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RA Counting for Hybrid Resources

Sept 5-6, 2019
CPUC RA Working Group Meeting

SCE EXTERNAL

Outline

- Introduction
- Potential issues and use cases
- Summary

Introduction

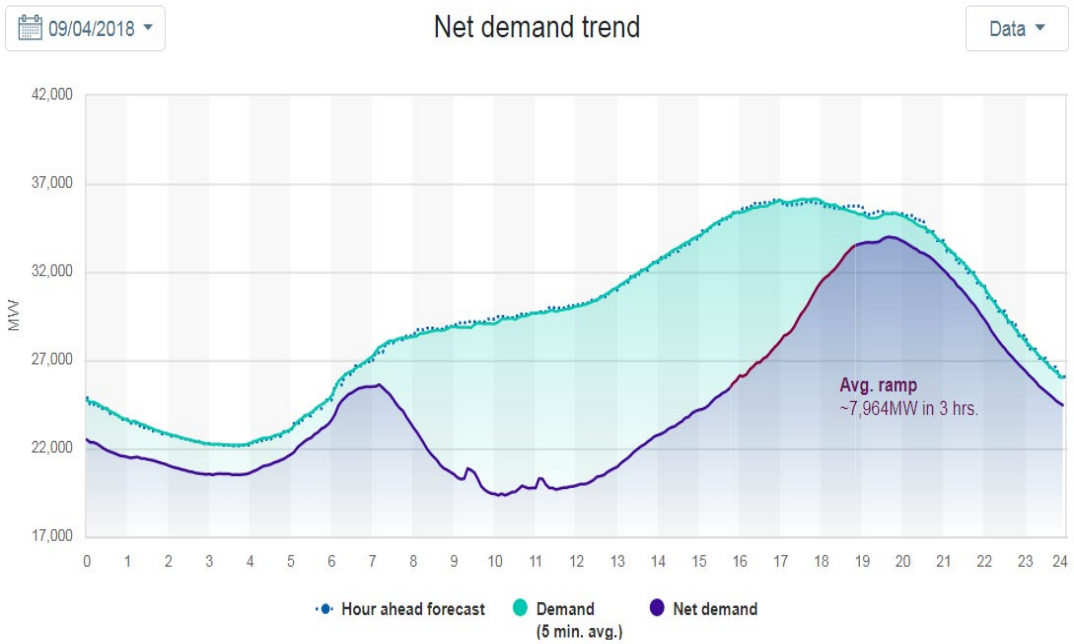
- Increasing number of hybrid resources is anticipated*
- It's important to develop an appropriate RA counting methodology for hybrid resources that fully recognizes reliability contribution of the resource
    - The ability to reduce mid-day over gen, mitigating steep evening ramps, and help meeting the evening peak (even if charged from on-site renewable under ITC**)

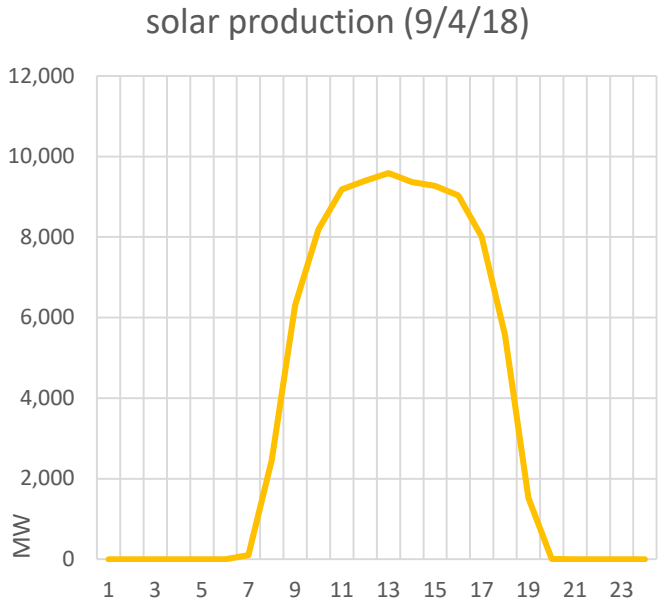
❖ This discussion focuses on a storage plus renewable resource interconnected to the CAISO grid

*: 35 GW of hybrid resources in CAISO's Generator Interconnection Queue as of July 2019 (source: CAISO Hybrid Resources Issue Paper).
**: Battery systems that are charged by a renewable energy system more than 75% of the time are eligible for ITC (source: NREL at https://www.nrel.gov/docs/fy18osti/70384.pdf).

RA value for wind & solar as measured in ELCC

- ELCC is based on a loss-of-load probability study
  - Declining ELCC values, likely driven by net load peak shift to evening hours





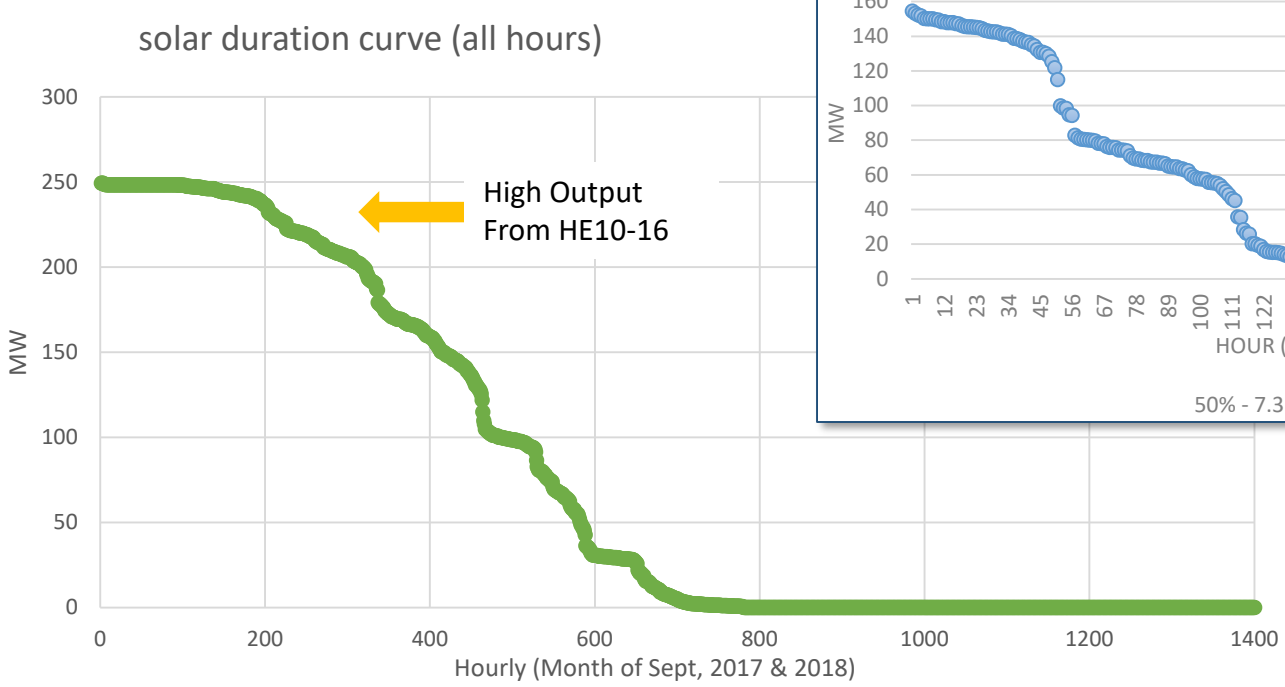
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
R. 14-10-010 Previously Adopted Values	Wind	11%	17%	18%	31%	31%	48%	30%	27%	27%	9%	8%	15%
CPUC adopted values	Wind	14%	12%	28%	25%	25%	33%	23%	21%	15%	8%	12%	13%
R. 14-10-010 Previously Adopted Values	Solar	0%	2%	10%	33%	31%	45%	42%	41%	33%	29%	4%	0%
CPUC adopted values	Solar	4%	3%	18%	15%	16%	31%	39%	27%	14%	2%	2%	0%

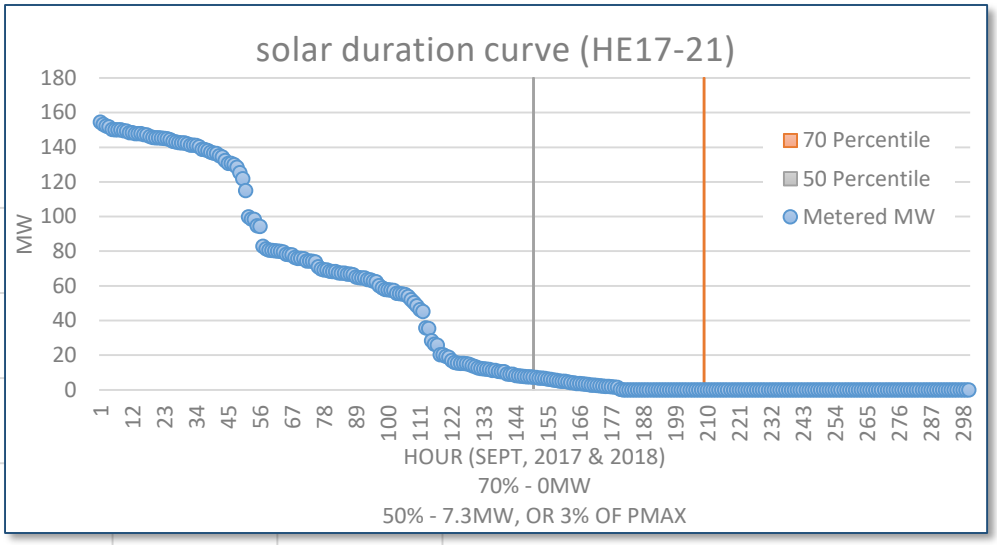
Source:

1. the CAISO website
2. RA Track 3 Decision

Typical solar production duration curve

- Solar duration curve significantly depends on hours chosen
  - An exceedance methodology evaluated over AAHs (HE17-21) can lead to significantly lower or zero RA value compared to ELCC
    - 70 percentile corresponds to 0MW output for the sample solar unit
    - 50 percentile corresponds to 3% Pmax
  - The percentile threshold does not capture mid-day over-gen phenomenon as the methodology filters out high-output solar hours

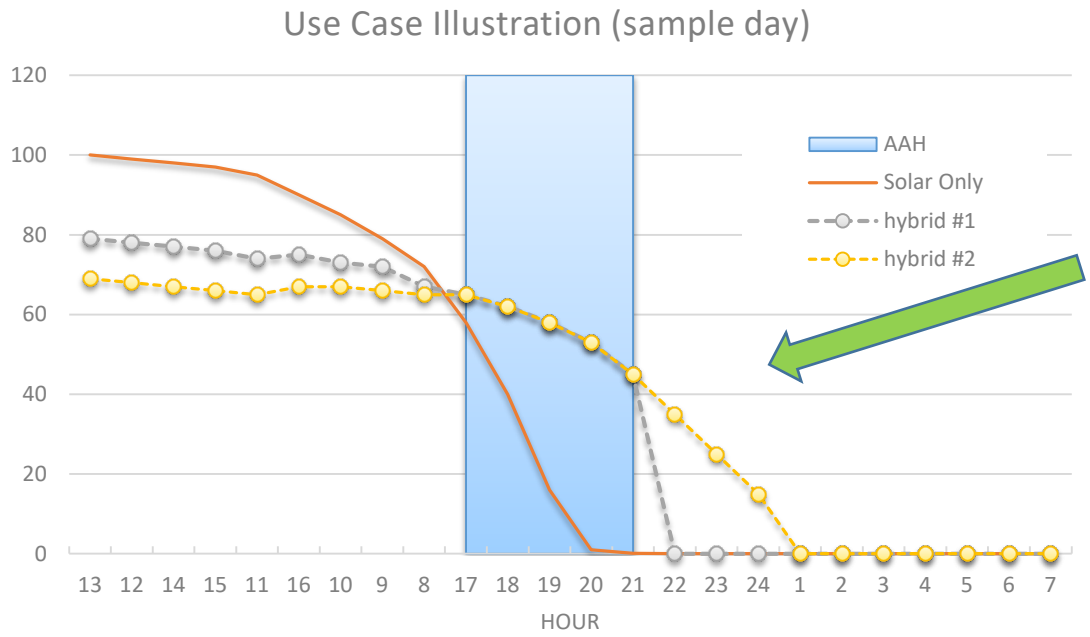




Hybrid resource use cases:

battery shifts solar production to evening hours & mitigate over-gen

- Use cases:
  - Hybrid Case #1: discharge in AAHs only (e.g. Maximize RA value in AAH is the standard)
  - Hybrid Case #2: discharge in extended hours (e.g. ability to meet net load in periods outside of the AAH including the morning ramp)
- Observation:
  - Exceedance methodology: potential difficulty in capturing reliability contribution outside AAHs (or other pre-selected hours)
  - "ELCC + storage NQC": the potential to capture reliability contribution within & outside AAHs by including ELCC and storage NQC in the RA value. Both ELCC and NQC are not limited to only AAHs



- Greater reliability contribution by Case 2
- An exceedance methodology may derive same RA value for both cases
- ELCC+NQC approach is more appropriate in addressing the issue

An exceedance methodology, evaluated solely on AAHs, may not align with other system needs

- Can an exceedance methodology lead to a disincentive to discharge in a non-AAH hour when needed?
  - Meeting system needs during AAHs are critically important.
  - Non-AAH hours can be important as well, during which the battery discharge could provide reliability, e.g. due to a cloud condition or mitigate mid-day over gen
- There is a potential incentive issue when RA counting does not consider system needs outside AAH
  - When the market dispatches the battery in non-AAH hours, the hybrid resource could see a lower RA value in the future even it follows the CAISO dispatch
  - To maximize its RA credit, the battery may not have sufficient incentive to provide the dispatch flexibility or follow the market dispatch, which can lead to a reliability issue or market inefficiency

Observations

- For stand-alone solar units, an exceedance methodology, evaluated on AAHs, can lead to significantly lower RA value compared to existing ELCC value. This observation alone suggests an exceedance methodology can create a significant disconnect from the ELCC methodology.

- Although an exceedance methodology has the advantage of tracking actual performance of a hybrid resource during evaluated hours (e.g. AAHs), such methodology can undervalue reliability contribution of the underlying storage component and lead to incentive issues in market dispatch, which should be carefully considered.

SCE's Previously Submitted Proposal*

- Pairing a battery with a dispatchable resource
  - Sum of the two NQCs subject to deliverability
- Pairing a battery with a non-dispatchable renewable resource
  - The battery is fully dispatchable by ISO: the sum of the ELCC and battery NQC subject to deliverability
  - The battery is non-dispatchable by ISO: determined by an ELCC methodology modeling the renewable resource coupled with the battery

*: SCE July 2018 Track 2 Opening Testimony and Proposals. SCE March 2019 Track 3 Proposals.

Potential Other Options

- For a hybrid resource with a battery co-located with renewable where the battery does not have any operational limitation in charging or discharging
    - The ELCC plus the Pmax of the battery subject to deliverability
    - This would be consistent with SCE previous proposal
- If there is an operational limitation (such as the ITC requirement), then the RA value should be the ELCC plus the capacity of the battery incorporating the limitation, subject to deliverability
    - Potentially, there can be a new MCC bucket to accommodate the type of hybrid resources falling into this category. Alternatively, there can be a derating on the battery NQC
    - This could avoid computational needs for deriving new ELCC values. However it would require careful calibration to “derate” the capacity.