Valuing Capacity for Resources with Energy Limitations

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Background and Objective

Background

In 2012 the NYISO and GE Energy Consulting performed an evaluation of the Contribution to Resource Adequacy of Special Case Resources for the Installed Capacity Subcommittee of the New York State Reliability Council.

This analysis considered:

Penetration

Duration of Use

Persistence of Use

Objective

Build upon the analysis performed for SCRs, expanding the scope to include distributed energy and other resources with energy limitations considering

The impacts of:

- **Duration of Use**
- **Penetration**
- **Persistence of Use**
- **Diversity of Resources**
- **Performance**
- **Seasonal or Daily Limitations**

On Capacity Value as Measured in:

- **Daily Loss of Load Expectation (LOLE - Days/Year)**
- **Hourly Loss of Load Expectation (LOLE Hours/Year)**
- **Loss of energy Expectation (LOEE)**

Approach

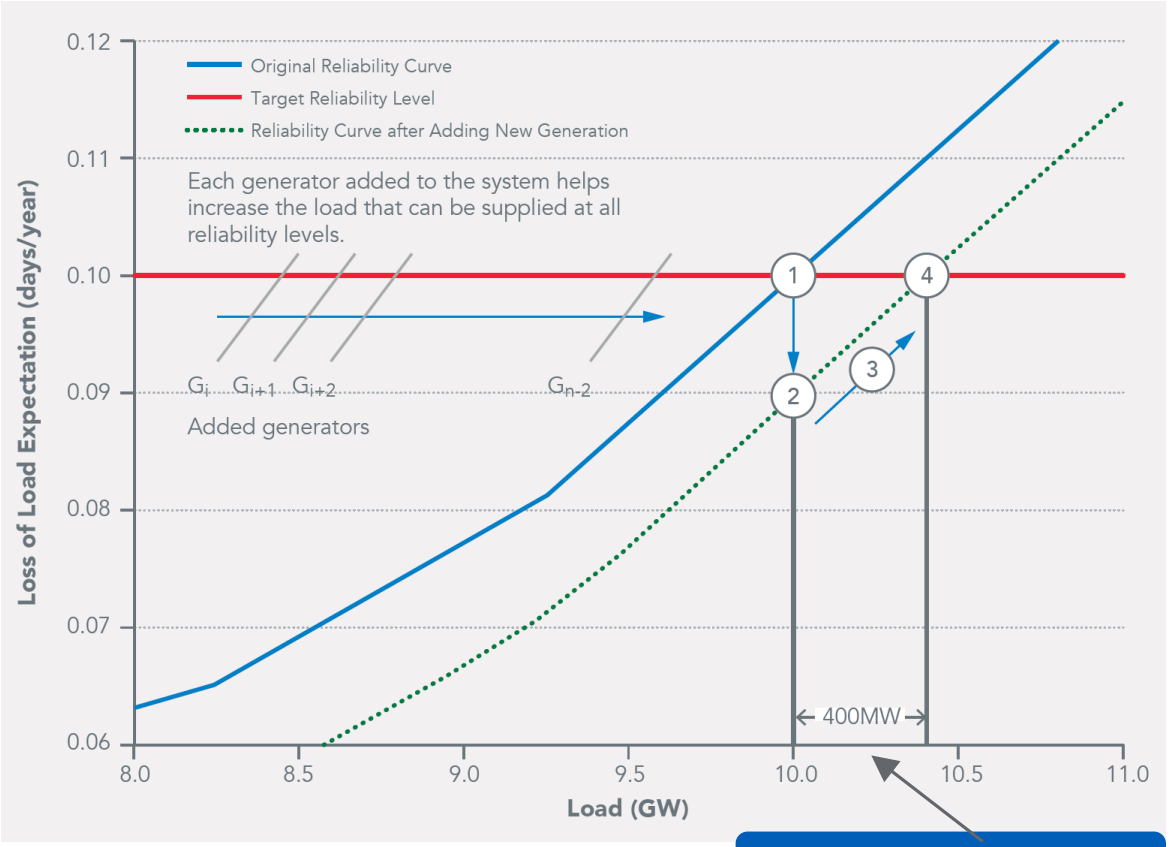
Approach

GE Energy Consulting will develop a GE MARS post processing routine to schedule resources subject to the parameters listed on the previous slide against the hourly NYCA capacity margin for each replication of the GE MARS simulation.

Each replication's hourly NYCA capacity margin will be adjusted by the schedule, and the reliability indices recalculated.

Approach - How is Capacity Value Calculated

1. Bring system to a reference point (2018 IRM Base Case with Optimized LCRs)
2. Add a resource, reliability improves
3. Increase system load, reliability decreases
4. Iterate until you match the initial system reliability for the metric you are considering

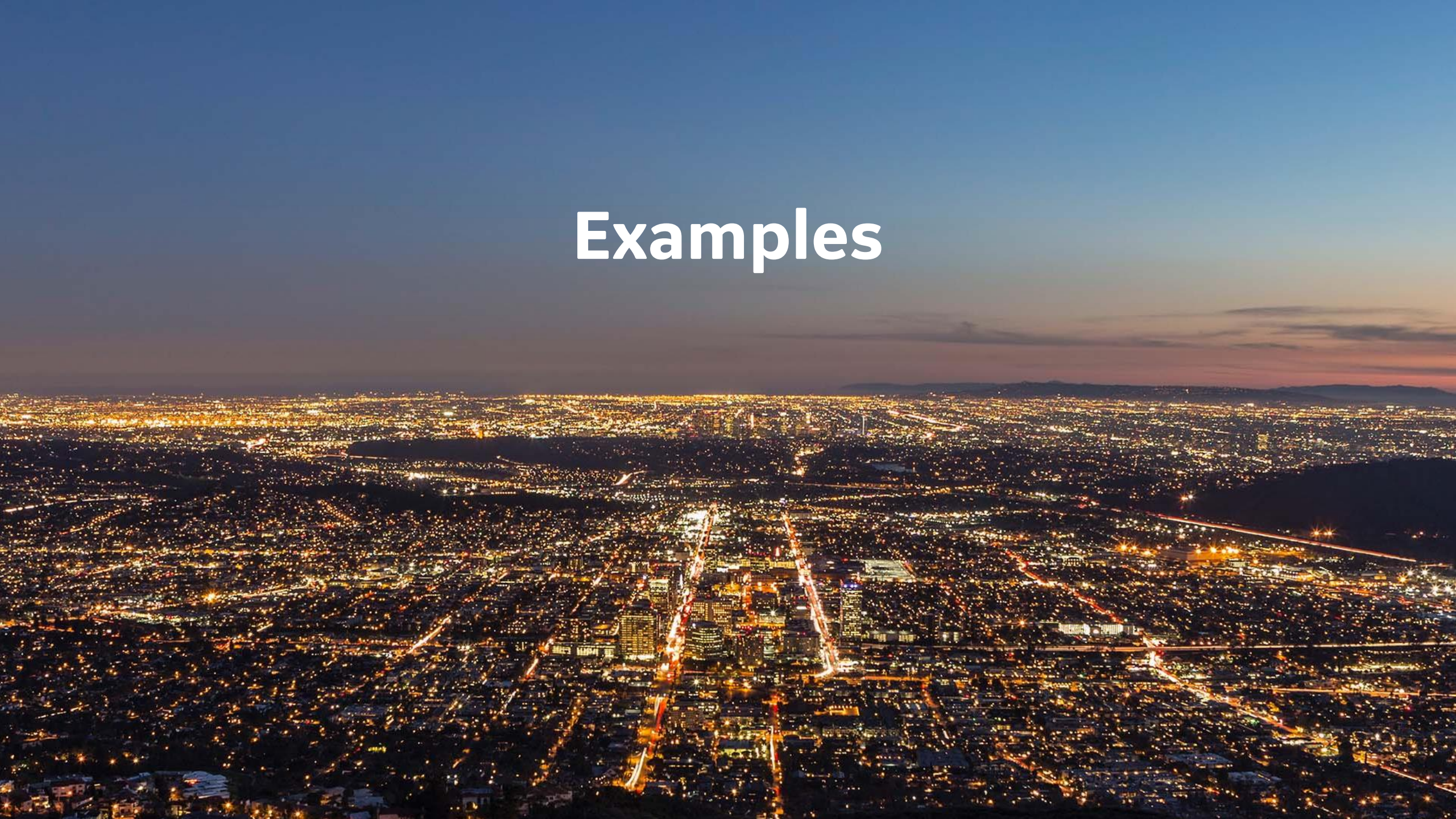


J. Katz, P. Denholm "Using Wind and Solar to Reliably Meet Electricity Demand, Greening the Grid" http://www.nrel.gov/docs/fy15osti/63038.pdf

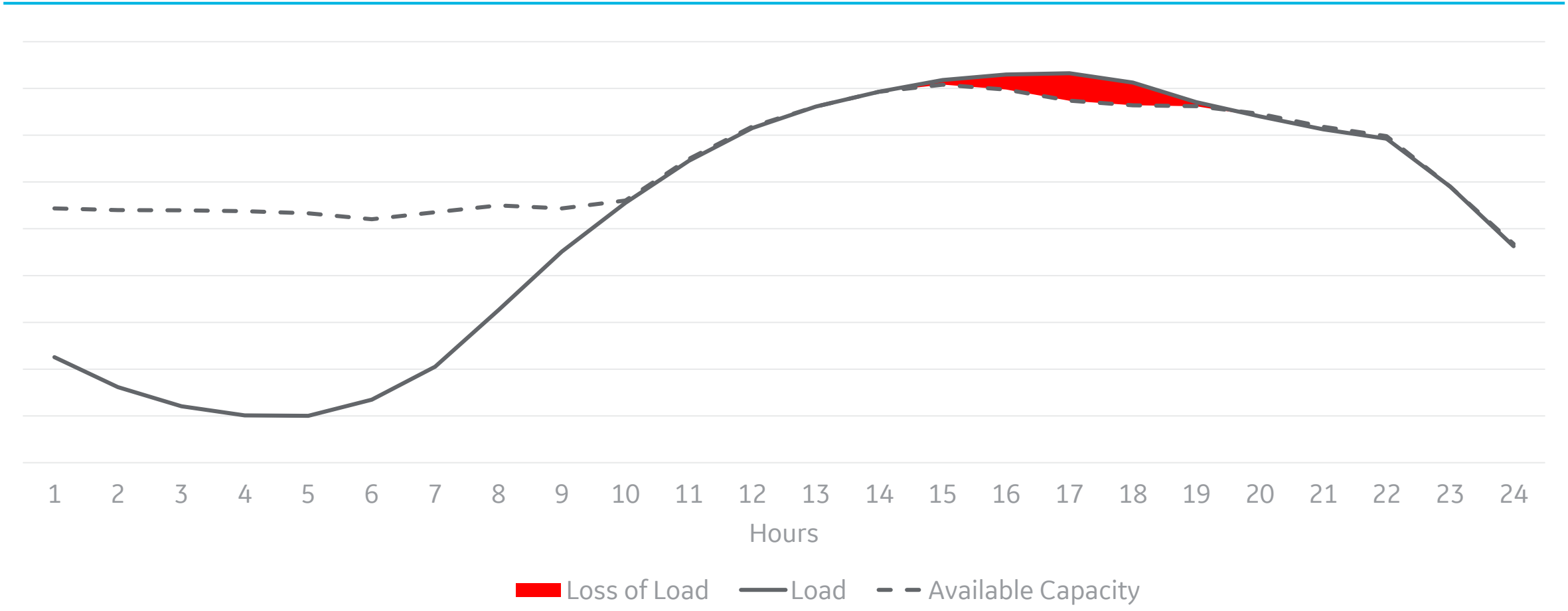
Approach - Sensitivities

Once the post processing routine has been developed, scenarios will be run through the tool varying each of the limiting parameters to determine the sensitivity of capacity value to each.

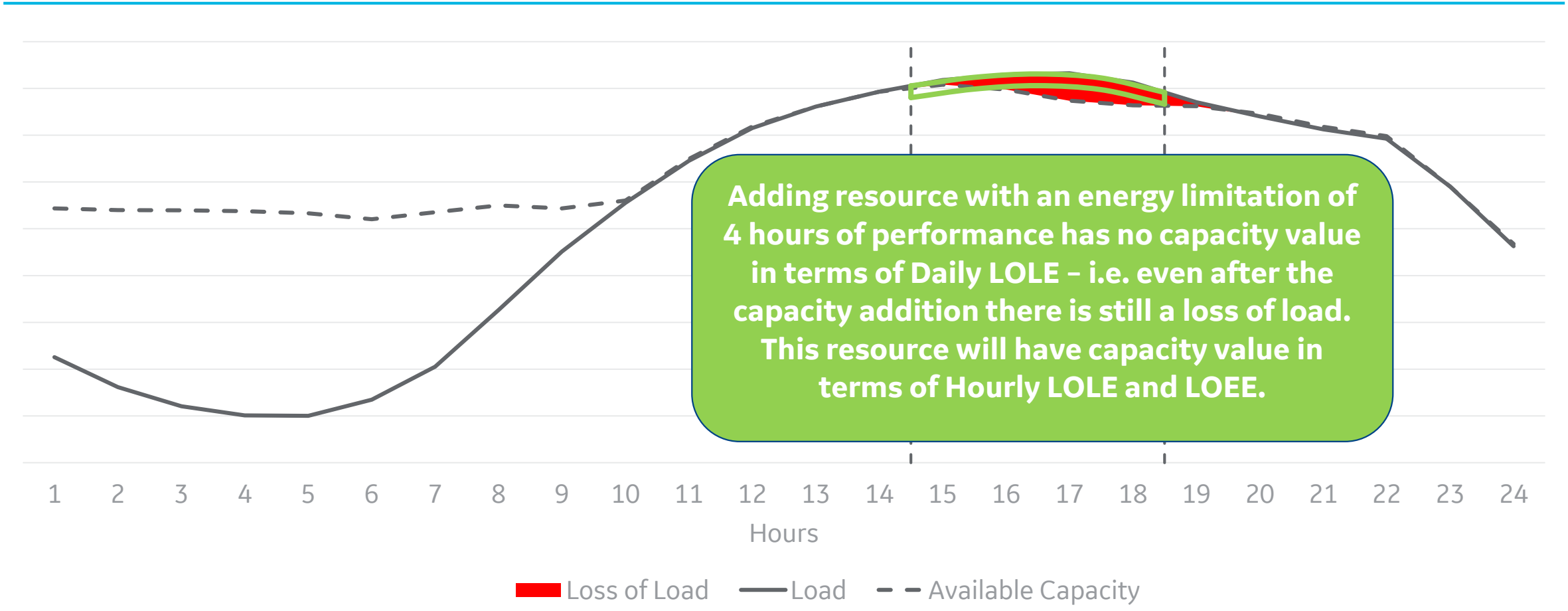
This analysis will be performed for the 2018 NYISO IRM Base Case as well as the high wind and high solar scenario developed for the 2018 IRM analysis.


Examples

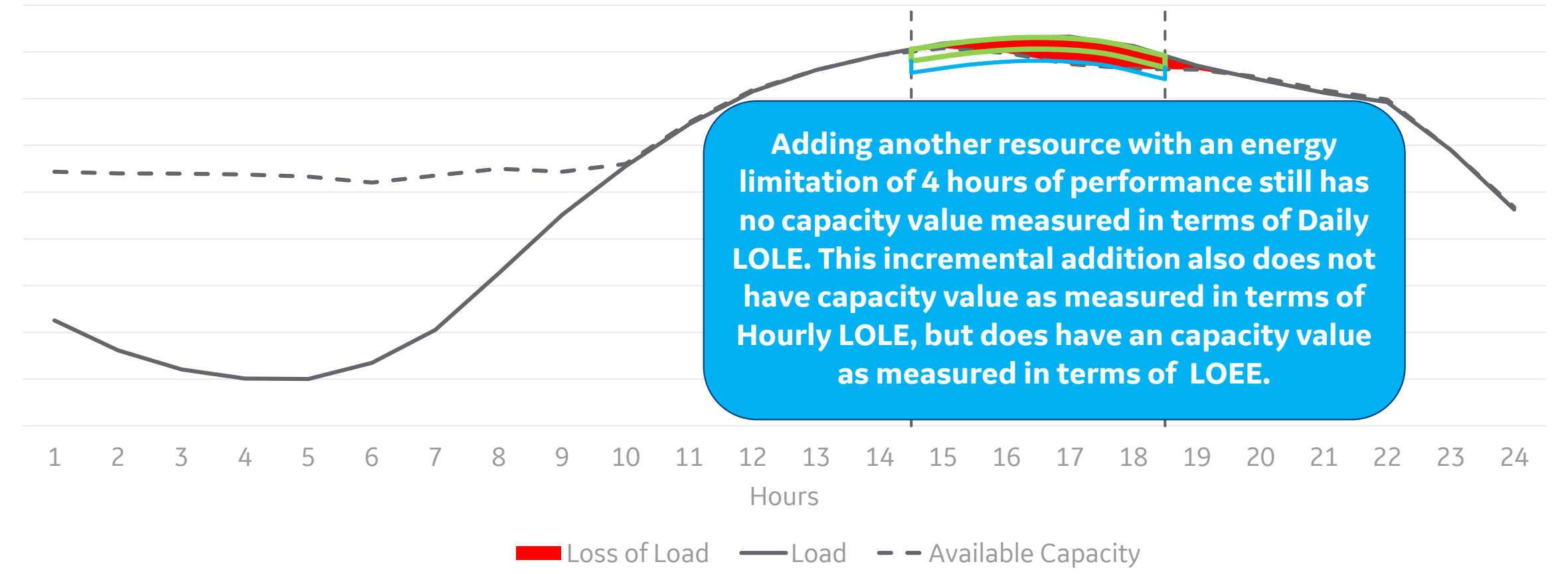
Capacity Value of Resources with Energy Limitations



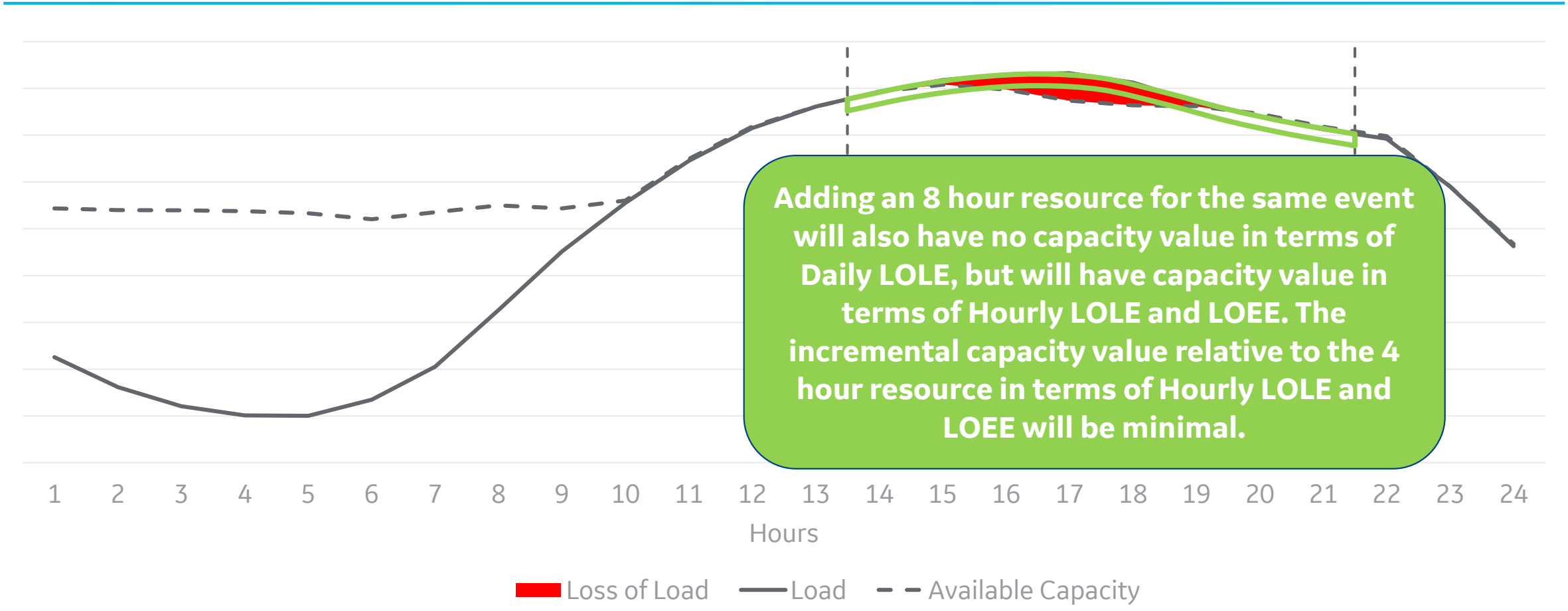
Capacity Value of Resources with Energy Limitations



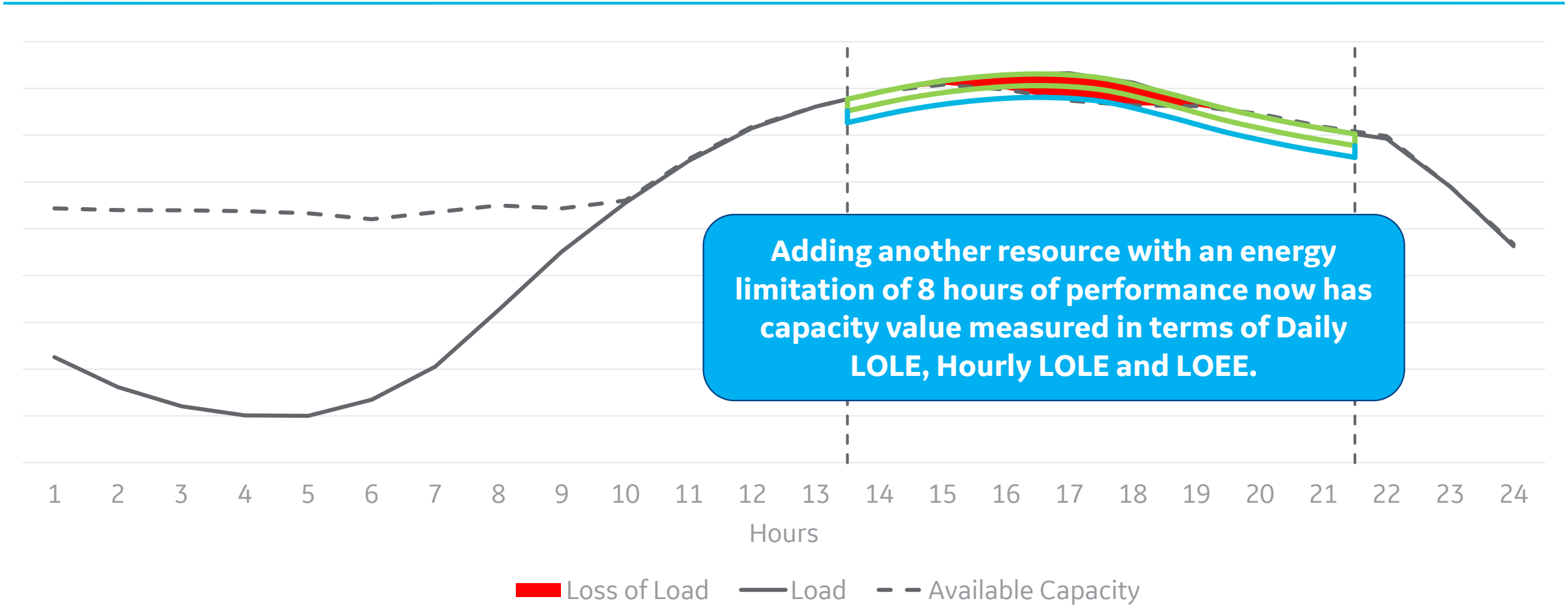
Penetration – 4 Hour Resource



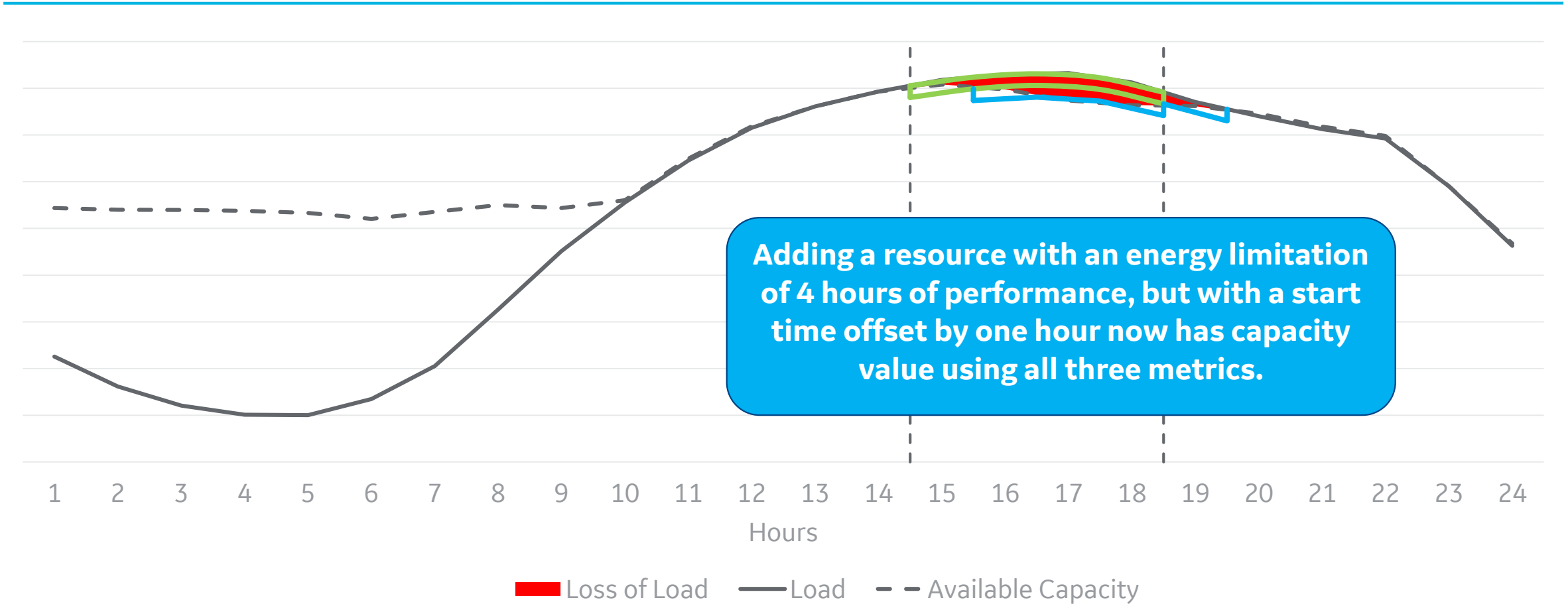
Duration


Adding an 8 hour resource for the same event will also have no capacity value in terms of Daily LOLE, but will have capacity value in terms of Hourly LOLE and LOEE. The incremental capacity value relative to the 4 hour resource in terms of Hourly LOLE and LOEE will be minimal.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hours
Loss of Load
Load
Available Capacity

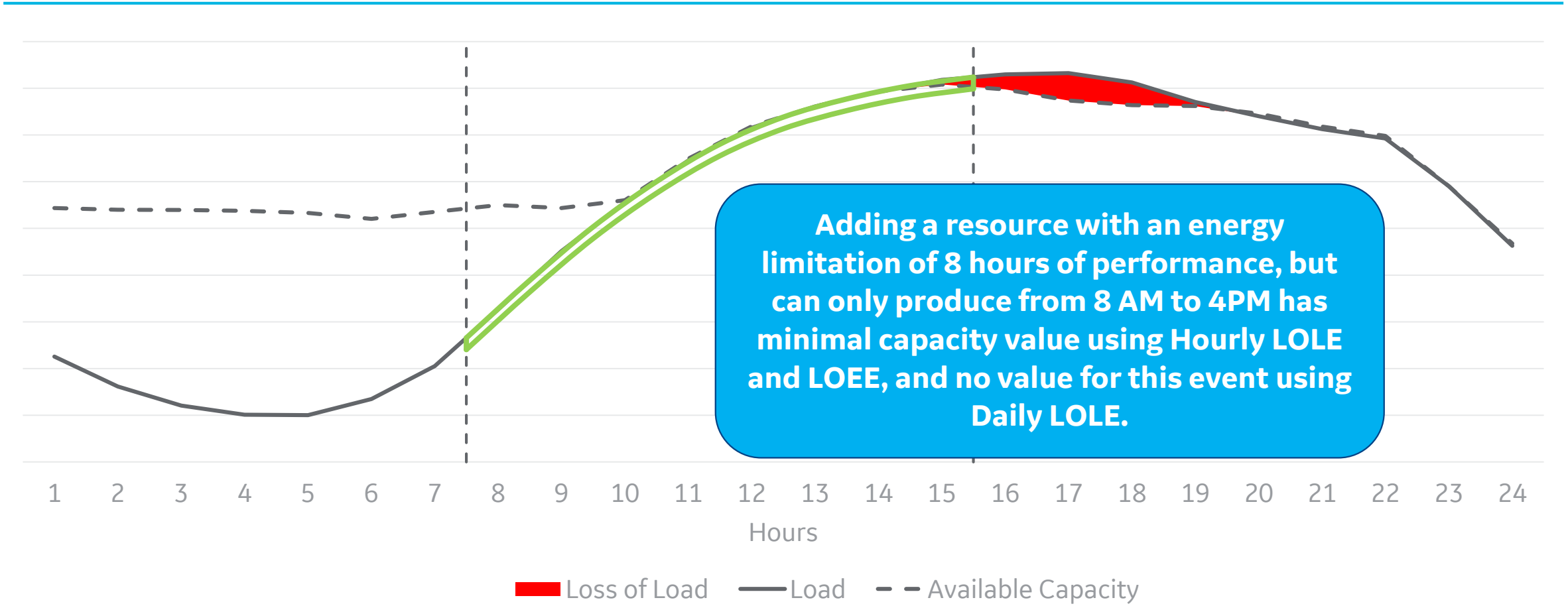
Penetration - 8 Hour Resource



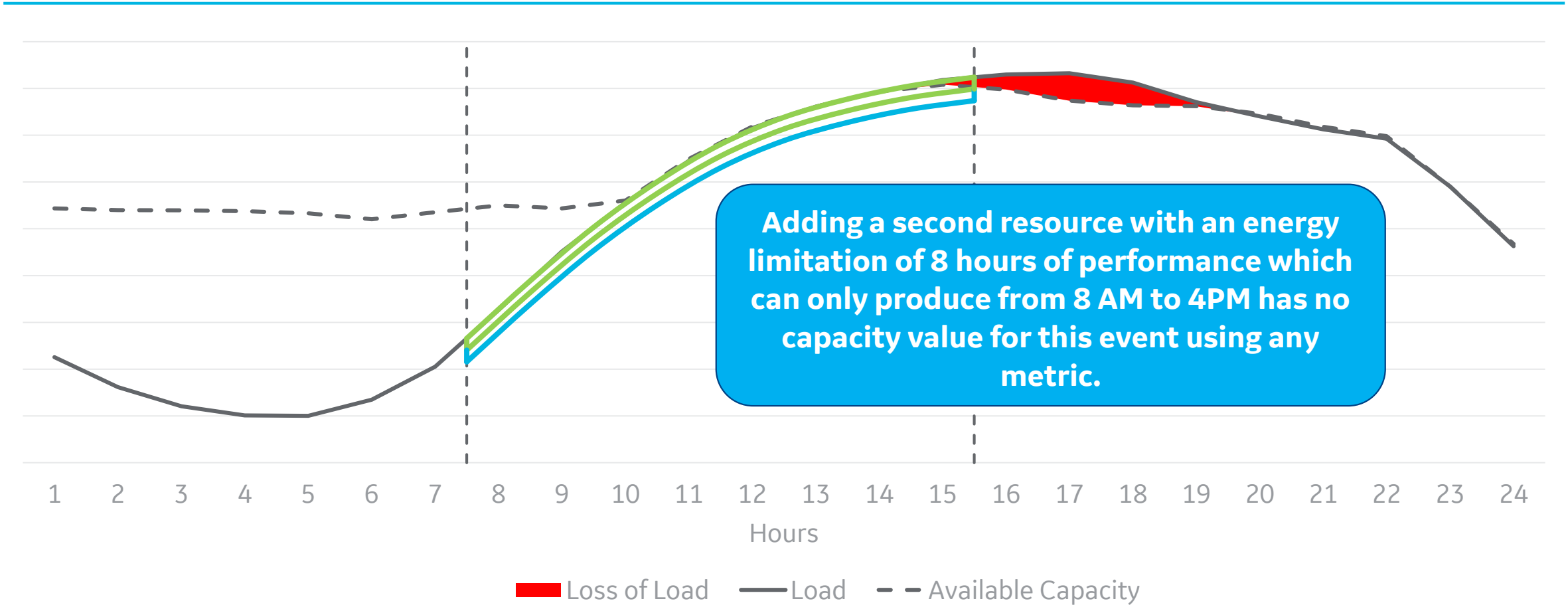
Diversity


Adding a resource with an energy limitation of 4 hours of performance, but with a start time offset by one hour now has capacity value using all three metrics.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Hours
Loss of Load
Load
Available Capacity

Daily Energy Limitations



Daily Energy Limitations



Next Steps

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Finalize an approach for scheduling resources with energy limitations against an hourly NYCA margin profile, subject to energy limitations

Extend the scheduling approach to multiple load levels / replications

Develop a tool to adjust the hourly NYCA Margin to calculate capacity value

Run the post processing tool developed for a range of energy limitation parameters on the 2018 IRM Base Case and 2018 IRM High Wind High Solar Case