

**Congestion Severity Index**

The lists on the following tabs are sorted by the Congestion Severity Index of the constraints. The Congestion Severity Index is based on the theoretical potential maximum number of dollars paid into the market by load serving entities due to congestion on the constraint in question. It is the maximum potential amount of money (in millions of dollars) that could have been saved over the course of this time period had the constraint not been bound. Both directions of the constraint are captured (there are a few constraints in ATC that have been bound in different directions at different times).

**Hours**

The "hours" measurements provided on the table is a measure duration of constraint binding. The number given is the total number of "hours" that the constraint occurred. RT data may have partial hours since RT constraints are bound in five minute intervals.

**Day Ahead and Real Time**

Day Ahead (DA) constraints indicate that MISO committed generation out of economic order in the Day Ahead market, meaning that more expensive generation is committed for the next day in order to avoid constraints that would occur if only the cheapest generation was scheduled to run. Real Time (RT) constraints show up when MISO did not anticipate overloads on the system in the Day Ahead market. Adjustments must be made to the generation mix during the operating day in order to mitigate constraints.

**Potential Solution**

Potential solutions have been provided for some constraints listed. These solutions may not have been designed for the sole purpose of alleviating the listed constraints and therefore will not necessarily fully mitigate the constraints, but will reduce the constraint's frequency and severity under normal operating conditions.

Severity Index	Hours	Constraint	Potential Solution
<b>5.60</b>	<b>1,221</b>	<b>Total for all ATC Day Ahead constraints - November 2011</b>	<b>Solutions listed in ATC TYA unless otherwise noted</b>
1.45	316	Sheepskin - Stoughton 69 kV flo Paddock 345/138 kV Transformer T21	Area transmission outages may have contributed to this constraint Rockdale - West Middleton 345 kV (Planned 2013)
1.33	78	Rockdale 345/138 kV Transformer T21 flo Rockdale 345/138 kV Transformer T22	Area transmission outages may have contributed to this constraint Rockdale - West Middleton 345 kV (Planned 2013)
0.63	154	Flow South PTDF	Flow Control Device (Proposed, 2014)
0.52	99	Lakeview - Zion 138 kV flo Pleasant Prairie - Zion 345 kV	Pleasant Prairie - Zion Energy Center 345 kV line (Proposed 2014)
0.51	51	Pleasant Prairie - Zion 345 kV flo Cherry Valley - Silver Lake 345 kV (ComEd)	Pleasant Prairie - Zion Energy Center 345 kV line (Proposed 2014)
0.31	289	Nordic - Felch Tap 69 kV flo Chandler 138/69 kV Transformer T1	Arnold 345/138 kV Transformer (Provisional, 2015) Second Chandler 138/69 kV Transformer (Proposed, 2012) Flow Control Device (Proposed, 2014) ATC Northern Plan Projects
0.26	20	Granville - Butler 138 kV flo Granville - Arcadian 345 kV	Area transmission and generation outages may have contributed to this constraint Terminal Equipment Replacement at Butler Substation (Proposed 2012)
0.20	21	Minnesota to Wisconsin Exports Interface (MWEX)	Monroe County - Council Creek 161 kV line (Proposed, 2014) North La Crosse - Madison 345 kV line (Proposed 2018)
0.12	38	Kenosha - Lakeview 138 kV flo Pleasant Prairie - Zion 345 kV	Pleasant Prairie - Zion Energy Center 345 kV line (Proposed 2014)
0.07	49	Manrap - Shoto 69 kV flo Northeast - Shoto 69 kV	Shoto - Custer 138 kV line (Provisional 2022)
0.07	9	Lakeview - Zion 138 kV flo Zion - Arcadian 345 kV	Pleasant Prairie - Zion Energy Center 345 kV line (Proposed 2014)
0.03	4	Bain 345/138 kV Transformer T4 flo Pleasant Prairie - Arcadian 345 kV	Area transmission and generation outages may have contributed to this constraint Pleasant Prairie - Zion Energy Center 345 kV line (Proposed 2014)
0.02	15	Sheepskin - Stoughton 69 kV flo Columbia Unit #1	Area transmission outages may have contributed to this constraint Rockdale - West Middleton 345 kV (Planned 2013)
0.02	8	Caledonia SW STR - Merrimac SW STR 69 kV flo Dam Heights - Kirkwood 69 kV	Area transmission outages may have contributed to this constraint
0.01	12	Footville SW STR - REC Center Tap 69 kV flo Kegonsa 138/69 kV T31 Transformer	Area transmission outages may have contributed to this constraint
0.01	7	Brevort - Straits - McGulpin 138 kV flo Morgan - Plains 345 kV	Flow Control Device (Proposed, 2014) ATC Northern Plan Projects
0.01	2	Sheepskin - Dana Corp SW STR 69 kV flo Stoughton - Kegonsa 69 kV	Area transmission outages may have contributed to this constraint
0.00	2	University - Whitewater 138 kV	Area transmission outages may have contributed to this constraint
0.00	7	Nine Mile - Kincheloe Main Tap 69 kV	Uprate Pine River - Nine Mile 69 kV line (Proposed 2016) Flow Control Device (Proposed, 2014) ATC Northern Plan Projects
0.00	2	University - Whitewater 138 kV flo University - Sugar Creek 138 kV	Area transmission outages may have contributed to this constraint
0.00	9	Masonville - Lakehead Rapid River 69 kV flo Chandler - Delta 69 kV	Chandler - 18th Road 138 kV line (Proposed 2014)
0.00	3	Evergreen - Pine River 69 kV flo Straits - Hiawatha 138 kV + Hiawatha 138/69 kV Transform	Flow Control Device (Proposed, 2014) ATC Northern Plan Projects
0.00	1	McCue - REC Harmony Tap 69 kV flo Christiana - Kegonsa 138 kV	Construct 69-kV double-circuit line between McCue and Lamar (Provisional, 2022)
0.00	4	Tone Tap - Rudyard Tap 69 kV flo Pine River - Nine Mile 69 kV	Flow Control Device (Proposed, 2014) ATC Northern Plan Projects

\* This project not part of the ATC 10-Year Assessment

1. This constraint may have been bound for other contingencies as well.

0.00	1	Indian Lake 138/69 kV Transformer T1	Indian Lake - Hiawatha 138kV line (Proposed, 2014) Flow Control Device (Proposed, 2014) ATC Northern Plan Projects
0.00	1	Cornell - Chandler 69 kV flo Empire - Forsyth 138 kV + MINE LOAD	Arnold 345/138 kV Transformer (Provisional, 2015) Flow Control Device (Proposed, 2014) ATC Northern Plan Projects
0.00	1	Mass - Bruce Crossing 69 kV flo Atlantic - Winona 69 kV	ATC Northern Plan Projects
0.00	18	Manistique Transformer T1	No solution - virtual activity causing congestion

\* This project not part of the ATC 10-Year Assessment

1. This constraint may have been bound for other contingencies as well.

Severity Index	Hours	Constraint	Potential Solution
4.97	221	<b>Total for all ATC Real Time constraints - November 2011</b>	<b>Solutions listed in ATC TYA unless otherwise noted</b>
2.65	95	Sheepskin - Stoughton 69 kV flo Paddock - Rockdale 345 kV	Area transmission outages may have contributed to this constraint Rockdale - West Middleton 345 kV (Planned 2013)
1.75	29	Rockdale 345/138 kV Transformer T21 flo Rockdale 345/138 kV Transformer T22	Area transmission outages may have contributed to this constraint Rockdale - West Middleton 345 kV (Planned 2013)
0.33	77	Nordic - Felch Tap 69 kV flo Chandler 138/69 kV Transformer T1	Arnold 345/138 kV Transformer (Provisional, 2015) Second Chandler 138/69 kV Transformer (Proposed, 2012) Flow Control Device (Proposed, 2014) ATC Northern Plan Projects
0.12	9	Nordic - Felch Tap 69 kV flo Plains - Arnold 138 kV <sup>1</sup>	Arnold 345/138 kV Transformer (Provisional, 2015) Second Chandler 138/69 kV Transformer (Proposed, 2012) Flow Control Device (Proposed, 2014) ATC Northern Plan Projects
0.06	2	Kenosha - Lakeview 138 kV flo Pleasant Prairie - Zion 345 kV	Pleasant Prairie - Zion Energy Center 345 kV line (Proposed 2014)
0.02	1	Manrap - Shoto 69 kV flo Northeast - Shoto 69 kV	Shoto - Custer 138 kV line (Provisional 2022)
0.02	0	Indian Lake 138/69 kV Transformer T2 flo Indian Lake 138/69 kV Transformer T1	Indian Lake - Hiawatha 138kV line (Proposed, 2014) Flow Control Device (Proposed, 2014) ATC Northern Plan Projects
0.01	5	Chandler - Goodman SW STR flo Chandler - Delta 69 kV	Chandler - 18th Road 138 kV line (Proposed 2014)
0.01	1	Kenosha - Lakeview 138 kV flo Arcadian - Zion 345 kV	Pleasant Prairie - Zion Energy Center 345 kV line (Proposed 2014)
0.00	0	Sheepskin - Stoughton 69 kV flo Rock River 138/69 kV Transformer	Area transmission outages may have contributed to this constraint Rockdale - West Middleton 345 kV (Planned 2013)
0.00	1	Presque Isle Output	ATC Northern Plan Projects

\* This project not part of the ATC 10-Year Assessment

1. This constraint may have been bound for other contingencies as well.

### Day Ahead Hours Vs. Congestion Severity



