



COVID-19 Impact to Load & Outage Coordination

Release Date: June 8, 2020

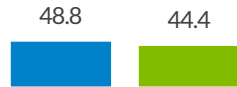
COVID-19 load impact methodology and assumptions

- The load impact is performed by running a backcast model using actual weather.
 - This approach removes the weather bias, creating a reliable comparison to historical information
 - Freezing the model prior to COVID - 19 started, removes the load shape adjustments and model adaptation to recent history
- The difference between the model and actual load would be a “load deviation” from normal.
- The load deviation since March 13, 2020 would reflect the impact of COVID – 19 related closures and stay at home ordinances to normal MISO load conditions.

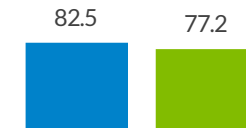
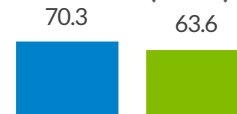
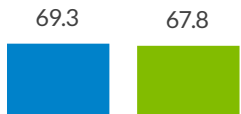
COVID- 19 related closures are slowing down energy and load deviation

Simulated and Actual Energy (TWh)

■ Simulated ■ Actual



Average Simulated and Actual Load (GW)



March 14 - 31

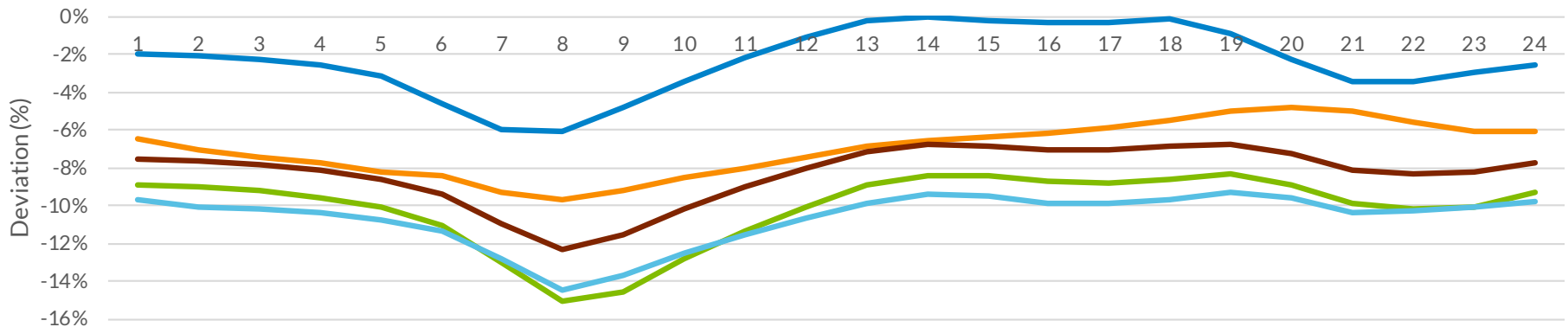
April 1 - 30

May 1 - 31

June 1-8

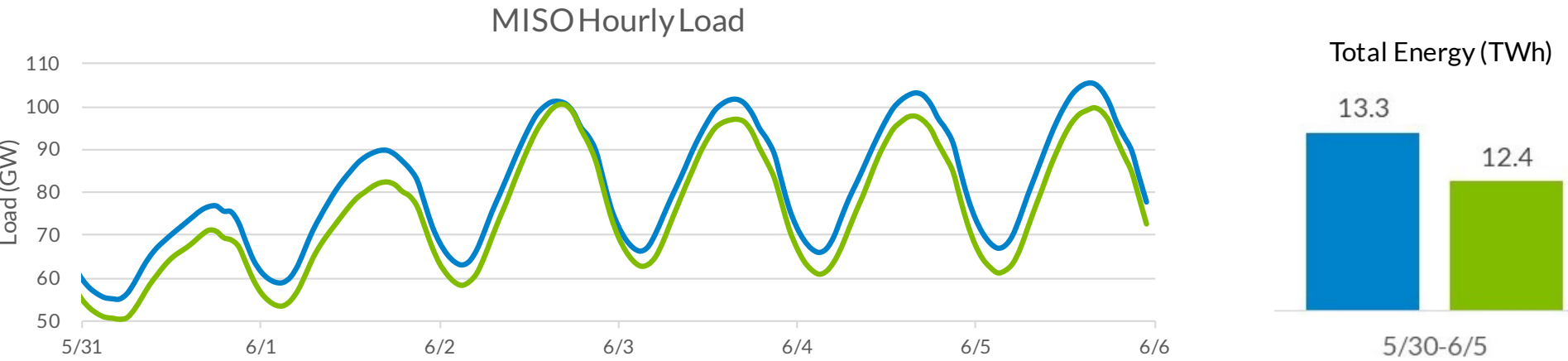
Energy and Load are starting to recover. June deviations from normal measure in the 7% range as temperatures rise and stay at home restrictions are lifted

Average Hourly Load Deviations

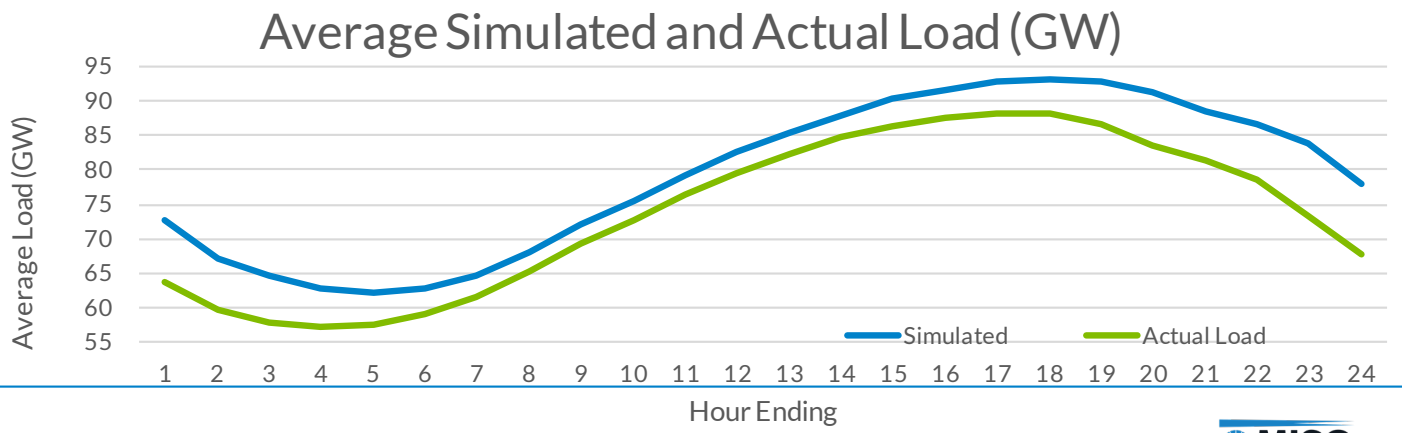
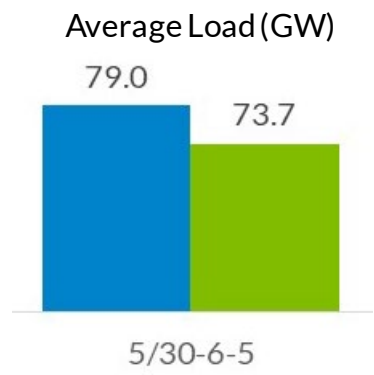


— March 14 - 31 — April 1 - 30 — May 1 - 31 — June 1-8 — March 14 - June 8

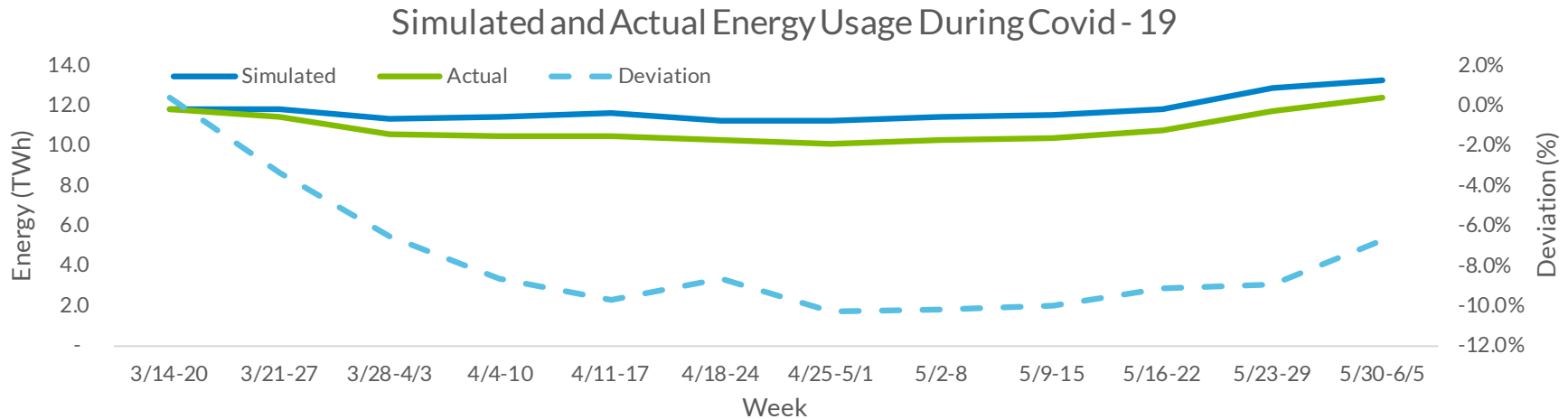
COVID- 19 Impacts to Load 5/30 – 6/5



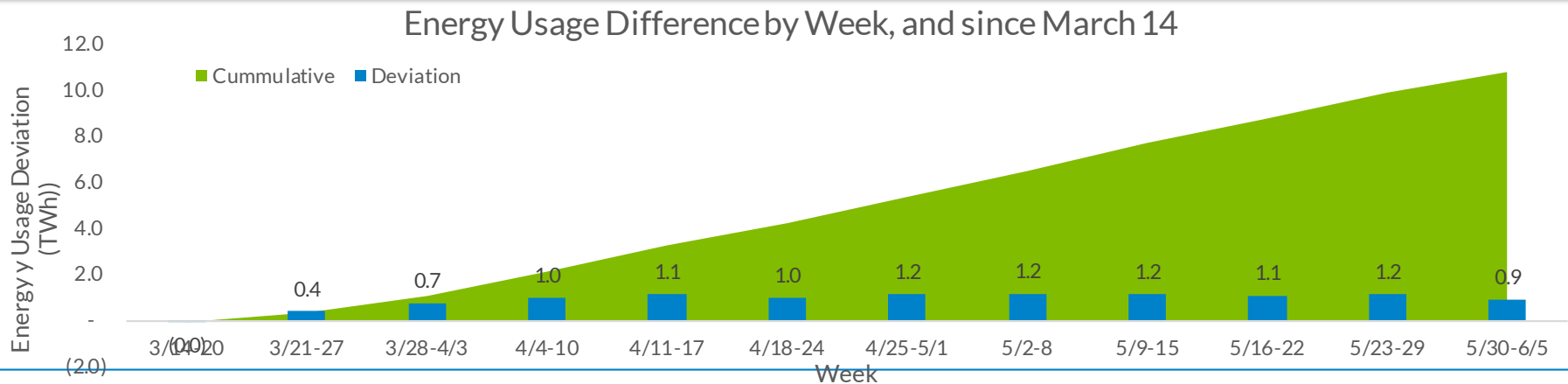
Energy and Load deviation for this week is 7% lower than normal. Deviations are declining due to the reopening of the economy and warmer weather



COVID- 19 Impacts to Energy Usage



Energy Usage deviation is declining for a third straight week. Latest weekly deviation is 7%



Summary of COVID-19 impact on MISO Load Levels

- MISO's load shape curve has changed due to COVID 19 related measures
- MISO started using the summer load model for the purposes of this simulation on 5/23
- States are starting to lift restrictions and manufacturing, retail are reopening
 - Third straight week energy and load deviations are reversing trends
 - June so far measures about 7% down from normal, compared to 10.6% in May.
- Load forecast errors are not impacting reliable operations

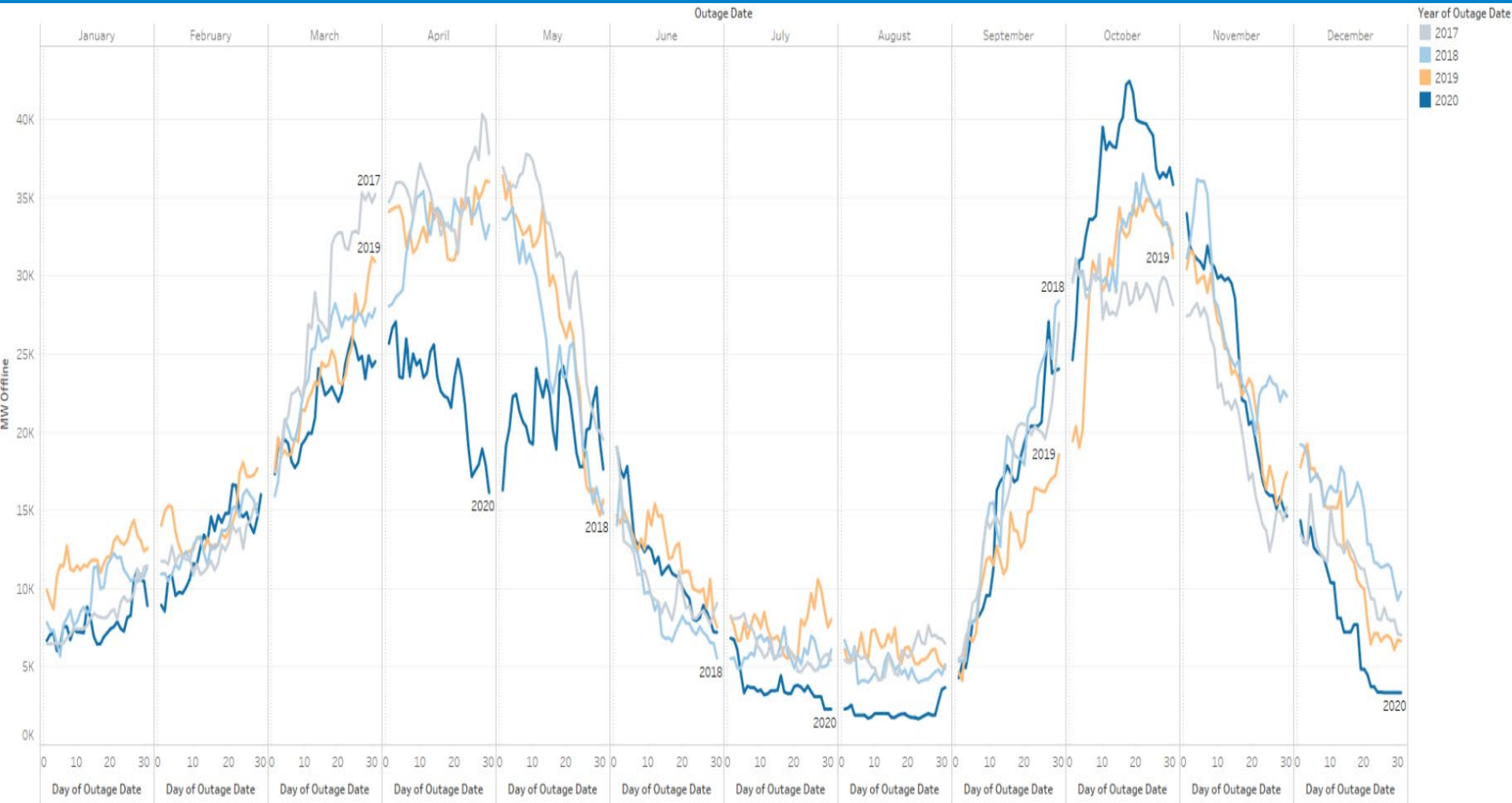


Outage Coordination Guidance

Outage Coordination impacts by Covid-19

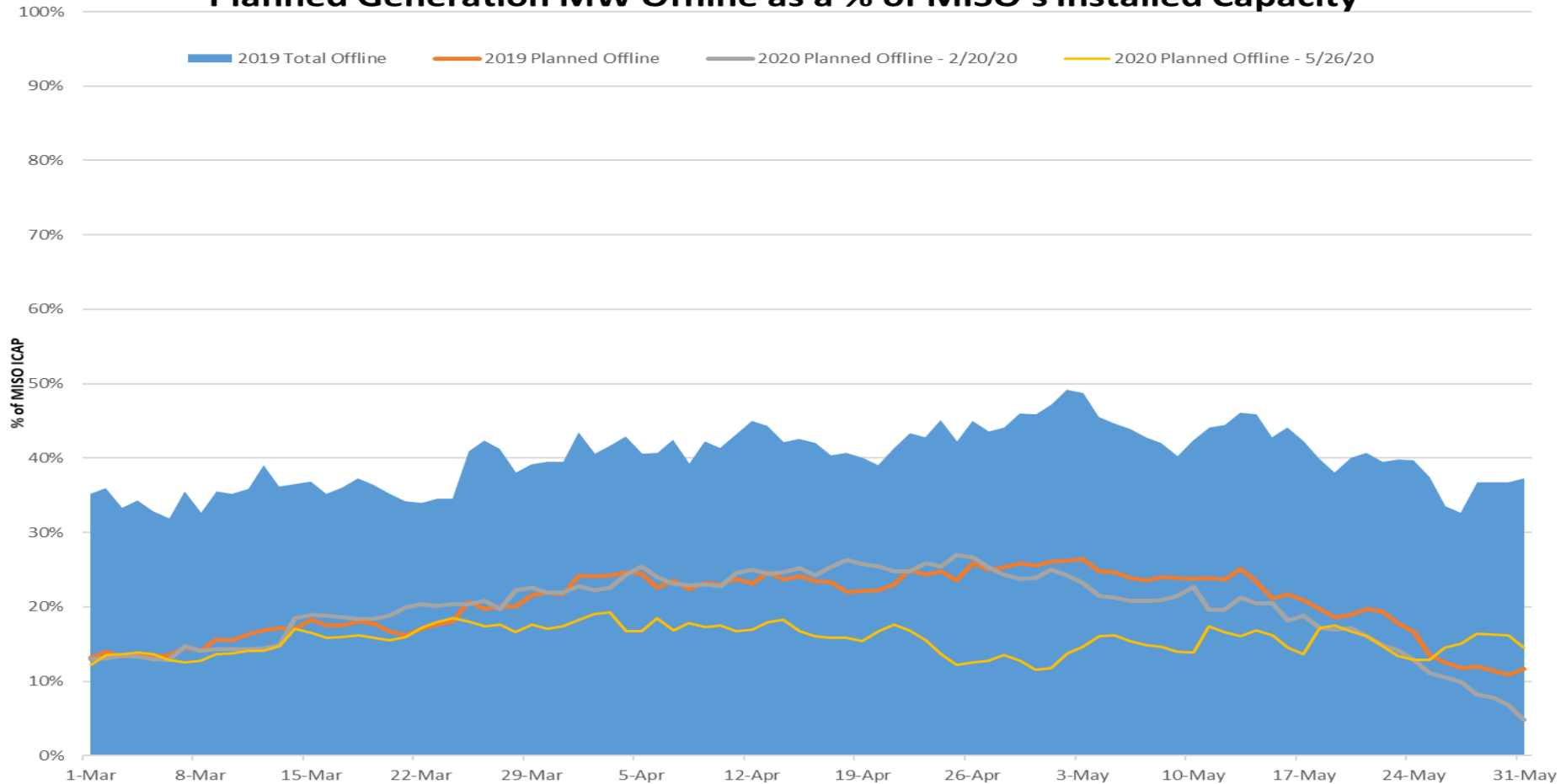
- MISO has had no reports of changes to outage schedules due to COVID since our last update
- To date, MISO has seen 109, or roughly 16%, of its planned transmission outages move; the majority of those are COVID related
 - Outage activity in the footprint experienced a slowdown in April and we expect to see this activity gradually return throughout the month of May.
- 21GW of planned generation outage schedules (approximately 35 generator outages) across the MISO footprint have been impacted by COVID. Changes include ending outages early, delayed start dates, cancellations and rescheduling for fall of 2020.
 - MISO is working with its Generator Owners with a focus on reliably rescheduling outages prior to Summer months and coordinating on the scheduling of outages for the fall of 2020.

Planned MW offline in April and May is well below prior year values. Additionally, we are seeing a large number of outages being submitted for October compared to prior years.



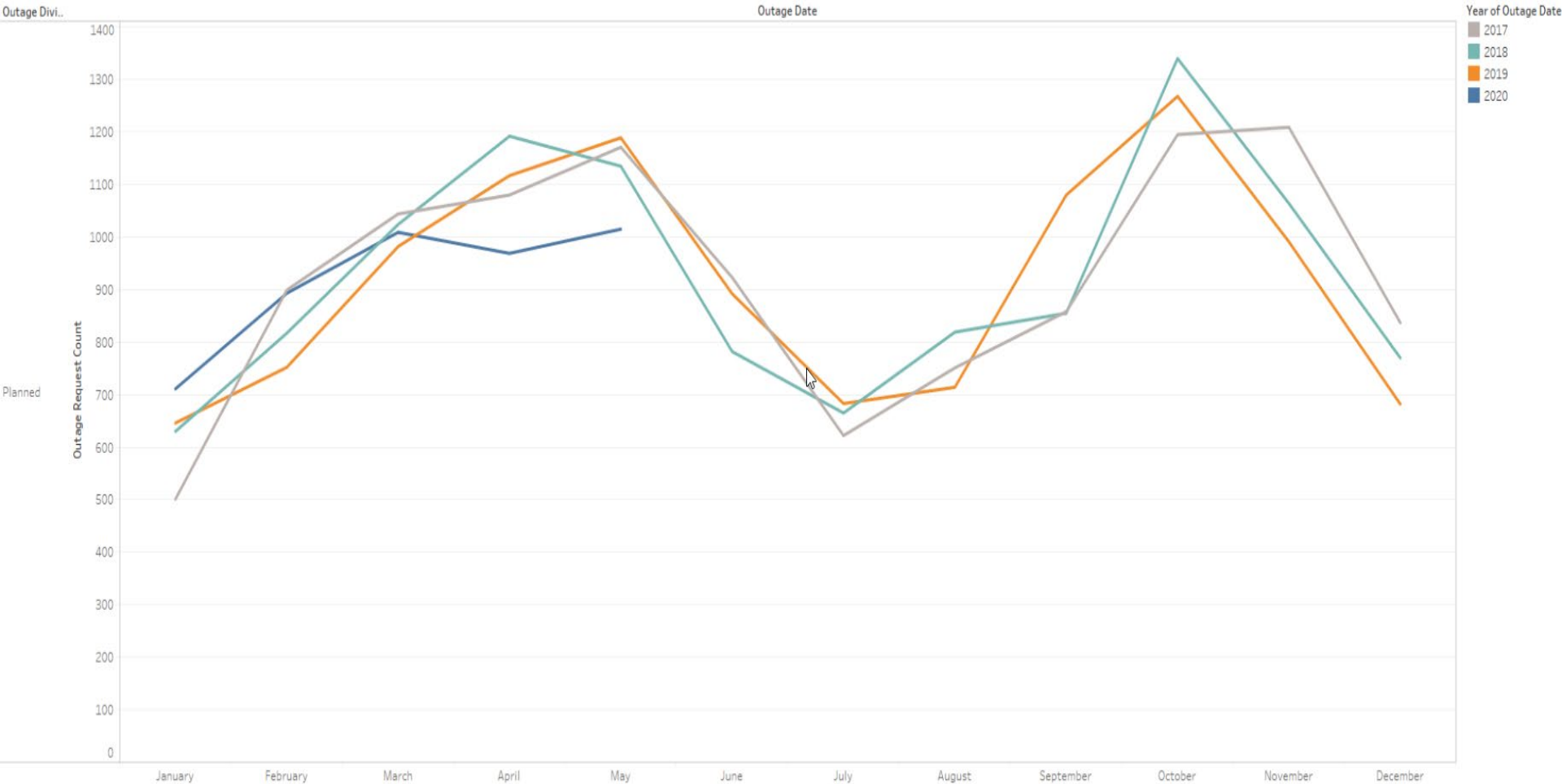
Planned MW Offline in April and May decreased due to the impacts of rescheduling/cancelling Generator outages due to COVID impacts.

Planned Generation MW Offline as a % of MISO's Installed Capacity



Total Planned Transmission outages show a steady decline beginning in early March compared to prior years.

Transmission Outage Count by Year



Planning Generation Outages – Fall

- MISO’s Maintenance Margin tool should be used when identifying opportunities to take Generator Outages in Fall of 2020
 - Daily reports posted on the MISO OASIS and the “Market Reports” section of the MISO public website
 - $\text{Maintenance Margin} = \text{Maintenance Limit (ML)} - \text{Planned Generator Outages}$
 - Maintenance Limit is the maximum amount of generation that can be offline at a given time without reliability concerns
 - More detail on Maintenance Margin can be found in **BPM-008 Attachment F**
- Generation Owners are expected to review and utilize Maintenance Margin when identifying the best opportunity to schedule their Planned Generator Outage.
- Periods of low or negative Maintenance Margin should be avoided.

Study Methods Used by MISO Outage Coordination

- MISO Outage Coordination uses 3 different methods when evaluating generator outages.

Maintenance Margin

Updated each week day for time period beyond **30 days out and up to 3 years in the future** includes a report of historic outage levels

GOAT

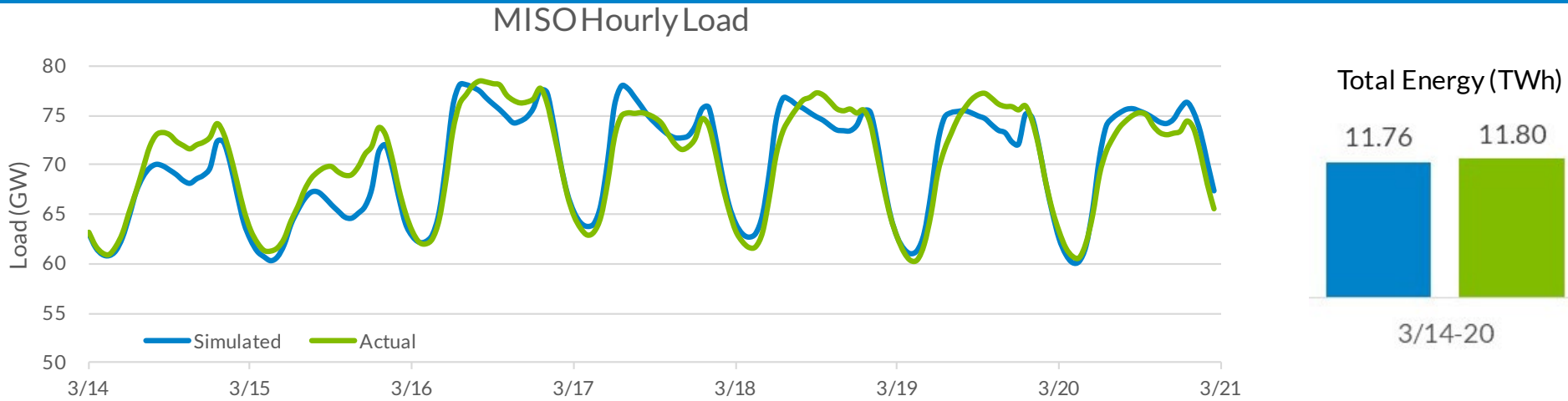
Generator Sufficiency Outage Analysis Tool provides contingency analysis tool for the time period **7 days – 30 days out.**

Multi-Day

Similar to [Multiday Operating Margin Forecast Report](#) process that ensures MISO has enough generation resources **less than 7 days out.**

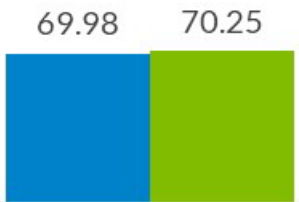
Appendix: Historical weekly load deviations

COVID- 19 Impacts to Load 3/14 - 20



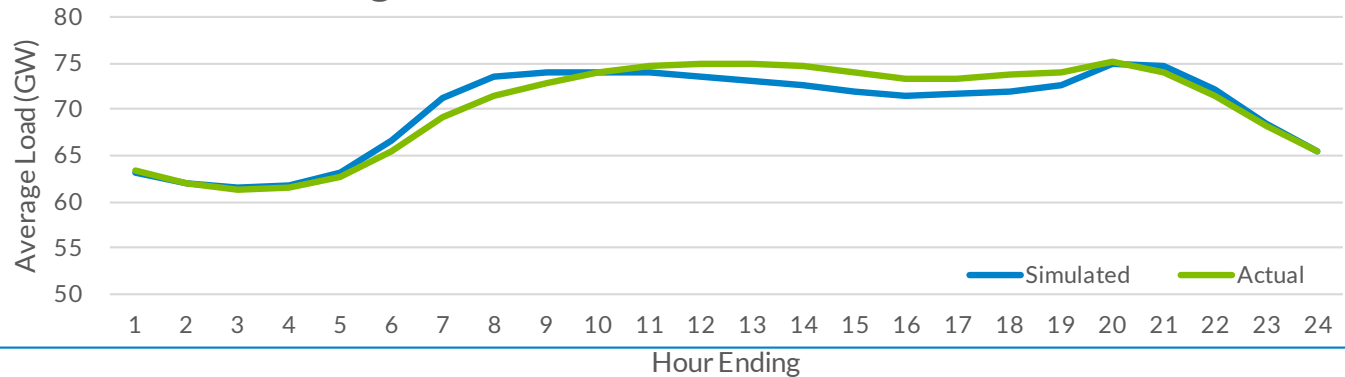
Morning peak shifts to later in the day. Energy usage is higher during the afternoon.

Average Load (GW)

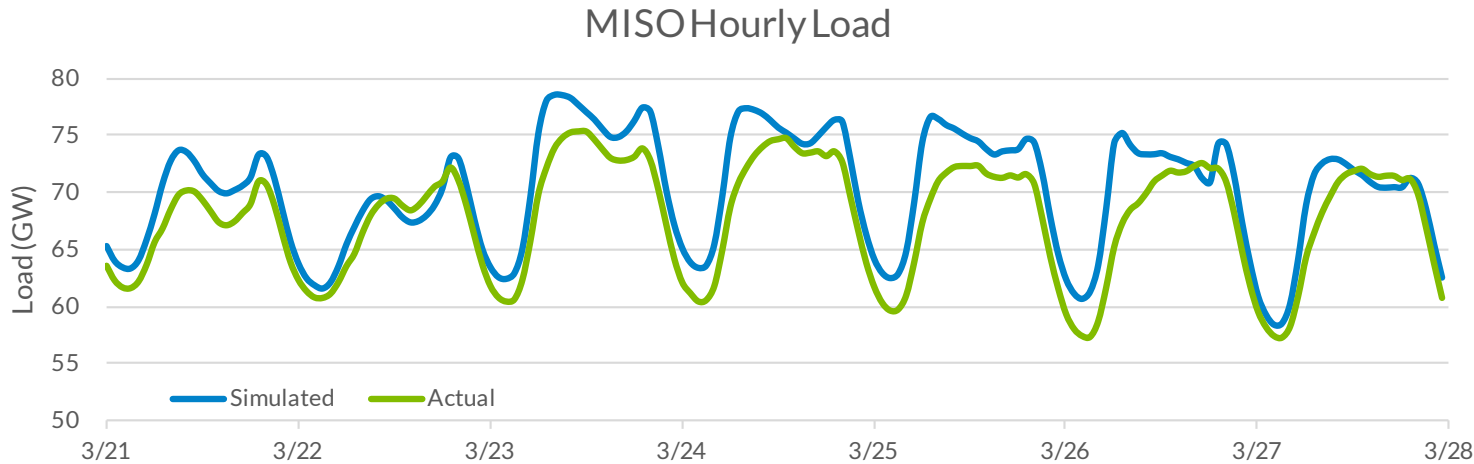


3/14-20

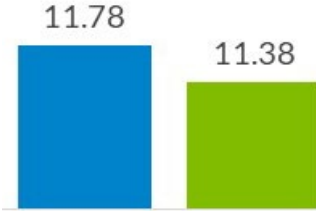
Average Simulated and Actual Load (GW)



COVID- 19 Impacts to Load 3/21 - 27



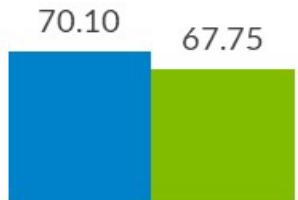
Total Energy (TWh)



3/21-27

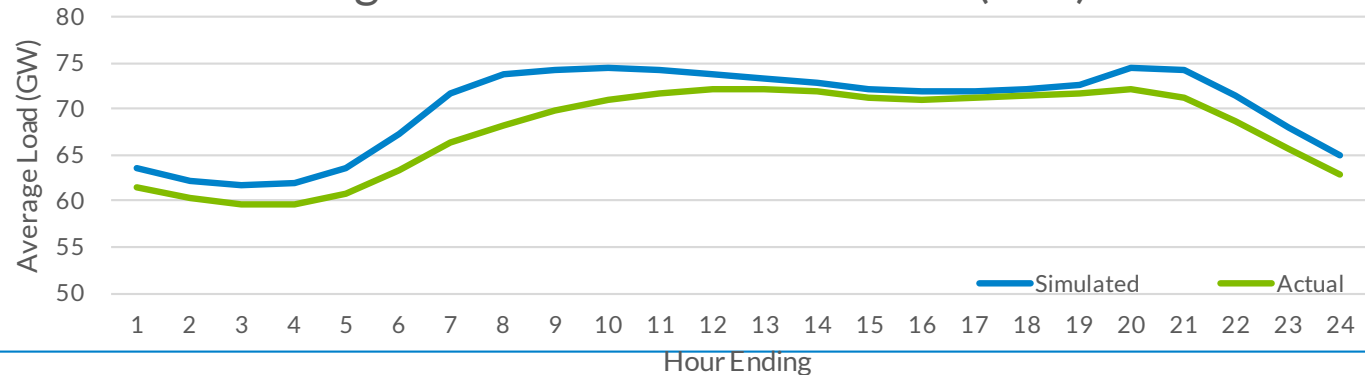
Lower morning ramp, and lower evening demand and energy usage

Average Load (GW)



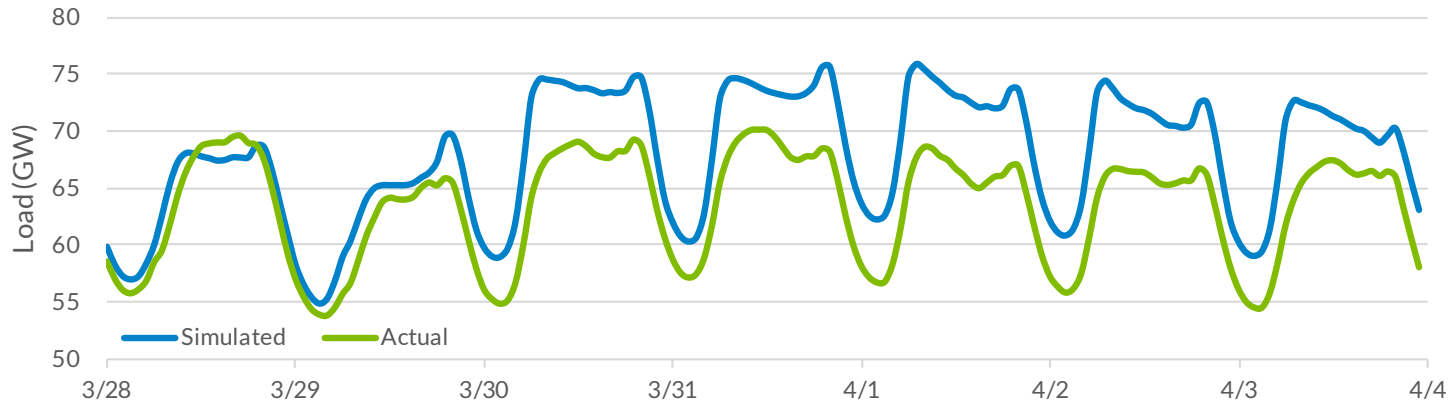
3/21-27

Average Simulated and Actual Load (GW)



COVID- 19 Impacts to Load 3/28 – 4/3

MISO Hourly Load



Total Energy (TWh)

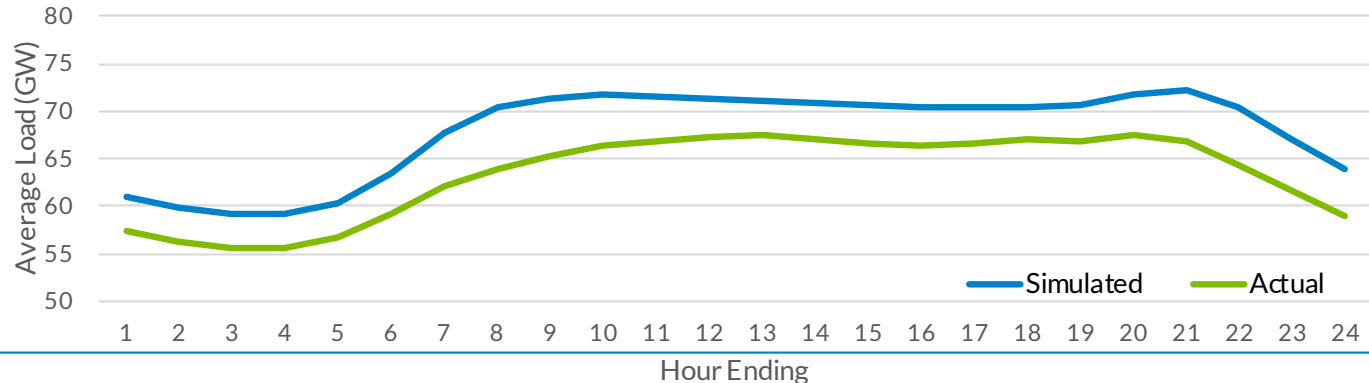


Additional stay at home ordinances lead to a load deviation, 7% lower than normal

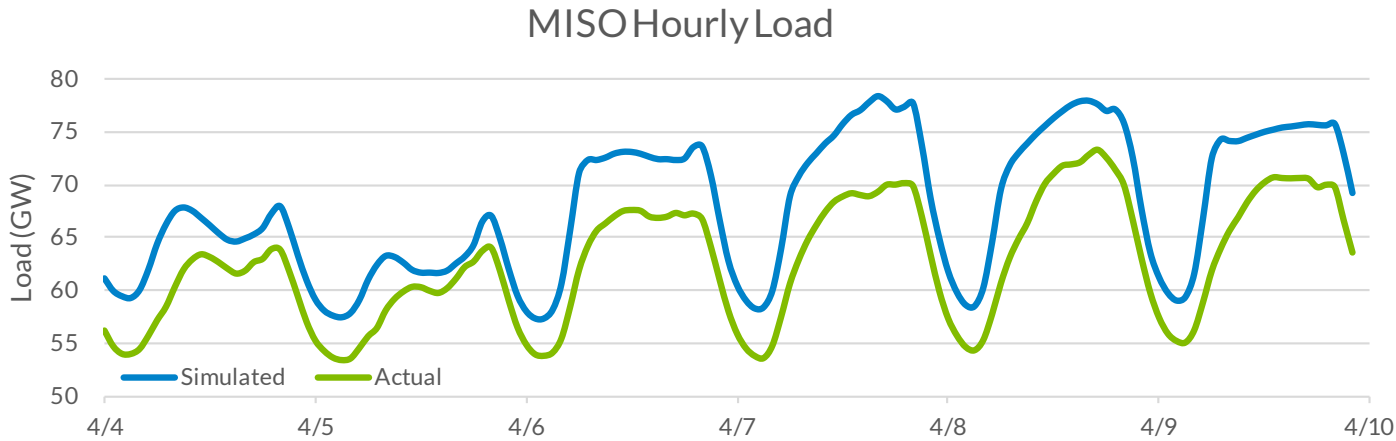
Average Load (GW)



Average Simulated and Actual Load (GW)



COVID- 19 Impacts to Load 4/4 – 4/10

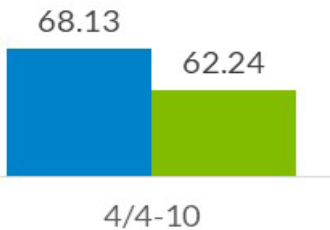


Total Energy (TWh)

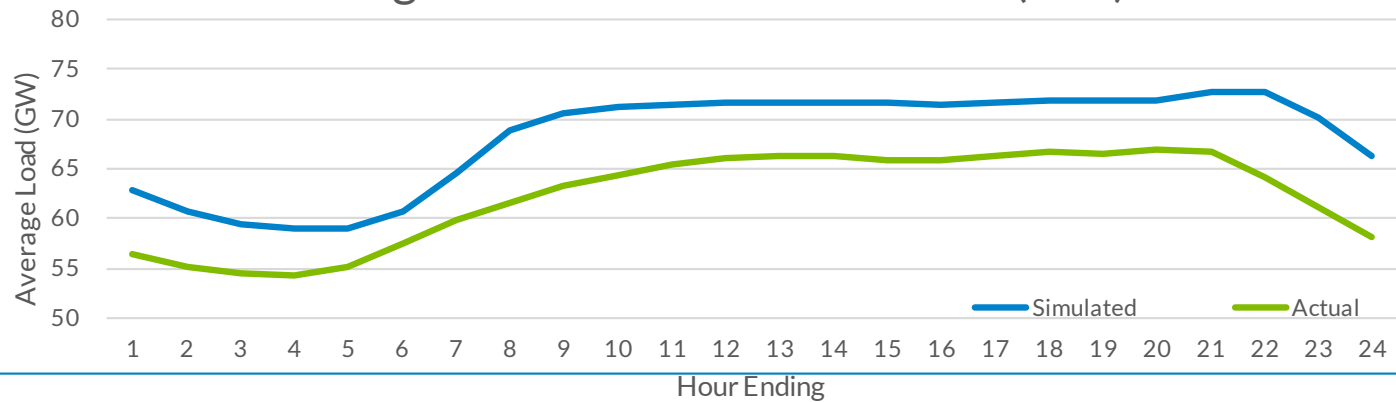


Load continues to decline, measuring 9.5% lower than normal.

Average Load (GW)

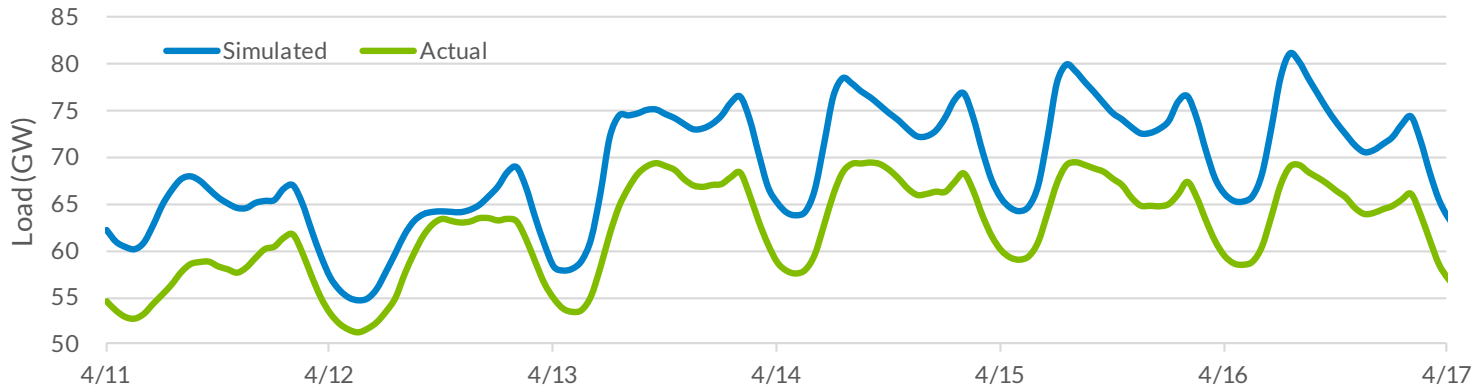


Average Simulated and Actual Load (GW)

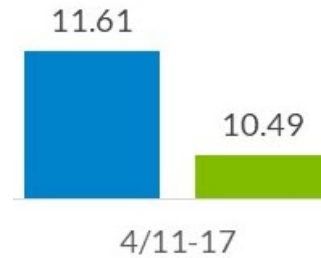


COVID- 19 Impacts to Load 4/11 – 4/17

MISO Hourly Load

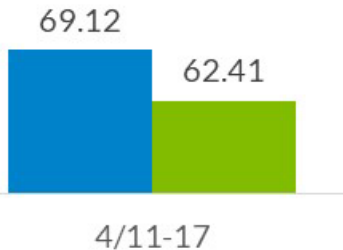


Total Energy (TWh)

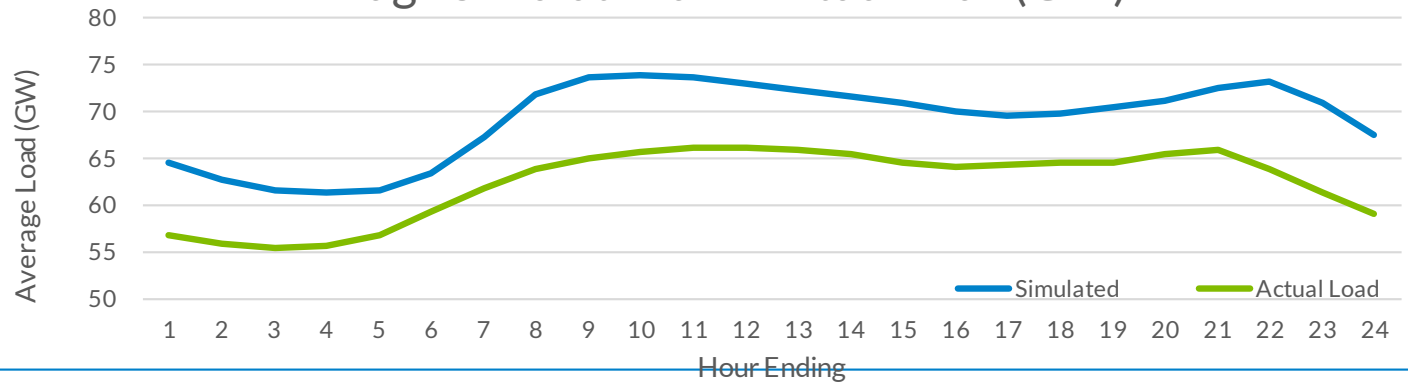


Load continues to decline, measuring 10.8% lower than normal.

Average Load (GW)

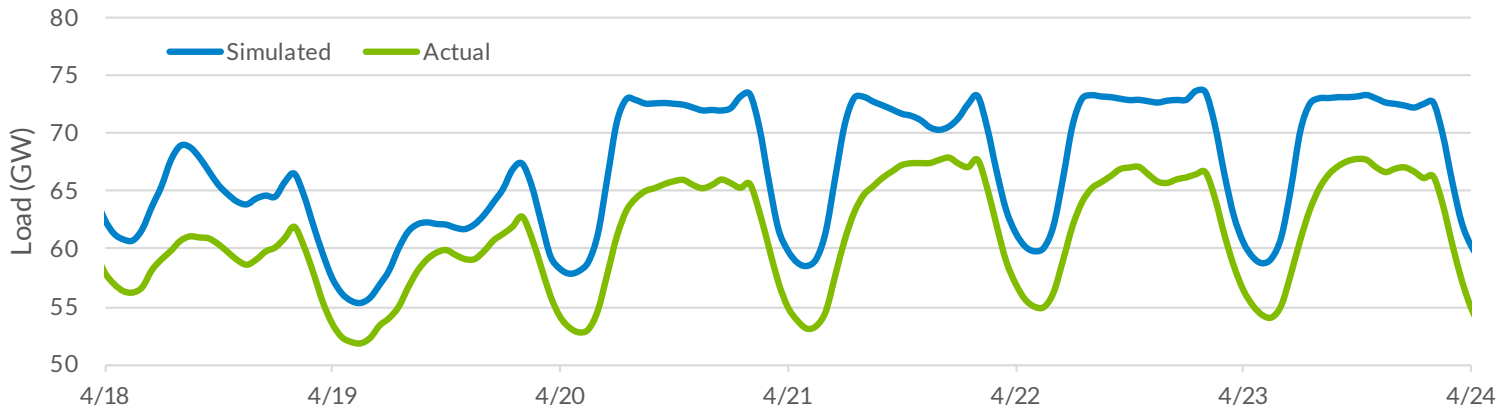


Average Simulated and Actual Load (GW)

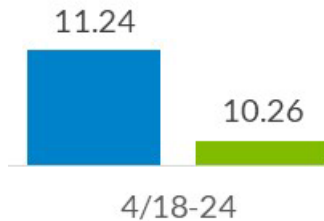


COVID- 19 Impacts to Load 4/18 – 4/24

MISO Hourly Load

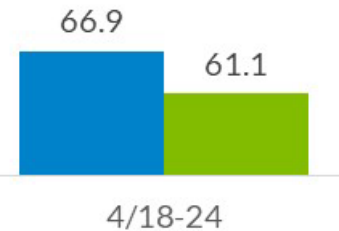


Total Energy (TWh)

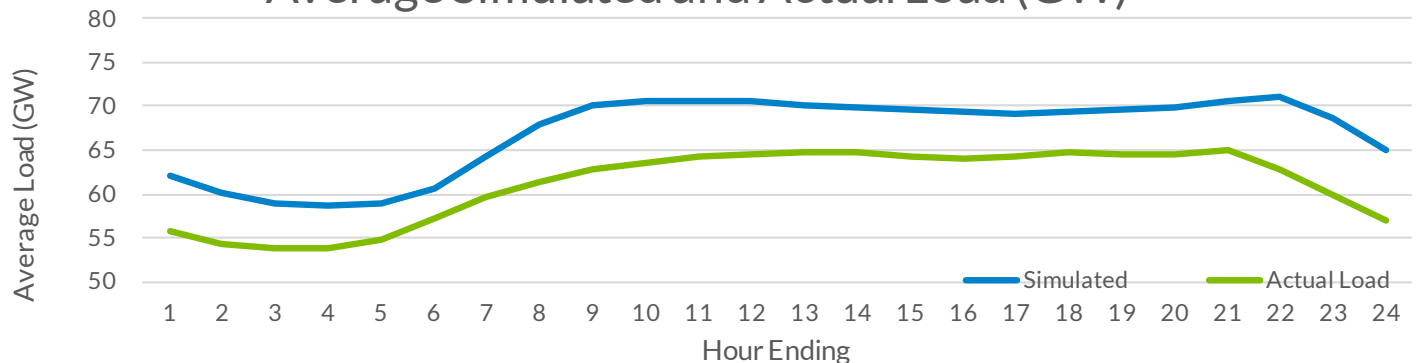


Load reduction for the week is 9.6% lower than normal, rate of reduction has slowing from prior week.

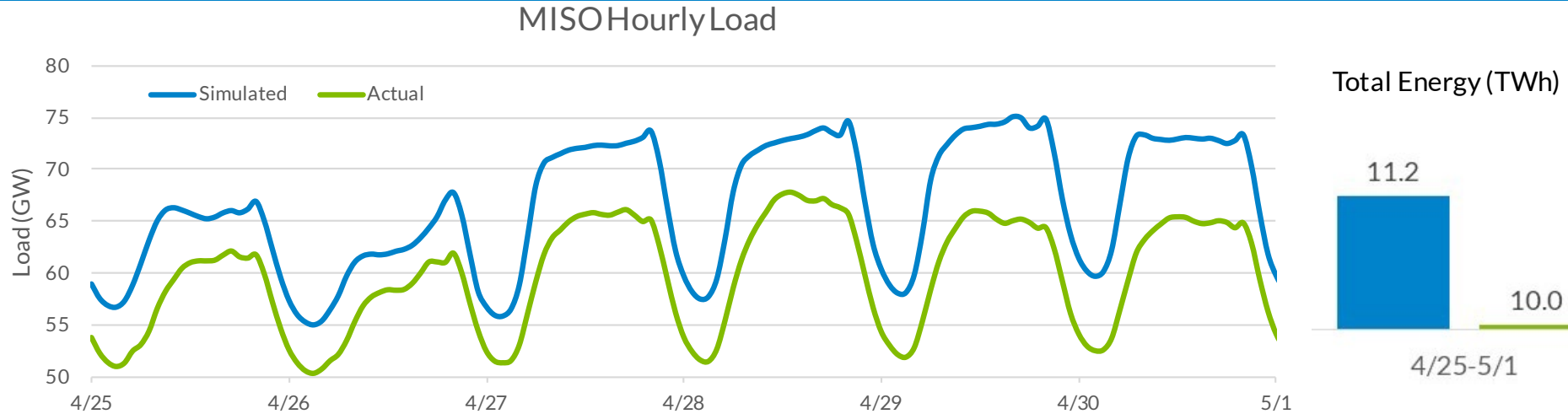
Average Load (GW)



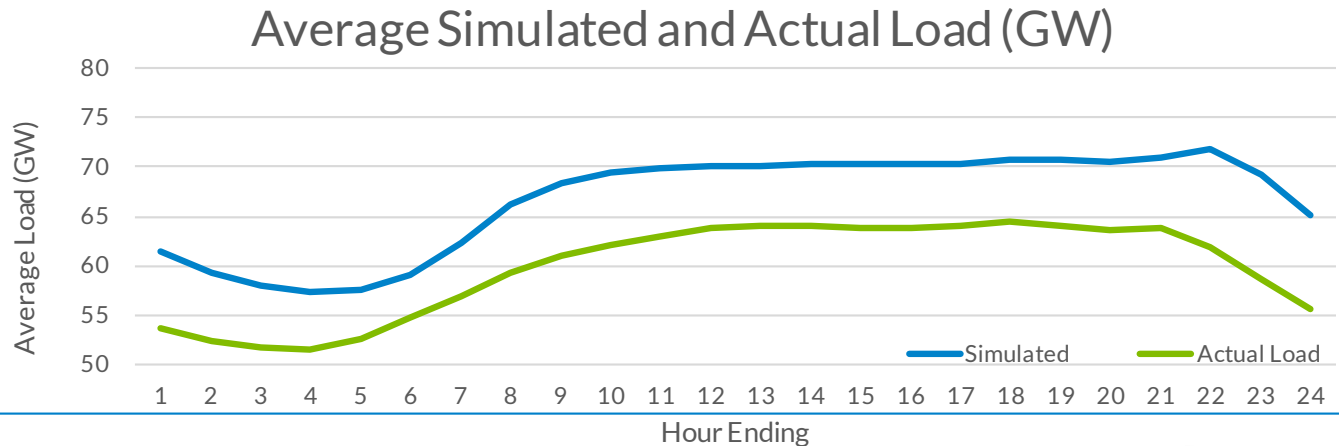
Average Simulated and Actual Load (GW)



COVID- 19 Impacts to Load 4/25 – 5/1

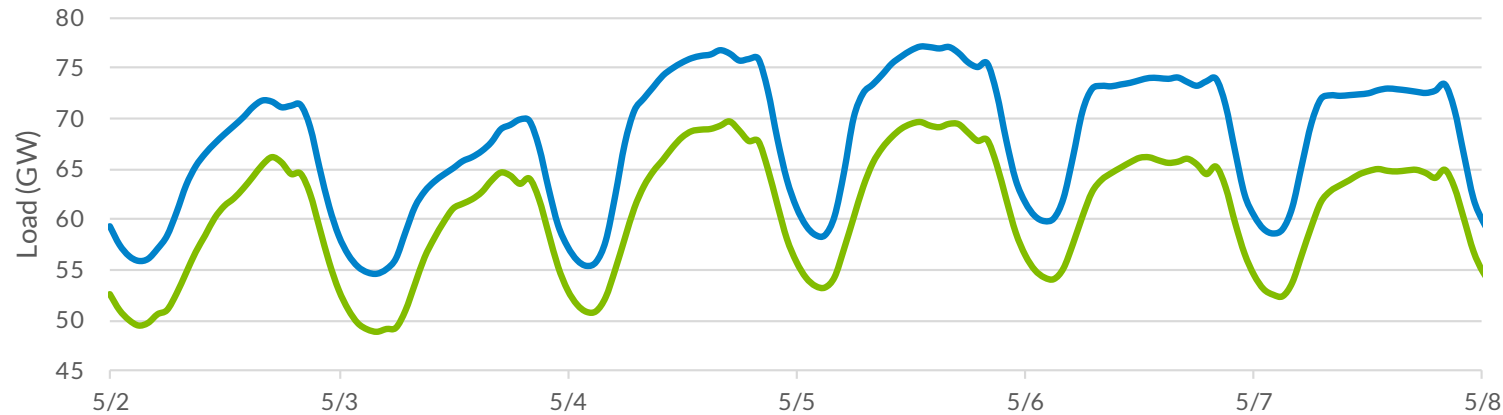


Load reduction for the week is 11.5% lower than normal, the lowest registered since 3/14

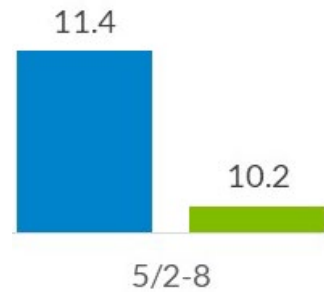


COVID- 19 Impacts to Load 5/1 – 8

MISO Hourly Load



Total Energy (TWh)

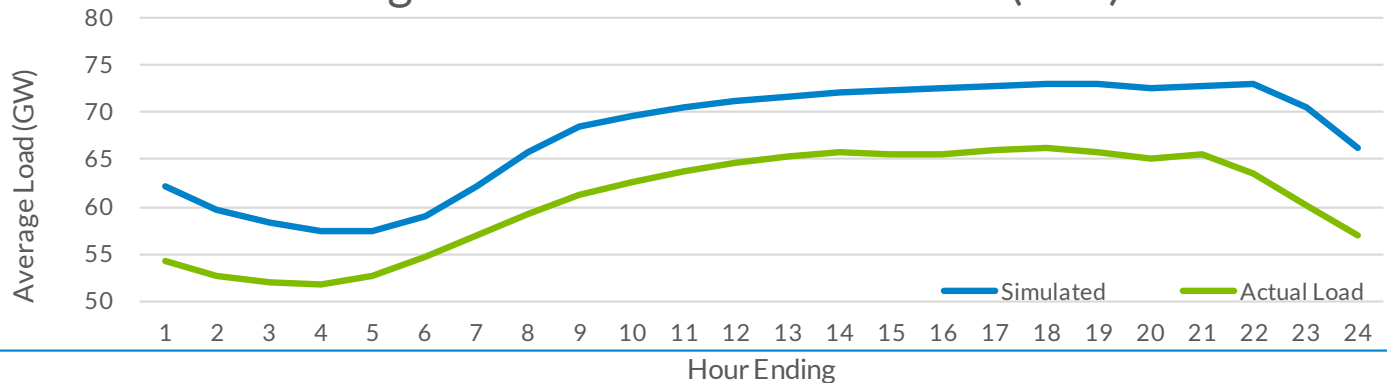


Energy for the week is about 10.2% lower than normal, Load is 11.4% lower than normal.

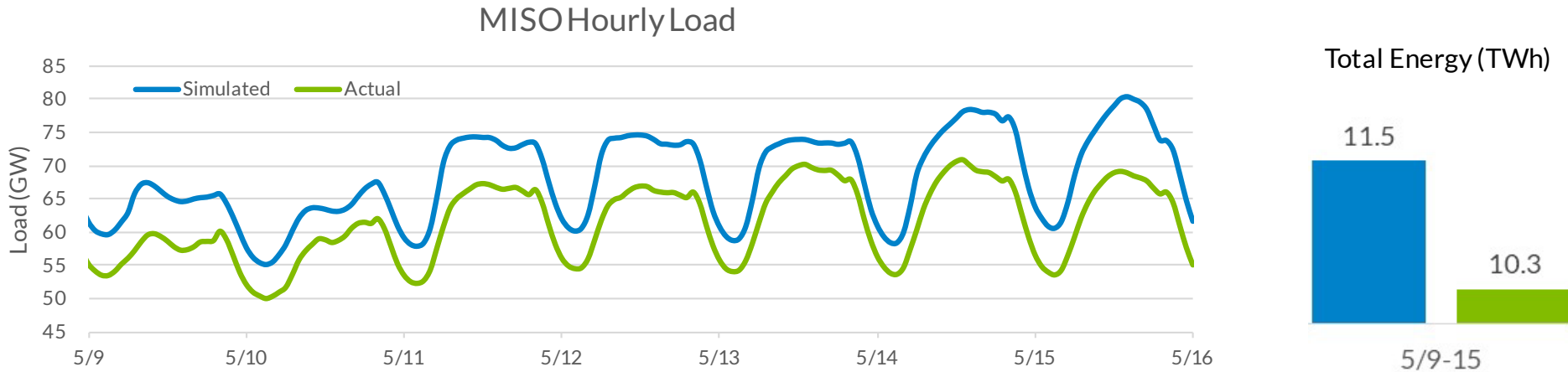
Average Load (GW)



Average Simulated and Actual Load (GW)

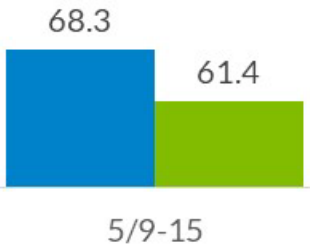


COVID- 19 Impacts to Load 5/9 – 15

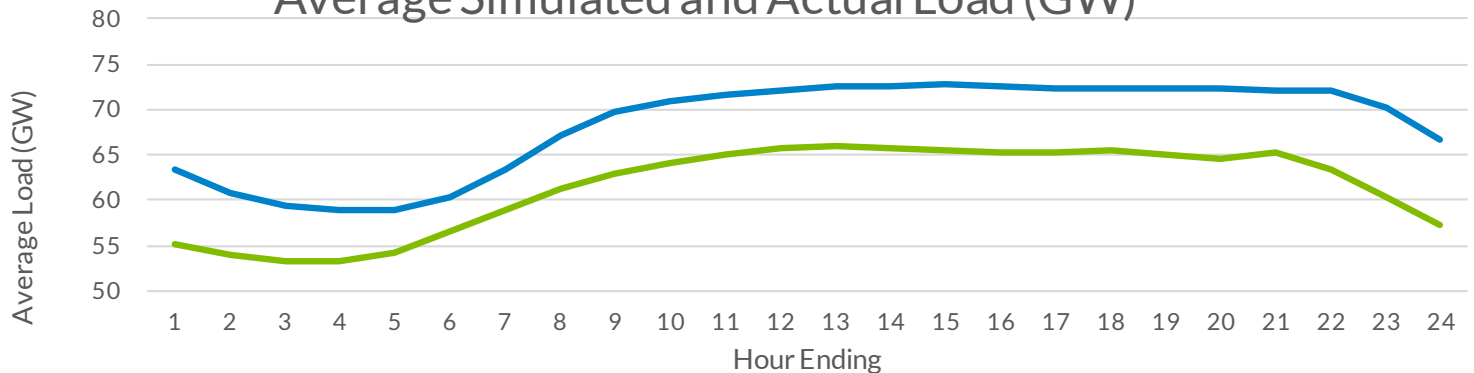


Energy for the week is about 10% lower than normal, Load is 11.2% lower than normal.

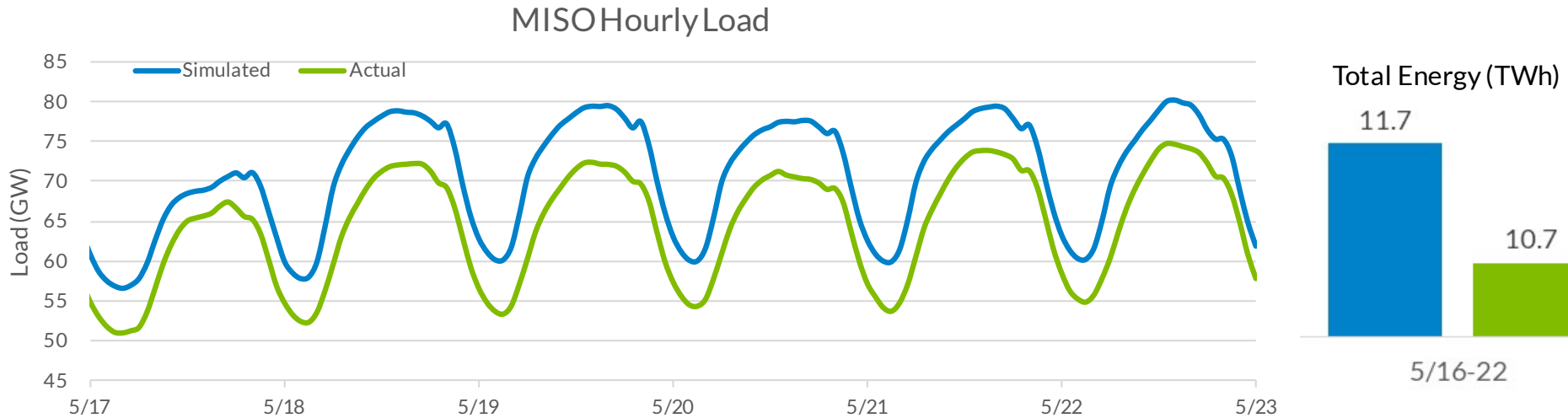
Average Load (GW)



Average Simulated and Actual Load (GW)



COVID- 19 Impacts to Load 5/16 – 22



Energy for the week is about 9% lower than normal, Load is 10% lower than normal. Deviations are beginning to decline due to the reopening of some retail & manufacturing.

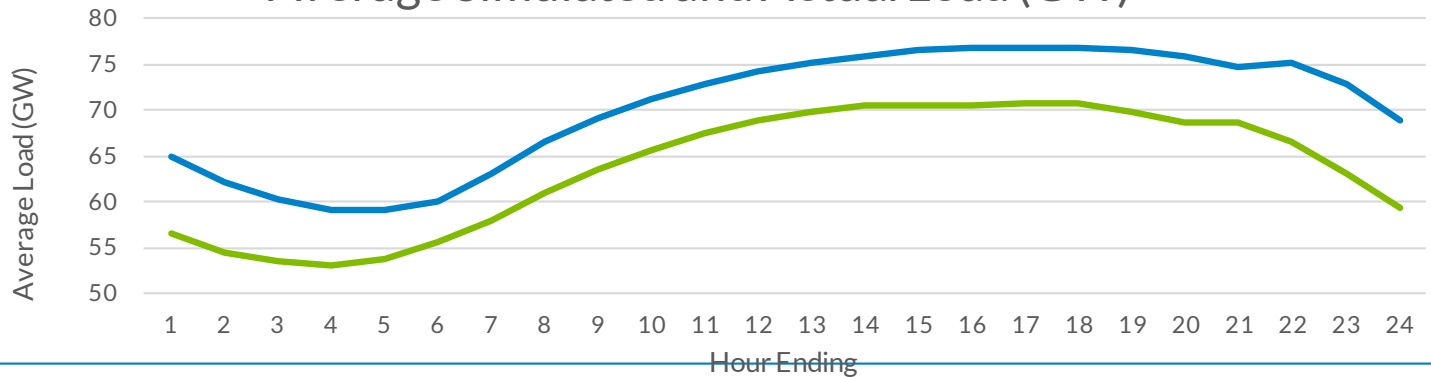
Average Load (GW)

70.2

63.8

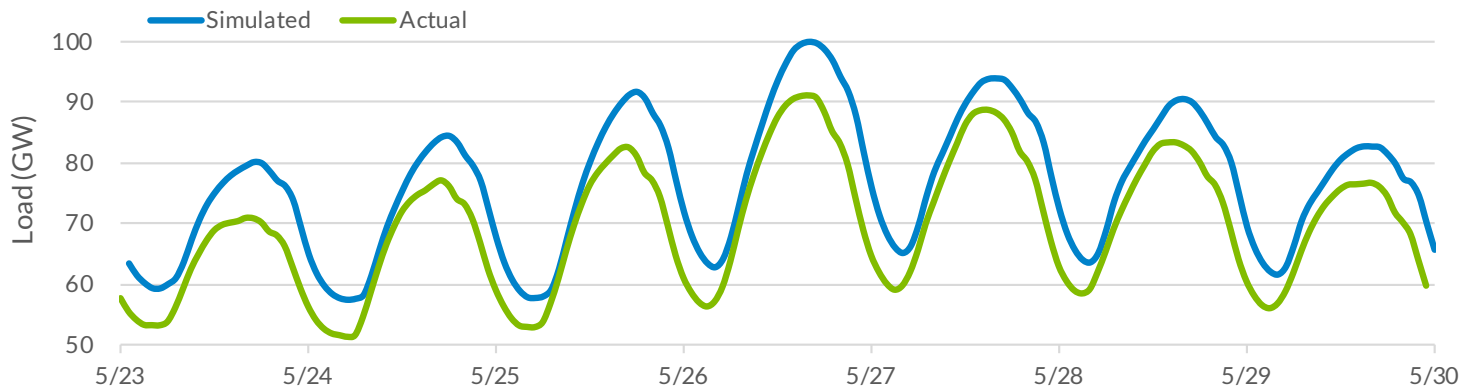
5/16-22

Average Simulated and Actual Load (GW)

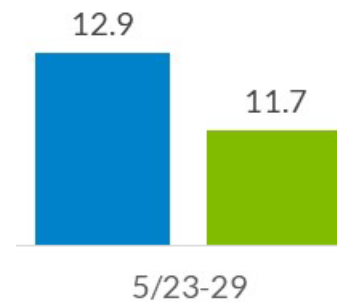


COVID- 19 Impacts to Load 5/23 – 29

MISO Hourly Load



Total Energy (TWh)



Second week in a row Energy for the week is about 9% lower than normal, Load is 10% lower than normal. Deviations are declining due to the reopening of the economy

Average Load (GW)



Average Simulated and Actual Load (GW)

