Unit Performance Adjustment for Intermittent Resources and Limited-duration Resources (including Energy Storage Resources)

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Unit ELCC$_{dy}$ = Class ELCCdy x Unit performance adjustment$_{dy}$

Planned resources

Existing resources

Intermittent Resources

Planned vs. Existing **Intermittent Resource** Units

Performance adjustment is applied similarly to planned/new and existing Intermittent Resource units

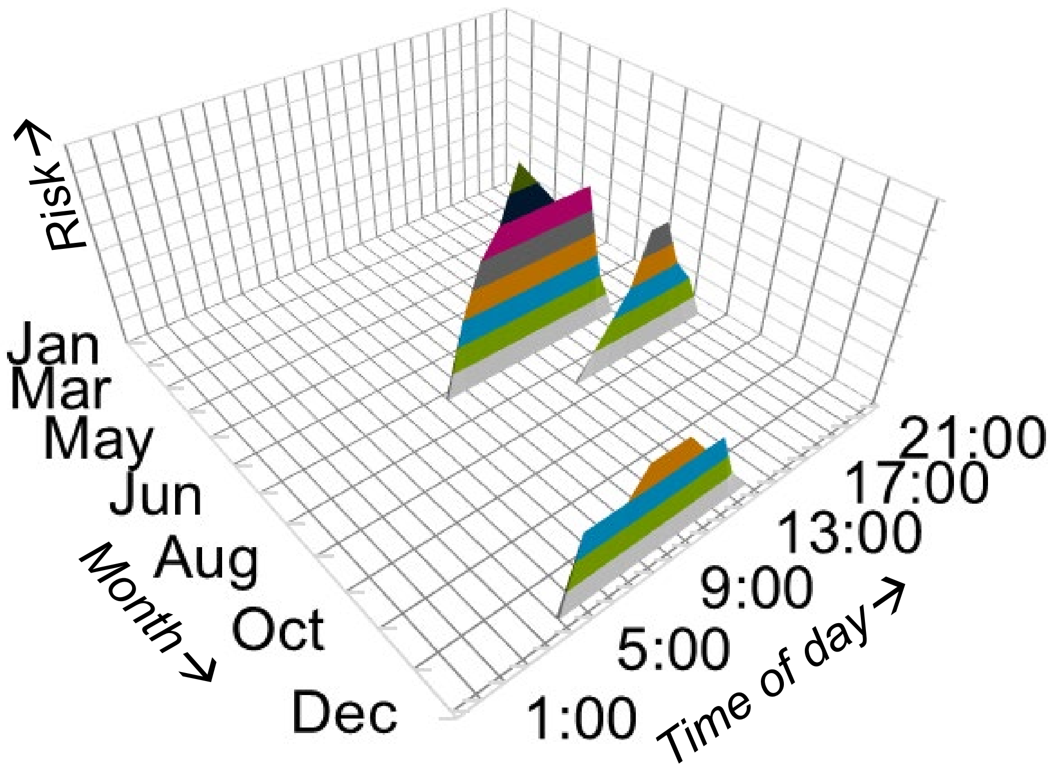
- Planned units: use 10 years of backcast data (except no earlier than 2012)
  - New Queue requests would need to provide backcast data (validated by PJM) if a capability value is required in the Queue
  - Also used prior to entering operations to calculate potential deficiency
- Existing units: use 10 years of actual data, if younger than 10 years old then supplement with backcast data (except no earlier than 2012).
  - More recent years weighted slightly heavier than older years to account for possible plant degradation or improvement.

Intermittent Resources: Performance Adjustment Concept

- Status quo in PJM and MISO relies on a fixed number of windows per year and a fixed duration for each window e.g.:
  - PJM: 4-hour window each day in June, July, and August
  - MISO: 1-hour window on top 8 coincident peak days of the year
- Potential solution would identify both the number of windows per year and the window duration based on outputs of the ELCC model. The ELCC model includes many hundreds of scenarios across multiple years of load shape and corresponding Intermittent Resource output:
  - Across all ELCC scenarios: the average number of days with significant LOLE **determines the number of performance windows per year.**
  - Across all ELCC scenarios: the average duration of each LOLE event **determines the duration of each performance window.**

Intermittent Resources: Performance Adjustment Concept Illustration

- For example: in this fictional ELCC case, these windows were identified with significant Loss of Load Probability:
  - July 5 from hour ending 11 through 19 inclusive
  - August 15 from hour ending 16 through 22 inclusive
  - Dec 20 from hour ending 7 through 15 inclusive
- This case therefore has 3 windows, with a duration of 9, 7, and 9 hour respectively.
- This data is averaged with the same type of data from all the other hundreds of ELCC cases to produce an **average number of annual windows** and an **average window duration**.



Intermittent Resources: Performance Window Policy

- The performance windows would set by the average number of annual windows and the average window duration identified in the foregoing analysis of ELCC cases.
- PJM would assess the need to adjust these windows every 4 years.
- A specific Intermittent Resource unit would be allocated a share of its class's total ELCC in proportion to:
  1. Its average output during the relevant windows over the 10 years of actual (and/or backcast data, if applicable), relative to
  2. The average output of the fleet during the same windows
- This produces a performance adjustment that is i) relatively stable from year to year ii) more closely matches what a unit-specific ELCC would be and iii) is responsive to changes in hourly risk profiles due to changing load shape and resource mix.

Limited Duration Resources incl. ESR

Performance for **Limited Duration Resources incl. ESR**

- EFORd is the status-quo performance metric for this class. Such resources must enter a forced outage when broken, which impacts EFORd.
- Under a potential ELCC approach, limited-duration resource (incl. ESR) capacity market offers and sale quantities could be capped at: ***(nameplateMW)*(ClassELCC)*(1-EFORd)*(DurationDeratingIfApplicable)***

Example:

- 100 MW/300 MWh ESR with 5% EFORd in 6-hour ESR class. ClassELCC = 90%.
- Battery duration = 3 hours (300 MWh/100MWh) → DurationDerating = 50% (3 hours/6 hours)

(nameplateMW)(ClassELCC)*(1-EFORd)*(DurationDeratingIfApplicable)*

(100 MW) * (90%) * (100%-5%) * (50%) .

→ *42.75 MW*