



Preliminary MISO January 30-31 Maximum Generation Event Overview

February 07, 2019

Purpose & Key Takeaways



Purpose:

Preliminary summary of operations during the January 30 – 31 North and Central Region Maximum Generation Event

Key Takeaways:

- MISO and Members reliably managed operations during extreme cold last week, where temperatures fell below -30°F in some parts of North and Central regions
- Resulting high load, unavailable generation, and uncertainty in both load and supply created challenges throughout the event
- Emergency procedures were implemented and maintained from early Wednesday morning through Thursday afternoon to reliably manage these challenges
- Winter preparedness by MISO and its members ensured readiness for the extreme conditions, but, as always, we are looking for potential improvements

A strong arctic high pressure system brought historic cold to North and Central Regions from January 28-31, impacting load, generation availability, and increased uncertainty



Significant Observations

Atypical load profile

- MISO system peaked at 101 GW from a forecast of 104 GW on January 30
- School and other closings and Load Modifying Resource deployments impacted actual load

Generation availability impacted

- Unidentified temperature cutoff thresholds challenged wind forecasting in morning of Jan 30. Unexpected shutoffs led to a large deviation from planned output
- Some gas supply limitations and cold-related mechanical issues resulted in forced outages

MISO and Member actions

- Emergency procedures that deployed LMRs and voluntary load management were sufficient to meet peak obligations and mitigate uncertainties

Import response

- Increased imports occurred in response to emergency pricing across much of the event

Extreme N/C cold drove high load, a sudden and unexpected drop in wind generation, forced outages, and uncertainty, which required the declaration of the Maximum Gen Event

MISO Classic (North/Central Regions)	2014		2018	2019			
	01/06 -21°/-11°F	01/07 -13°/-10°F	01/17 -2°/-3°F	01/28 2°/10°F	01/29 -20°/4°F	01/30 -26°/-10°F	01/31 -21°/-8°F
Integrated Peak Load (GW)	79.9	76.7	73.7	70.4	74.3	76.7	75.1
Average Daily MISO Wind	7.2 GW	2.0 GW	12.0 GW	12.9 GW	12.9 GW	4.3 GW	4.7 GW
Gas Price* (\$/MMBtu)	\$13.17	\$7.39	\$3.91	\$3.13	\$4.23	\$7.42	\$5.09
Average Daily RT LMP (\$/MWh)	\$97.74	\$225.83	\$40.90	\$25.53	\$26.92	\$107.90	\$49.29
Max Daily NSI (Import)	4.3 GW	-2.1 GW	3.4 GW	7.1 GW	9.0 GW	13.7 GW	7.8 GW
Cold Weather Alert					Called on Jan 25 for Operating Days Jan 29 – Feb 01		
Max Gen Event Step 1a			Step 1				
Conservative Operations							
Max Gen Event Step 2a/b			Step 2				
Max Gen Event Step 1b/c							
Max Gen Alert							
Max Gen Warning							

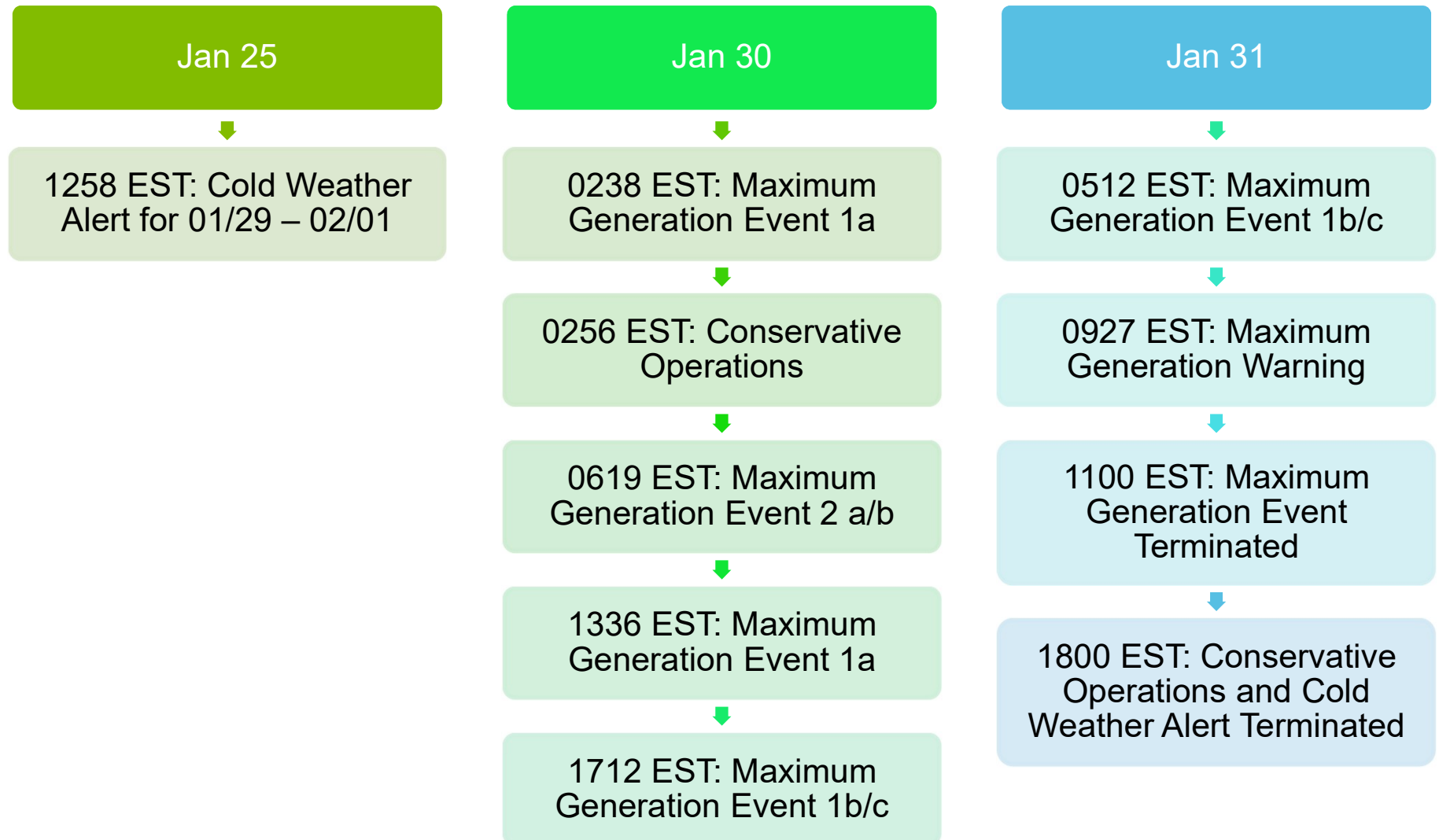
Shading indicates declaration was active during that day

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- Temperatures are daily low values for North and Central Regions
 - LMP is calculated as an average of Hubs in the North and Central regions
 - * Chicago City Gate Gas Price



Data Source: Real-Time Operations, Market Analysis, and MISO Website

MISO continued to monitor conditions and update communications accordingly during the event



Next Steps: Complete Evaluation & Lessons Learned

- MISO will continue to review the January 30-31 event to determine the opportunities to increase preparedness for extreme situations and enhance our processes or procedures in the future
- MISO will complete its evaluation and update details surrounding outages, load, temperatures, and pricing in preparation for the March MSC meeting and stakeholder meetings later in February and March