

Tailored Availability Metric

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Agenda

- **Recap**
- **Purpose of Discussion**
- **Background**
- **Analysis**
- **Next Steps**
- **Schedule**

Recap

Recap

- The project scope for this project has been expanded to include availability-based and performance-based resources

Purpose of Discussion



Purpose of Discussion

- **The purpose of this presentation is to discuss the analysis done thus far for availability-based resources using the EFORd to determine the Seasonal Derating Factor (AEFORd)**
 - We will come back at a future Working Group meeting with discussion of continued analysis of availability-based resources as well as analysis for other resources

Background

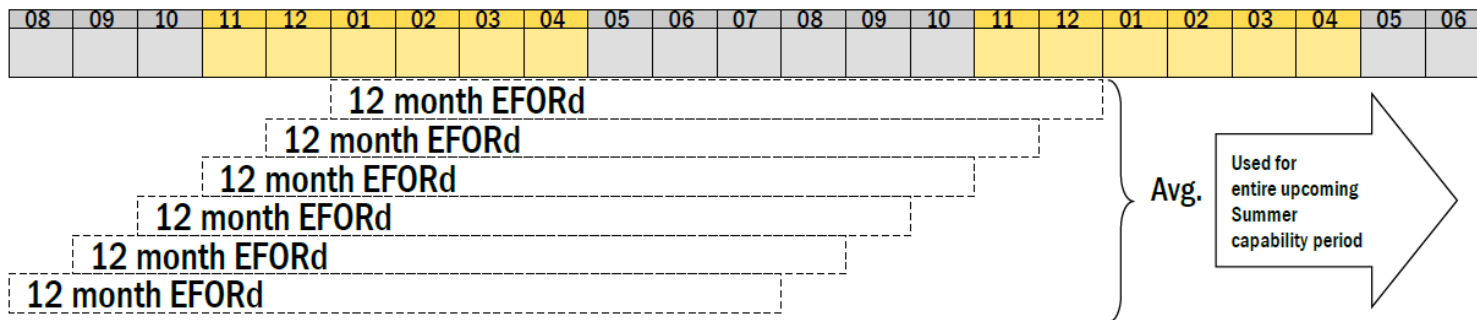


EFORd Background

- The Equivalent Forced Outage Rate demand (EFORd) is defined as the portion of time a unit is in demand, but is unavailable due to forced outages and forced derates
- The NYISO uses the calculated EFORd in order to measure the amount of unforced capacity a unit is allowed to sell
 - $UCAP = \text{Available ICAP} * (1 - AEFORd)$
- Events that have an effect on a unit's EFORd include: forced outages, forced derates and startup failures
 - Forced outages occur when the unit is available at full output but for less than 100% of the time
 - Forced derates occur when the unit is available 100% of the time but at a reduced output

EFORd Background

- The current methodology for calculating a Capability Period AEFORd is the average of six consecutive (rolling) 12-month EFORd calculations
- The initial analysis, which focuses on the Summer Capability Period, calculates the AEFORd based on the below months:



EFORd Background

- In the current EFORd model, a total of 72 months are captured (six 12-month blocks)
 - Summer peak months (June, July, August) account for 25% of the monthly count
- For the Summer Capability Period, January - July are counted in each of the six 12-month blocks, which accounts for 50% of the calculation
 - In other words, 50% of the Summer Capability EFORd for 2018 is calculated based on data from January – July 2017

Analysis

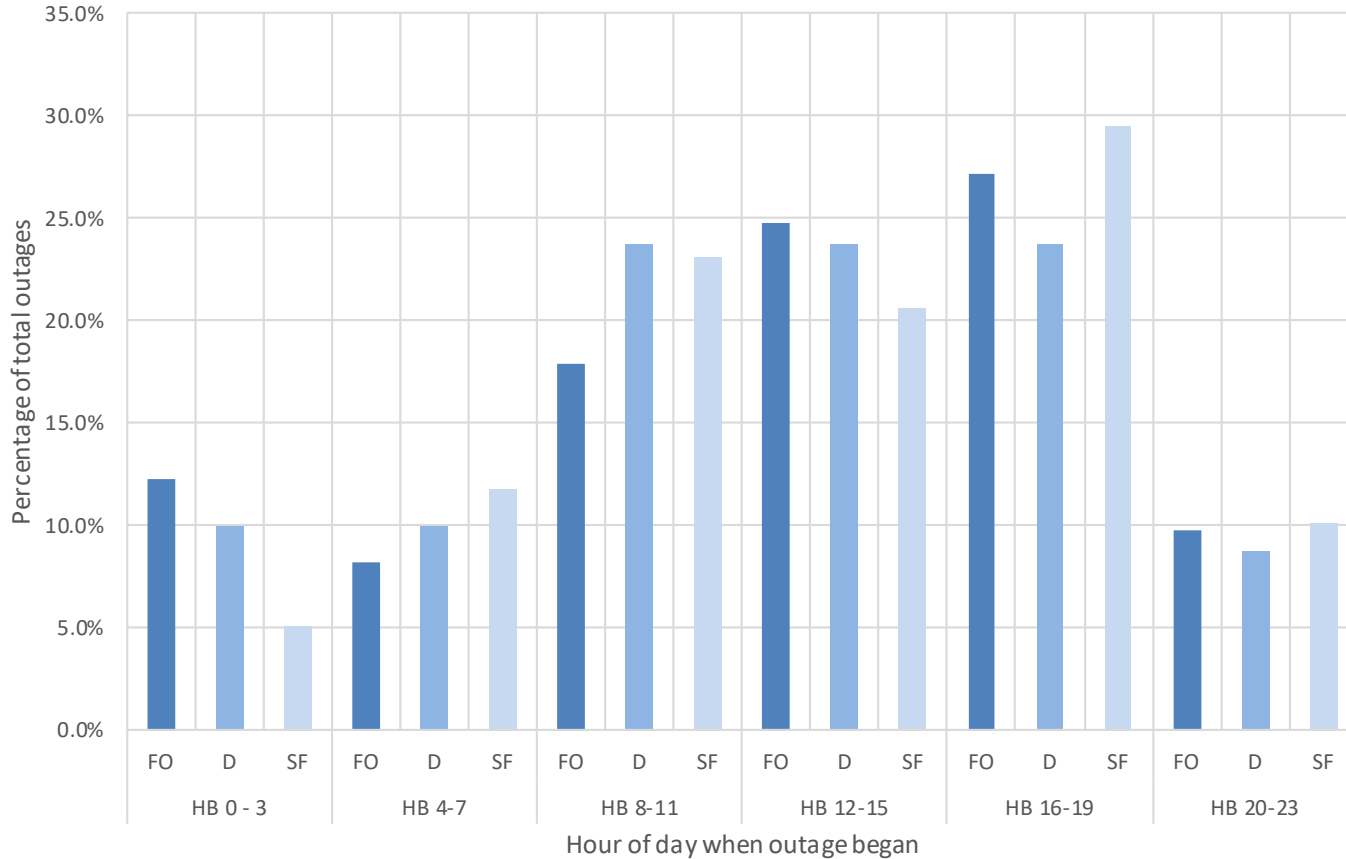
Analysis: Statistics

- In order to better define the problem, historic statistics were pulled to accurately reflect the occurrence and duration of forced outages, forced derates and failed starts in different types of units
 - The analyzed data was split up by unit type: Combustion Turbines (CT), Combined Cycles (CC) and Steam Turbines (ST)
- Two aspects were measured:
 - When the event started
 - How long the event lasted
- Knowing the event statistics used to calculate the EFORd will better help to understand potential changes or weighting to the calculation

Analysis: Statistics

- **The statistics pulled reflect what these events typically look like during peak periods**
 - Forced outages, forced derates and startup failures during peak periods are more impactful to system reliability
- **Trends in the statistics can inform how different weighting calculations could be effective**
 - For example, weighting CCs at an hourly level may not be impactful due to the fact that start times for these units typically occur in the morning

Event Start Time - CT

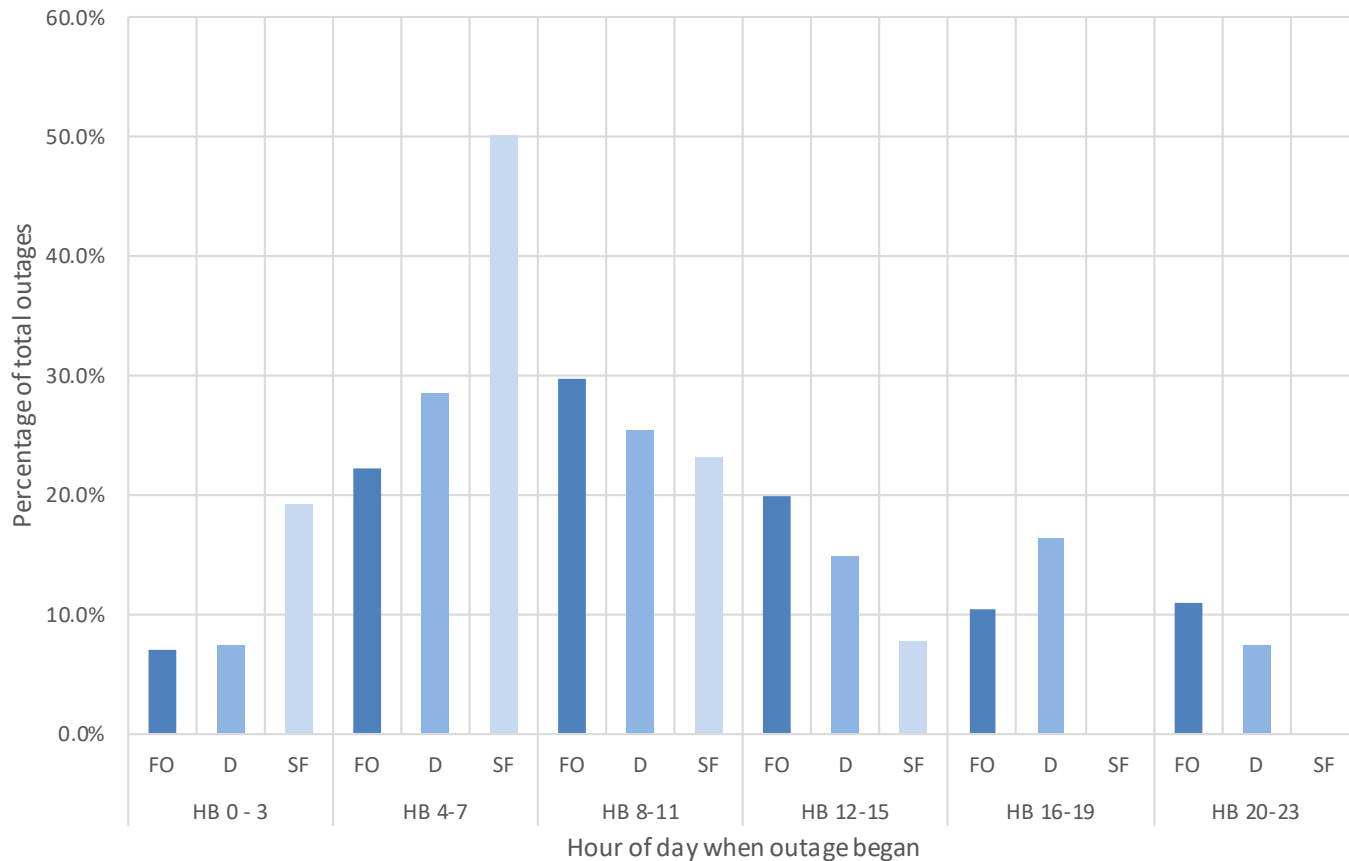


Class Average EFORd:
9.05 %

FO = Forced Outage
D = Derate
SF = Startup Failure



Event Start Time - CC

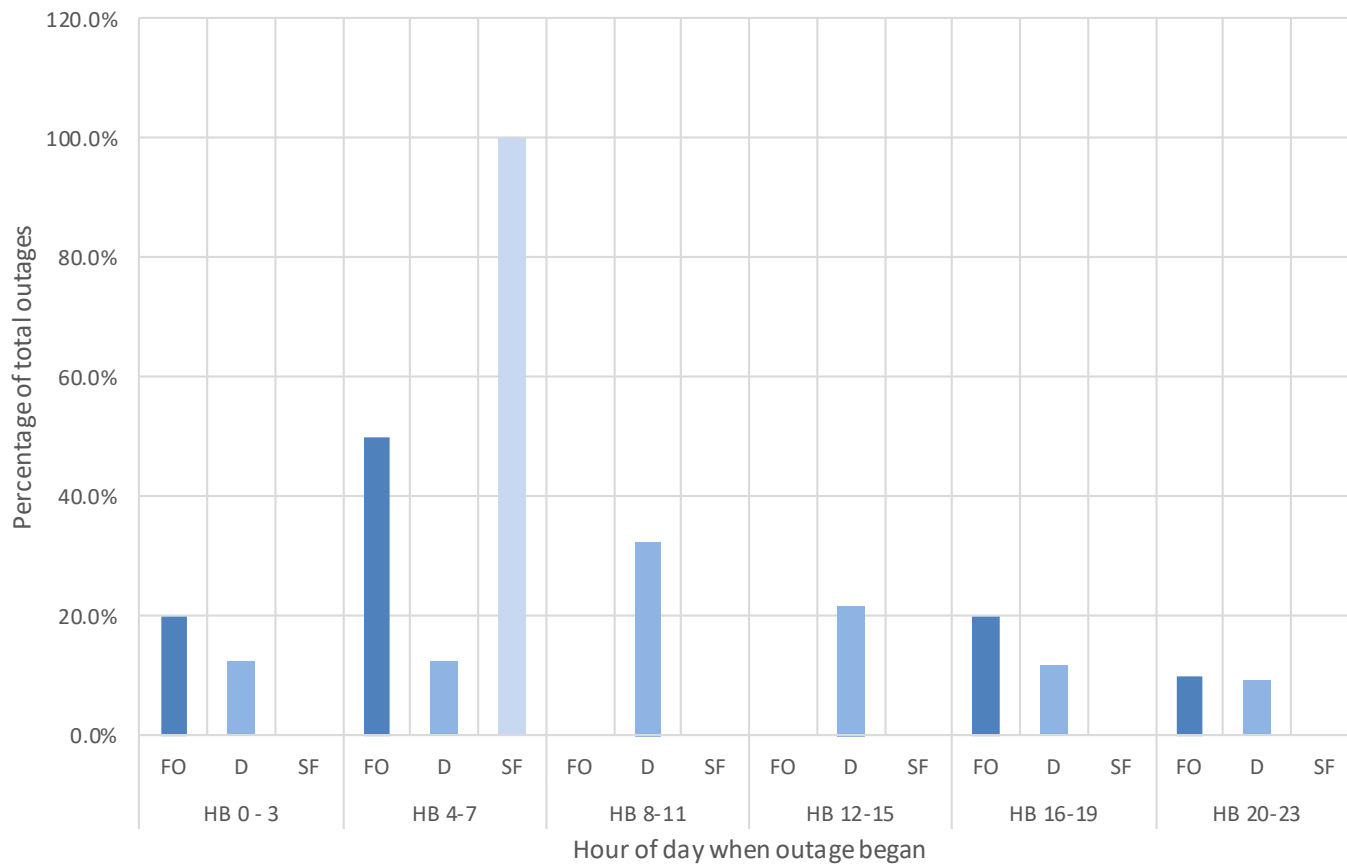


Class Average EFORD:
3.72 %

FO = Forced Outage
D = Derate
SF = Startup Failure



Event Start Time - ST



Class Average EFORd:
7.96 %

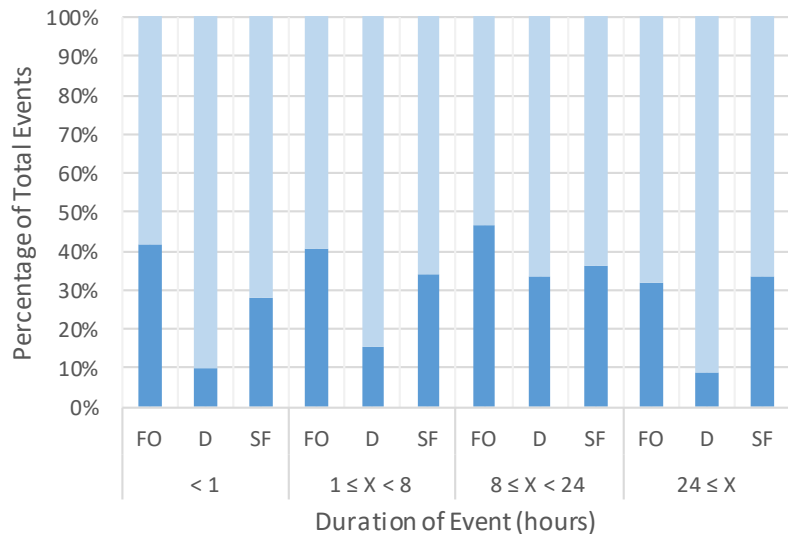
FO = Forced Outage
D = Derate
SF = Startup Failure

Analysis: Statistics

- **Peak Summer months (June, July, August) account for 25% of the weight of the current EFORD**
 - The duration of events in these specified months should correlate with the 25% value
 - For CT and CC, events that occur in the peak summer months typically account for 25-30% of the total event hours
- **NYISO defined peak hours account for 33% of the weight of the current EFORD**
 - Summer HB 12 – 19
 - Winter HB 14 – 21

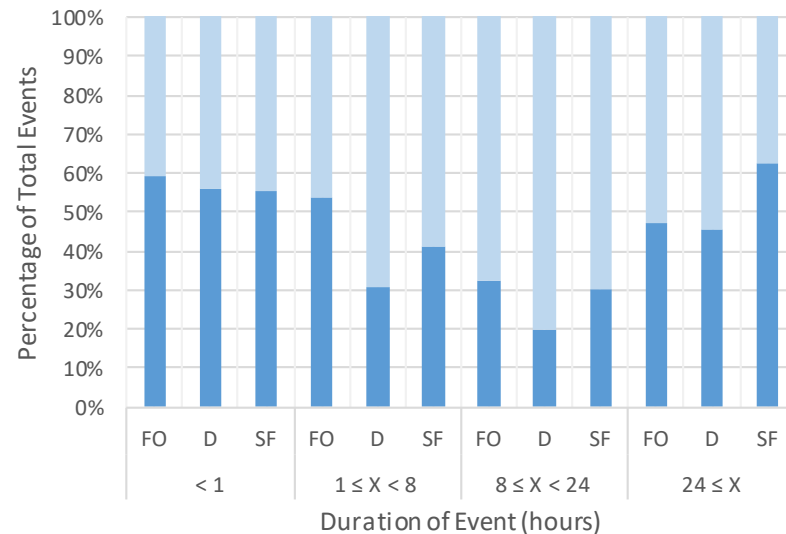
Duration of Events - CT

Peak Summer Months



■ Peak Summer Months ■ Non-Peak Months

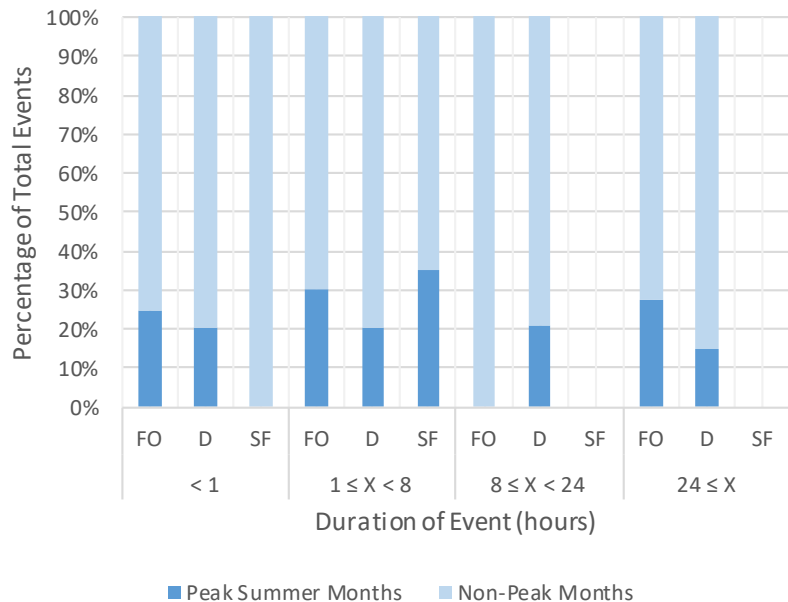
Peak Hours



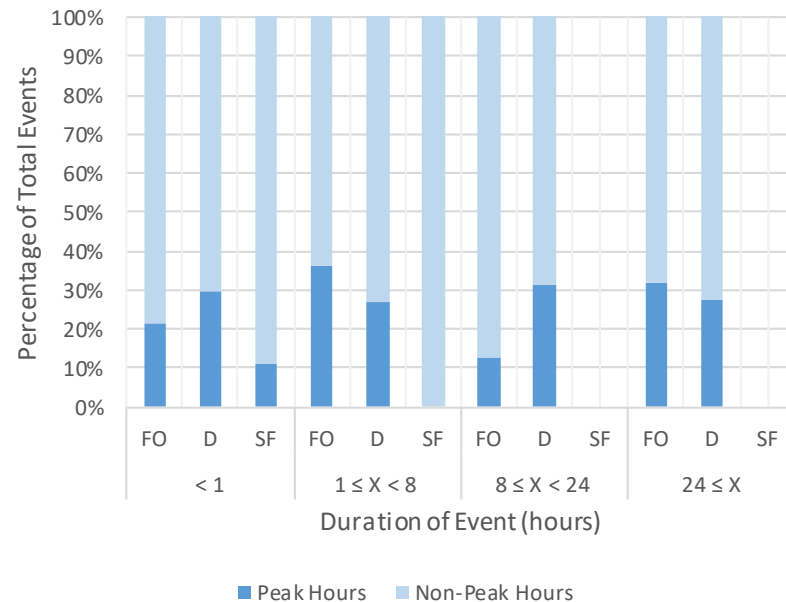
■ Peak Hours ■ Non-Peak Hours

Duration of Events - CC

Peak Summer Months

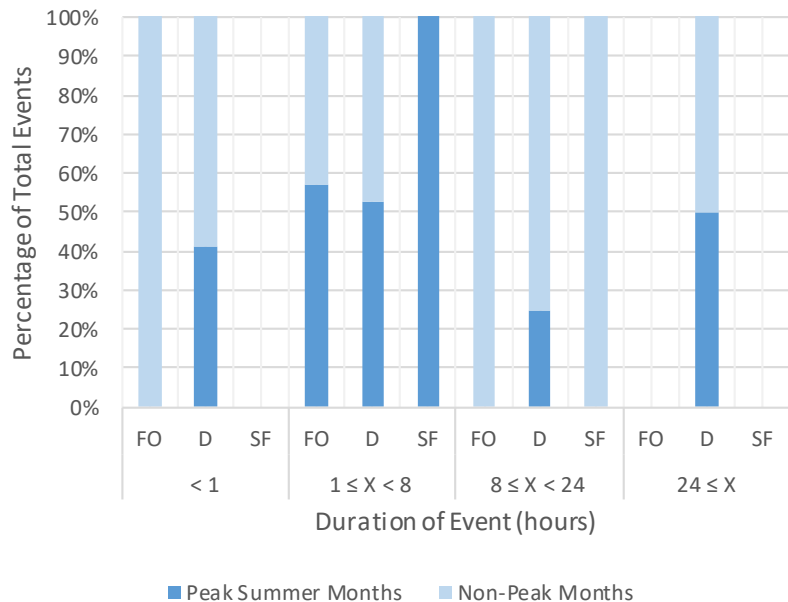


Peak Hours

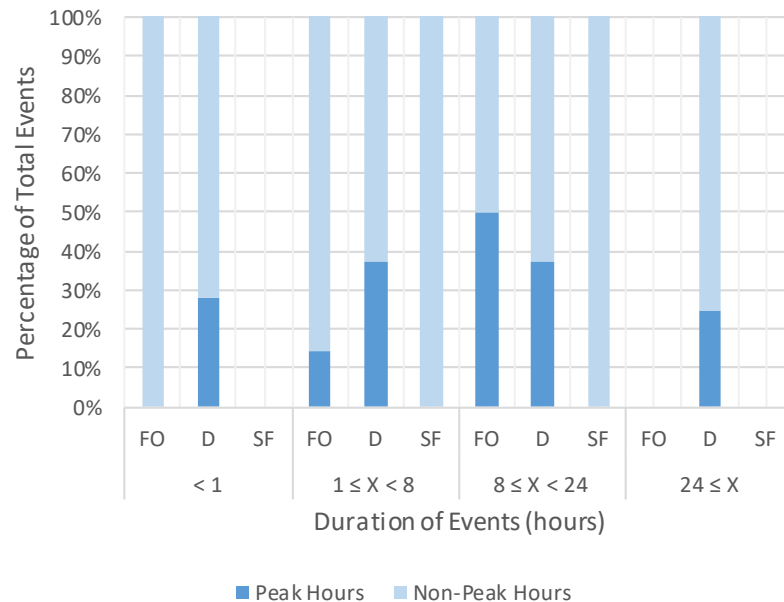


Duration of Events - ST

Peak Summer Months



Peak Hours



Additional Analysis

- NYISO is seeking stakeholder feedback on what, if any, additional analysis would be helpful in evaluating availability-based resources

NYISO Conclusions

- **At this time, the NYISO believes that weighting peak months should be more impactful to the AEFORd calculation**
 - Potential modifications to the AEFORd calculation could include:
 - shifting the measured window of the calculation to better reflect summer months
 - As previously mentioned, 50% of the Summer Capability AEFORd is January – July
 - weighting peak months more than non-peak months
- **Weighting the AEFORd at an hourly level may not be as beneficial to incentivizing availability**
 - To the NYISO, an outage at 2:00 AM on a peak day could be just as impactful as an outage at 2:00 PM due to the fact that there is question as to if the unit will return to service
 - Both outages are still impactful because they occur on a peak day

Next Steps

Next Steps

- For units that use the AEFORd, continued analysis could assess the weighting of peak months in the calculation, pending stakeholder feedback
- The NYISO will begin detailed discussion of assessing performance-based resources at a later working group meeting

Schedule

Schedule

■ Stakeholder Engagement Plan:

- This meeting - May, 2019: Discussion of Analysis
- May – July, 2019: Discussion of Analysis and Results of Analysis
- August – September, 2019: Market Design Concept Proposal

Feedback/Questions?

- The NYISO will consider input received during today's Working Group meeting and further input sent in writing to deckles@nyiso.com and econway@nyiso.com

Appendix

Resource Type

Resource Type	Availability-Based	Performance-Based
Most Generation	X	
Dispatchable DER	X	
ESRs	X	
Intermittent Resources		X
Limited Control RoR Hydro		X
SCRs		X

ICAP Manual Attachment J

- ICAP Manual Link

- (https://www.nyiso.com/documents/20142/2923301/icap_mnl.pdf/)

- $UCAP = (1 - EFORd) \times DMNC$

- $EFORd = \frac{f_f \times FOH + f_p \times (EFDH)}{SH + f_f \times FOH}$

- $f_f = \frac{\frac{1}{r} + \frac{1}{T}}{\frac{1}{r} + \frac{1}{T} + \frac{1}{D}}$

ICAP Manual Attachment J

- $r = \text{average forced outage duration} = \frac{FOH}{\text{number of forced outages}}$
- $T = \text{average time between calls for a unit to run} = \frac{RSH}{\text{number of attempted starts}}$
- $D = \text{average run time} = \frac{SH}{\text{number of successful starts}}$
- $f_p = \frac{SH}{AH}$

ICAP Manual Attachment J

- f_f = full f – factor
- f_p = partial f – factor
- FOH = (Full) Forced Outage Hours
- EFDH = Equivalent Forced Derated Hours
- SH = Service Hours; time a unit is electrically connected to the system
- AH = Available Hours; time a unit is capable of producing energy, regardless of capacity level
- RSH = Reserve Shutdown Hours; time a unit is available for service but not dispatched
- PH = Period Hours; 24 times the number of days in the reporting period

UOL Calculation

- **Derating Factors for Energy Storage Resources will be calculated based upon a time-weighted UOL availability evaluated against the ICAP sold**
 - For each RTD interval that the UOL is adjusted down due to a NYISO or a TO reliability need, the NYISO will replace the UOL with the bid UOL
 - The Normal UOL will have a floor of 0 and be capped against the ICAP Sold, and the number of seconds will be calculated for that interval
 - For the intervals where the unit was on a planned or scheduled outage approved by NYISO operations, the seconds will be set to 0, removing it from the calculation

UOL Calculation

- **Derating Factors for Energy Storage Resources will be calculated based upon a time-weighted UOL availability evaluated against the ICAP sold**
 - For each month, 4 values will be calculated
 - Total Seconds – Sum of seconds in the month that the unit was not on an approved outage
 - Total Available Capacity – Sum of (Normal UOL for interval * seconds in interval) for the month
 - Total Expected Capacity – ICAP sold * Total Seconds
 - Monthly Availability – Total Available Capacity / Total Expected Capacity

UOL Calculation

- 12-month blocks will be calculated, summing the Total Available Capacity, the Total Expected Capacity, and the availability calculation for the 12-month block
- The Derating Factor for Energy Storage Resources will be the average of 6 of the 12-month blocks
 - These will be the same 12-month blocks used in the existing EFORD calculation
 - Derating Factor to determine Summer UCAP uses a 12 month period ending in July, August, September, October, November, and December from the prior year
 - Derating Factor to determine Winter UCAP uses a 12 month period ending in January, February, March, April, May, and June from the current year
 - Derating Factor = $1 - \text{Availability Factor}$

The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



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