Removing Wind and Solar from RRS

Patricio Rocha Garrido
Resource Adequacy Planning
RAAS
April 27, 2020

Status Quo

- Wind and solar units are modeled at their respective capacity values with 0% forced outage rate throughout the entire year
  - If a 100 MW Nameplate wind unit has a capacity value of 13%, then in the RRS it modeled at 13 MW for the entire year with a 0% forced outage rate
  - If a 100 MW Nameplate solar unit has a capacity value of 38%, then in the RRS it modeled at 38 MW for the entire year with a 0% forced outage rate

IRM and FPR Calculation

- The Installed Reserve Margin (IRM) is mostly impacted by
  - Load Uncertainty
  - Forced Outage Rates
  - Capacity Benefit of Ties (CBOT)
- The Forecast Pool Requirement (FPR) which is what effectively determines the Variable Resource Requirement curve in RPM is mostly impacted by:
  - Load Uncertainty
  - Capacity Benefit of Ties (CBOT)
- This is the case because the FPR calculation removes the impact of the fleet-wide forced outage rate:

$$FPR = (1 + IRM) * (1 – \text{Fleet Wide Forced Outage Rate})$$

Status Quo – IRM/FPR Implications

- By including wind and solar in the RRS using the simplified method described in slide 2, the RRS fleet-wide forced outage rate is decreased which
  - Puts downward pressure on the IRM
  - Has a small impact on the FPR

Status Quo – IRM/FPR Implications

- The 2019 RRS, which used the Status Quo to model wind and solar, has the following results
  - Fleet-wide forced outage rate = 5.4%
  - IRM = 14.8%
  - FPR = 1.148 x (1 – 0.054) = 1.0860
- Removing wind and solar from the 2019 RRS (about 4,600 MW in 2023) produces the following results
  - Fleet-wide forced outage rate = 5.53%
  - IRM = 15.09%
  - FPR = 1.1509 x (1 – 0.0553) = 1.0872
- Hence, removing wind and solar from the 2019 RRS triggers a small impact on the FPR. The FPR increases by 0.0012
  - Assuming a 50/50 load of 150,000 MW. The Reliability Requirement would increase by 180 MW (150,000 x 0.0012)

Status Quo - Issues

- The Status Quo does not capture the variability (within seasons and across seasons) of wind and solar output.
  - 38% for all daily peak loads of the year for solar is not reasonable (same goes for wind)
- The Capacity Capability Senior Task Force (CCSTF) is currently considering switching to Effective Load Carrying Capability (ELCC) to calculate the capacity capability (value) of wind and solar
  - The ELCC base case is based on the RRS base case. It does not make sense to add wind and solar to an ELCC base case that already includes wind and solar units

Recommendation

- Remove wind and solar from the 2020 RRS
  - Impact on the FPR is small
  - Addresses underestimation of wind and solar output variability (more adequate representation of variability is provided by the ELCC runs)
  - Helps with consistency between RRS and ELCC runs