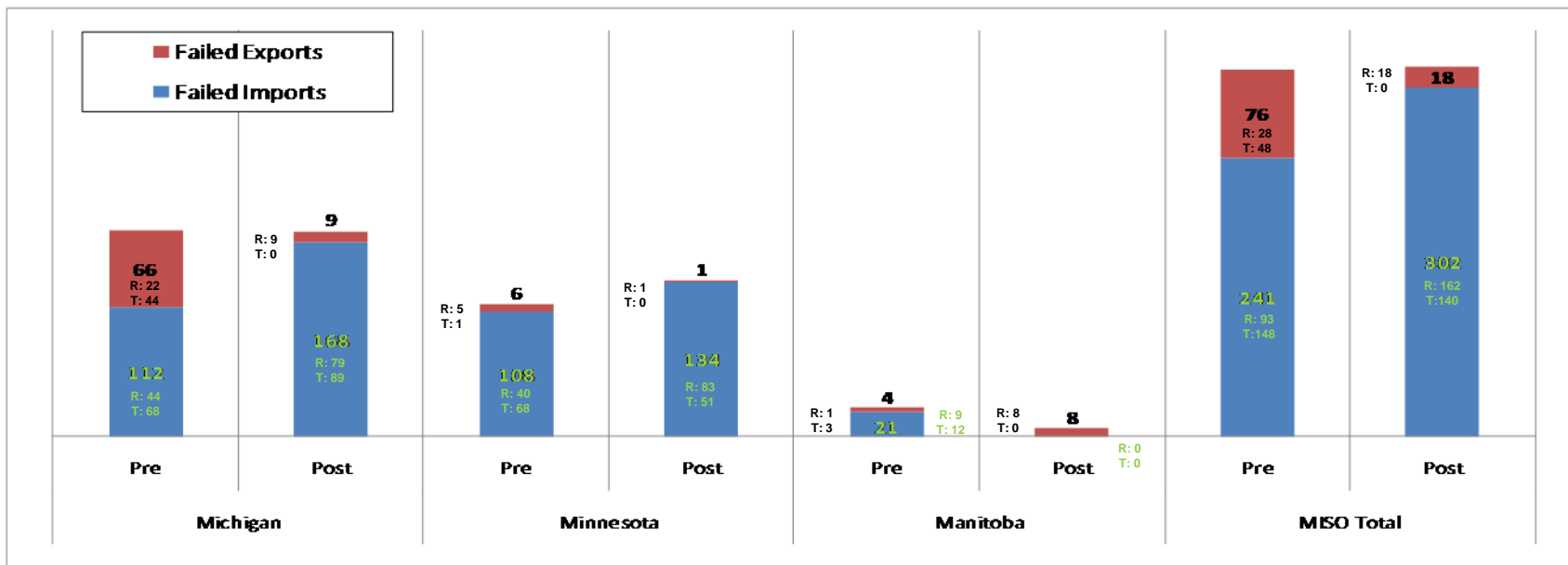
- The number of failures decreased in Manitoba yet increased in Michigan and Minnesota.
- Overall, the number of failures due to ramp post protocol *increased* by 49%.

Figure 9: MW Failed due to Ramp



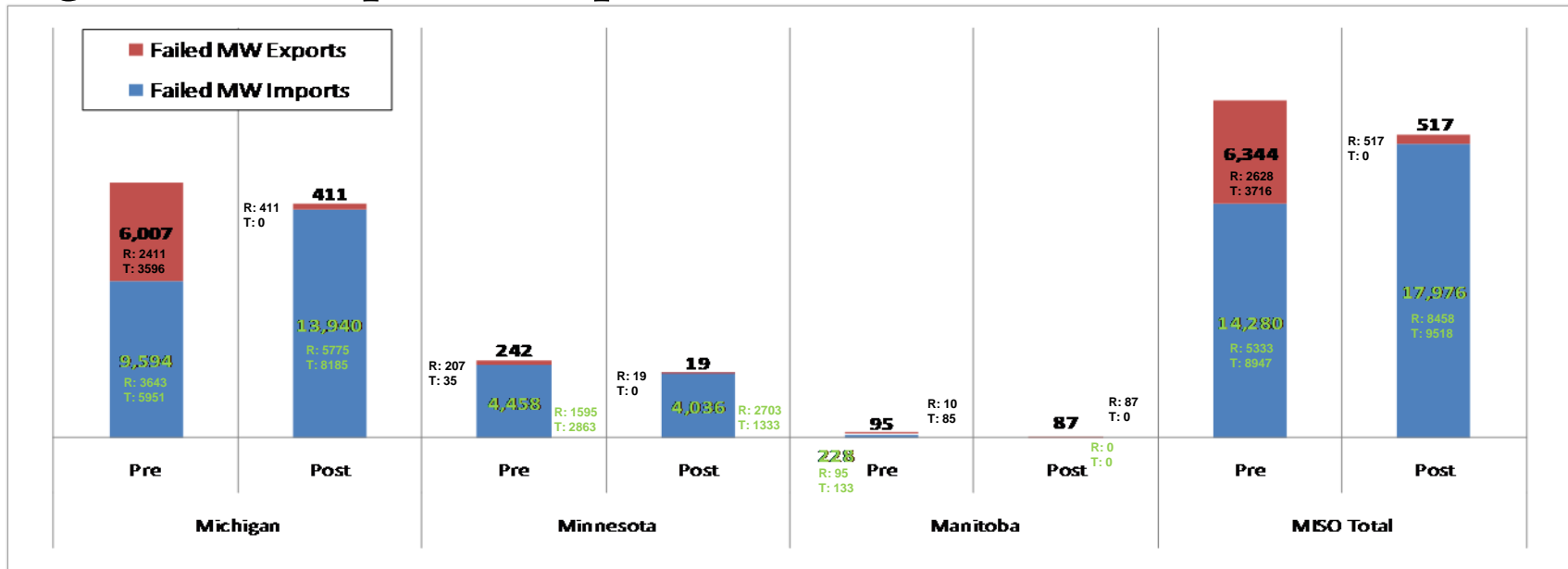
- The MW Failed increased on all inter-ties except Manitoba.
- Overall, the MW failed due to ramp in MISO post-protocol increased by 13%.

Figure 10: Imports/Exports # of MrNh failures in MISO



- Failed exports decreased by 76% in MISO.
- Failed imports increased by 25% in MISO.
- Overall, number of transactions increased by 1% in MISO.

Figure 11: Imports/Exports MW Failed (MrNh) in MISO



- MW failed exports decreased by 92% in MISO.
- MW failed imports increased by 21% in MISO.
- Overall, MW failed decreased by 10% in MISO.

Table 1: Pre-Protocol Summary Chart

Interface	Total Transactions	MrNh	% of Total	Total MW *	Failed MW	% of Total
Michigan	20,480	178	0.87%	924,899	15,601	1.69%
Minnesota	4,832	114	2.36%	86,268	4,700	5.45%
Manitoba	1,774	25	1.41%	24,931	323	1.30%
MISO Total	27,086	317	1.17%	1,036,098	20,624	1.99%

Table 2: Post-Protocol Summary Chart

Interface	Total Transactions	MrNh	% of Total	Total MW *	Failed MW	% of Total
Michigan	15,269	177	1.16%	649,428	14,351	2.21%
Minnesota	5,329	135	2.53%	49,219	4,055	8.24%
Manitoba	1,780	8	0.45%	38,684	87	0.22%
MISO Total	22,378	320	1.43%	737,331	18,493	2.51%

*The scheduling limits were lower on all interfaces (except Manitoba) in the post protocol timeframe. 21

- Before the MISO Protocol took effect, some Market Participants (MPs) may have been reluctant to trade across the MISO interface due to:
 - The inability to acquire transmission service from firm owners following last pre-dispatch run.
- Following protocol we are expected to:
 - See an increase in MPs trading across the MISO Interface
 - This was indeed the case, where MP participation increased by 11% at the Manitoba and Minnesota interfaces.
- Participant feedback:
 - What has happened from your perspective?

- As per its mandate, the MISO protocol was intended to:
 - Reduce the number of transactions failing due to transmission.
 - This was indeed the case, where failed transactions due to transmission decreased by 29% and MW failed by 25%.
 - Increase participation
 - This was achieved due to an 11% increase in MP participation at the Manitoba and Minnesota interfaces.
- MISO has indicated an improvement to their systems as they are better able to forecast their ramp limitations.

- Some concern was raised with the respect to participants who had pre-purchased ramp, and whose ramp was then released due to the protocol.
 - This would only affect participants whose PD-1 schedule was greater than their PD-2 schedule.
 - There have been 32 instances where an E-Tag was reloaded after PD-1 and the participant failed for ramp. Only 3 of these were export transactions.
 - Unfortunately we cannot verify if these participants had ramp prior to PD-2.
 - We believe the benefits of the MISO protocol outweigh this potential risk.

APPENDIX

- 9:07 – IESO 2 hour ahead pre-dispatch completes for HE 12.
- 9:10-9:20 – IESO adjusts all existing MISO E-Tags to match 2 hour ahead schedule (seen as RC curtailment).
- 9:25 – MISO performs transmission “re-sink” for transmission based on Energy MW values from E-Tags.
- 9:30 – 10:30 MISO re-evaluates ramp based on Energy MW values on tags and grants ramp reservations where available to transactions with submitted E-Tags.
- 10:00 – 10:30 – Participants acquire transmission in MISO.
- 10:20 – Any pre-reserved ramp reservation in MISO that does not have an associated tag is released.
- 10:07 – IESO 1 hour ahead pre-dispatch for HE 12 completes.
- 10:10-10:20 – IESO adjusts all existing MISO E-Tags to match 1 hour ahead schedule (seen as RC reload).
- 10:30 – MISO re-evaluates ramp based on Energy MW values on tags and grants ramp reservations where available to transactions with submitted E-Tags.
- 10:40 – MISO and IESO checkout for HE 12.
- 11:00 - Schedules begin to flow.