Accredited UCAP (UCAP) Calculation for ELCC Resources: Before and After ELCC Implementation

Patricio Rocha Garrido
Resource Adequacy Planning

Special PC

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Accredited UCAP

- "Accredited UCAP" is a measure of the physical capability of an ELCC Resource to provide resource adequacy in PJM.
  - ELCC Resources include nearly all renewables and storage: solar (fixed and tracking), wind (onshore and offshore), landfill gas that cannot run consistently at ICAP for 24 or more hours, intermittent run-of-river hydropower, storage (including pumped storage hydropower), hybrids and hydropower with non-pumped storage

AUCAP for ELCC Resources Before ELCC

ELCC Class	Pre-ELCC UCAP Method	Issues
Onshore Wind	368-hour rule (average output during 4-hr window in 92 days of previous summer)	By keeping a fixed 4-hr summer window, the potential shift in loss of load risk patterns due to high penetration of wind/solar (risk shift towards summer evenings & winter) is not captured. Outputs above the deliverability level included in UCAP calculation.
Offshore Wind		
Solar Fixed		
Solar Tracking		
X-hr Storage	10-hr rule (total MWh are divided by 10) times (1 – EFORd)	Recent LOLE analysis does not support a requirement of 10-hours to get UCAP equal to 100% of nameplate. Linear derating implicit in the 10-hour rule is not based on loss of load analysis.
Hydro Intermittent	(1 – EFORd) * ICAP	EFORd does not capture the intermittency due to variable stream flows
Hydro w/ non Pumped Storage	(1 – EFORd) * ICAP	EFORd does not capture the limited storage (and duration) of these resources
Landfill Gas	(1 – EFORd) * ICAP	EFORd does not capture the intermittency due to fuel availability

ELCC

1	ELCC uses Loss of Load Expectation analysis (consistent with today's Installed Reserve Margin study) to precisely quantify the resource adequacy contribution of a resource.
2	ELCC uses historical load shapes and weather data to compare future expected load shapes to future expected resource output. Resources that consistently produce during times of expected shortage get a higher ELCC.
3	ELCC is sensitive to a small number high-risk hours over 10+ years.
4	ELCC is sensitive to load shapes and the resource mix (e.g., with more solar, risk windows shift.)
5	It was originally developed in the 1960s to quantify the resource adequacy impact of carrying very large plants in a fairly small balancing area.
6	It was later applied to variable resources.

Why ELCC Is Helpful

Under high deployment of variable resources and limited-duration resources, periods of high risk of load shed can shift.

E.g., with high solar deployment displacing unlimited resources, summer risk shifts later in the afternoon and evening.

By comparing a resource or class to load and other resources, ELCC accounts for:

1. Hourly and seasonal trends
2. Consistency of output during high-risk periods
3. The effect of limited energy and limited-duration capability of storage-type resources
4. The effect of a changing resource mix, including interactions among different resource classes
5. Impacts due to load shape changes

ELCC is therefore a useful tool for quantifying resource adequacy value of resources under high deployment of renewables and storage.

ELCC Results for 2023/24 BRA Compared to Before ELCC

ELCC Class	Before ELCC	ELCC Class Rating 23/24 BRA
Onshore Wind	14.7%	15%
Solar Fixed	38%	38%
Solar Tracking	60%	54%
4-hr Storage	40%	83%*
Hydro Intermittent	100%*	42%
Landfill Gas	100%*	59%

** UCAP must be further derated by (1-EFORd)*

Accredited UCAP

- An ELCC Resource can provide Capacity in RPM up to the lesser of its Accredited UCAP and its CIRs.
  - This ensures that the megawatts provided in RPM by a resource are deliverable

- Accredited UCAP is calculated differently for different ELCC Resource categories, but is generally derived from:

EffectiveNameplateCapacity X ELCCClassRating X ELCCResourcePerformanceAdjustment

- "ELCC Class Rating" is an output of the ELCC model.

Issues with the current implementation of ELCC for AUCAP calculation

- Outputs above the current deliverability level are still included in the ELCC AUCAP calculation (just like in the methodology used before the ELCC implementation)
  - However, actual historical curtailments of resources are reflected in the current ELCC model and therefore historically undeliverable megawatts at certain hours are not included in the ELCC AUCAP calculation
- The transmission system has not been tested for injections above a resource's current deliverability level.
- PJM believes it will be important that the transmission system is tested for all meaningful injection levels accounted for in the ELCC accreditation process.
  - I.e., that the hourly output used for a resource in the ELCC method is capped at that resource's tested transmission deliverability level.

Contact

SME / Presenter:

Patricio Rocha Garrido,
patricio.rocha-garrido@pjm.com

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Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com