Perspectives on Capacity Performance Obligations

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Resource Adequacy Senior Task Force

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RMI works to transform the global energy system to secure a clean, prosperous, zero-carbon future for all

- RMI is a 501c3 non-profit
- 500+ staff on four continents working across many program areas
- Our Clean Competitive Grids initiative, within RMI's Carbon-Free Electricity program, focuses on market-based interventions to support the transition to modern, decarbonized electric grids
- We are presenting today on behalf of ourselves (this work is funded internally)

Our objectives for this presentation

1. **Offer more detail to explain our concerns with capacity performance obligations under the status quo**
2. **Articulate at a high level how one alternative might work**
3. **Use the public forum to hear feedback from stakeholders**

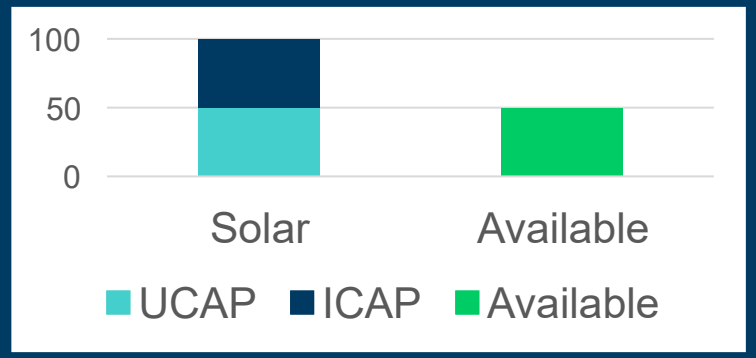
RMI believes the current rules around capacity performance obligations and penalties should be revised to align with the assumptions and modeling that underly PJM's capacity accreditation methodology.

An example: What does accrediting a 100 MW solar resource for 50 MW UCAP mean for its performance obligation?

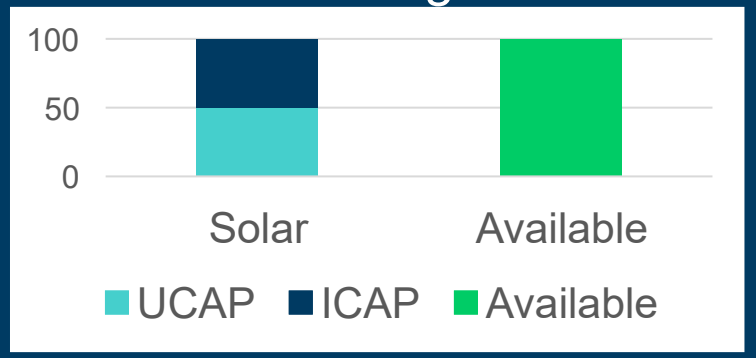
- A 50 MW UCAP accreditation means it takes 50 MW of "perfect capacity" to replace 100 MW of solar and achieve equivalent reliability outcomes
- That does not necessarily mean that the project is expected to deliver 50 MW UCAP during all periods of reliability concern
- Loss-of-load reliability modeling simulates system operations with this 100 MW nameplate solar project, and assumes the project delivers anywhere from 0 to 100 MW (depending on weather, etc.)
  - It is possible that the solar project can prevent outages when it is delivering 100 MW mid-day
  - It is certain that the project will not help prevent outages when it is delivering 0 MW at night
- Under today's rules, this plant would be obligated to deliver 50 MW when it could be delivering 100, and 50 MW when we know it will deliver zero
- **The performance assessment mechanism should ensure the solar performs like it was modeled in the loss-of-load analysis**

Illustrative example of solar capacity availability and suggested performance obligation

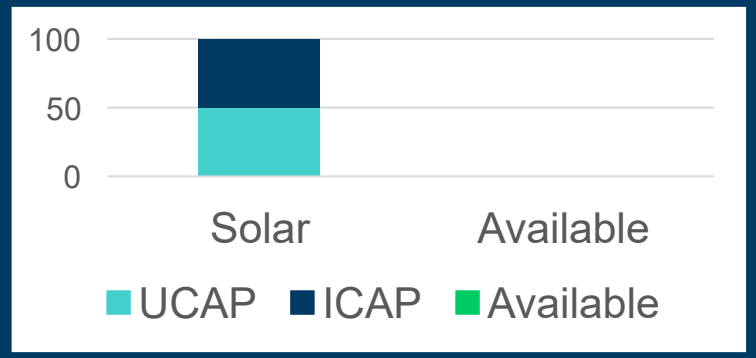
A solar resource's performance varies based on weather. We should expect solar to be available when it is sunny, as this matches how solar resources perform during reliability modeling.



Afternoon



Middle of a sunny day



Night

In order to realize reliability outcomes that match those from reliability modeling, we should obligate solar to perform at total available capacity (i.e., the green bar) in each case.

Capacity performance obligations and penalties should incent the best *possible* performance from a resource, consistent with how they are modeled

- In its reliability planning and modeling, PJM determines a resource's ELCC or UCAP probabilistically, using stochastic analysis that includes many scenarios
- Resource performance during simulations is based on historical performance from actual resources and back-casted performance for planned resources
- Because PJM's ELCC modeling satisfies reliability requirements, we should obligate resources consistent with their performance during this modeling
- If the reliability planning uses sound assumptions and resources

Performance obligations and penalties should minimize forced outages or reduced output that is "under management control"

- Reliability modeling includes some expectation of resource unavailability due to outages
  - Outages for dispatchable resources are captured through metrics for forced, planned, and maintenance outages (EFORd, EPOF, and EMOF)
  - Outages for variable resources are likely captured through actual and back-casted output profiles and reflected in ELCC accreditation
- Outages that occur because of factors under management control should not be excused from performance obligations
  - Excusals would enable resource owners to neglect maintenance or reliable operation and avoid penalty
  - This should apply to all resources (including thermal and variable generators)
- These recommendations may require extending the EFORd metric to variable resources and ELCC metric to thermal resources

PJM should revise its capacity performance rules to reflect the realities of resource availability

- Penalties should incent good O&M practices for all resources, and should not act as a deterrent to resources' participation in the capacity market
- PJM should not penalize wind generators for times when it is not windy
- PJM should not penalize solar generators for times when it is not sunny
- If PJM deems winter natural gas availability is a significant reliability risk, it could consider creating both "fuel secure" and "fuel insecure" classes in its RA modeling and allow gas generators to choose their class:
  - Fuel secure gas generators would be penalized for PAI outages when fuel was constrained. These generators would also be assigned a higher ELCC (from the modeling).
  - Fuel insecure gas generators would not be penalized for PAI outages when fuel was constrained – but would have a lower ELCC (from the modeling).

Mapping reliability risks to reliability planning and performance obligations

Reliability Risk	Impacted generators	How accounted for in RA modeling	How penalized today	Recommended changes
Unexpected outages due to equipment failure (i.e., forced outages)	ALL	Assumed to be rare but non-zero.	Penalty applies if this occurs during a PAI	Use EFOR adjustment to account for forced outage risk for all resources. Retain penalties for forced outages.
Low output due to low or zero wind or sun	Variable resources	Performance varies and is accounted for statistically based on weather. Reflected in low ELCCs.	Wind & solar assessed at fixed UCAP and penalized if PAI occurs when not windy/sunny	Only penalize wind and solar if they fail to produce as much as weather allows.
Liquid or gas fuel availability	Gas generators	Not accounted for	Penalized for not performing even if fuel is unavailable	Create fuel-insecure and fuel-secure types. Accredit and penalize accordingly