



Resource Adequacy Seasonal Slice Proposal

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About Gridwell Consulting

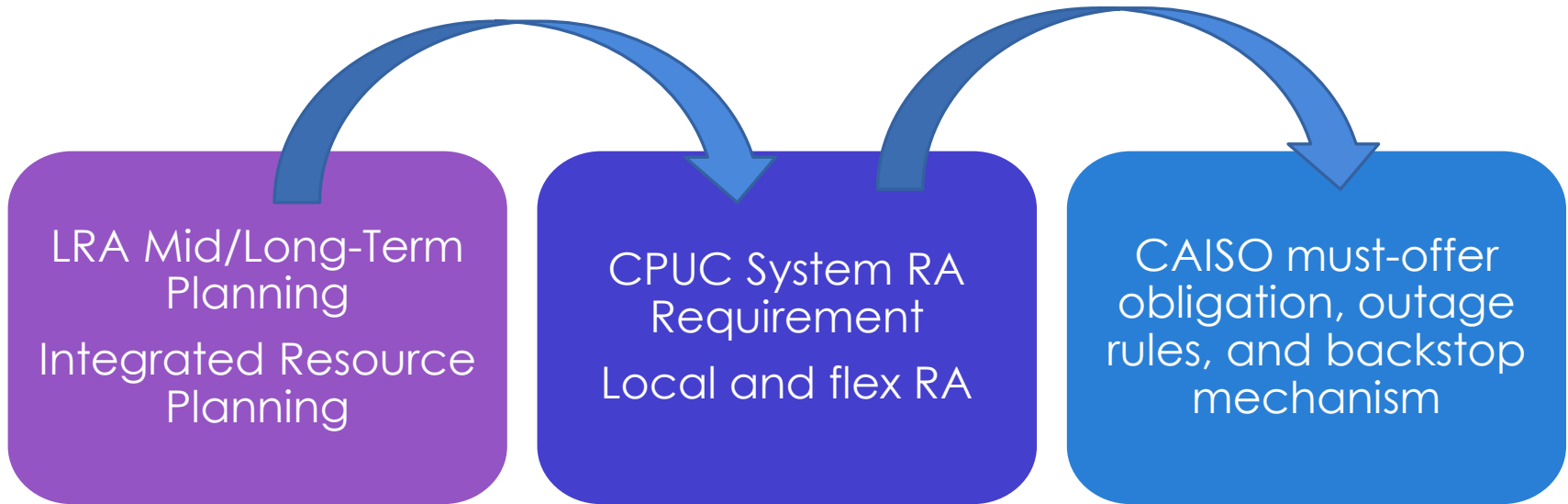
- Women-owned economics and energy consulting firm – www.gridwell.com
 - Educate, model, advise, and advocate
 - Experts in energy and ancillary service markets, resource adequacy, interconnection, and storage optimization and modeling for RFOs, due diligence, and bid strategy
- Carrie Bentley, co-founder and CEO
 - Designed CAISO's Capacity Procurement Mechanism, portions of forced and planned outage rules, and RA Availability Incentive Mechanism
 - Has evaluated or negotiated over 10,000 MW of long- and short-term RA contracts in California over last 5 years
 - Represent WPTF at the CAISO, full client list on website

Outline

1. CPUC System RA in context
2. Seasonal Slice Proposal Framework
3. Counting rules
4. Slice Validation
5. Discussion

1. System Resource Adequacy

CPUC System RA in context



- In CA resources are *built* solely to comply with IRP/planning goals under long term contracts
- RA program (1) commits energy to CAISO through energy must-offer, (2) incents investments in resources, and (3) determines efficient resource retirement/mothball

Issues with existing system RA framework

1. Insufficient RA capacity to serve peak load (*observed, despite CAISO emphasis on net peak*)
2. Insufficient RA capacity to serve net load peak (*observed, mostly due to delays in ELCC updates*)
3. Operationally-limited resources impact on hourly energy sufficiency (*future concern, addressed today through MCC buckets*)
4. Monthly requirements too granular to allow for efficient resource planned outages (*observed*)

2. Seasonal Slice Proposal

Seasonal Slice proposal elements

1. Seasonal showings
2. Seasonal peak load requirement (slice 1)
3. Seasonal resource Qualifying Capacity value
4. Enhanced counting rules
 - Solar, wind, hybrid, and all operationally-limited counting rules updated based on incremental ELCC
 - Thermal assets UCAP-light
 - Hydro and demand response updated
5. Seasonal slice-of-day validation (slice 2)
6. Sunset MCC buckets

Seasonal showings*

- Seasonal showings for all RA products
- System RA requirement would be seasonal
 - Summer, Non-Summer
 - Monthly updates to accommodate new resources online
- Maintain annual local RA requirement
 - Move from August NQC to Summer NQC value
 - Move from monthly showing to seasonal showing
- Sunset flexible RA requirement, in interim:
 - Move to seasonal showings
 - Use proxy month NQC value as proxy for Summer and Non-Summer until sunset date

*Additional detail can be provided at a different workshop

Seasonal peak load requirement

- Peak load planning is still a key element in ensuring reliability
- Cannot ignore the need to plan to peak, especially in non-summer season
- Seasonal RA requirement
 - Track 1: 1 in 2 peak load forecast month plus 17.5% PRM in summer season and 15% PRM in non-summer season
 - Track 2: Focus area to determine optimal requirement

Seasonal counting rules

- Single seasonal NQC that reflects resources contribution to reliability in all hours
- Enhanced counting rules that produce an NQC that accounts for resource individual contribution to grid reliability
 - ELCC for solar, wind, hybrid, and all operationally-limited resources
 - UCAP-light for thermal assets
 - Updated DR and hydro counting
- Details in next section

Seasonal slice-of-day validation

1. Solar RA is removed from all LSE's RA showing for evaluation purposes only
2. Remaining aggregate RA is validated against seasonal aggregate peak net load
3. If there is a deficiency, each LSE non-solar RA portfolio is compared against their coincident peak net load
 - Deficiency is allocated to short LSEs based on % short
 - LSEs have a 30-day opportunity to cure
4. Any remaining deficiency is considered a system RA shortfall under existing rules

Seasonal Slice proposal benefits

- ✓ Meets Commission goals
- ✓ Coordinated with IRP and CAISO rules/systems
- ✓ ELCC methodology captures all hours, including non-solar hours
- ✓ Seasonal slice-of-day validates net solar peak load is met by non-solar-RA and can be enhanced over time to accommodate any other counting rule deficiencies
- ✓ Yields a transactable product that works with existing contracts, small and large LSEs

3. Counting rules

Overview

- Resource limitations can either be reflected in RA requirement OR in counting rules
- Seasonal slice proposal primarily reflects availability in counting rules with an additional validation process
- ELCC methodology establishes QC based on equivalent reliability to a perfect resource considering all hours
- An accurate ELCC for any operationally-limited resource (due to fuel, use-limitations, or energy) will discount the RA sufficiently to ensure grid reliability in all hours

Counting rules should be coordinated across proceedings

- Mid-term Integrated Resource Plan (IRP) uses incremental ELCC (GAME CHANGER)
- Incremental ELCC buckets groups of resources by contract date (or COD) and studies their resource specific contribution to reliability, including during net load peak
- Coordinating the RA counting rules and IRP counting rules will:
 - Prevent over- or under- procurement
 - Ensure efficient entry and exit of resources

ELCC is targeted tool, but unnecessary for all resource-types

- ELCC is a resource and time-intensive process that yields best results for resources that are availability-limited
- Proposal: Seasonal counting rules-
 - Incremental ELCC by technology type, location, etc. for solar, wind, use-limited CTs, and storage
 - Non-use-limited thermal QC derated seasonally by ambient derates due to temperature
 - Update rules for hydro, non-dispatchable and DR
 - Use track as needed for more detailed proposals

Quick note on exceedance

- Exceedance methodology is a poor measure of resource reliability for most resource types
- It is not consistent with California law that requires ELCC for solar and wind
- Exceedance lacks statistical robustness as a measure of reliability because it does not account for resource and load diversity benefits
- Easy gut check: 75% solar exceedance means 25% of the time the solar won't meet this value; are we okay with being short 25% of the time without any further analysis of how short or what other resources will be available?

UCAP – response to CAISO proposal

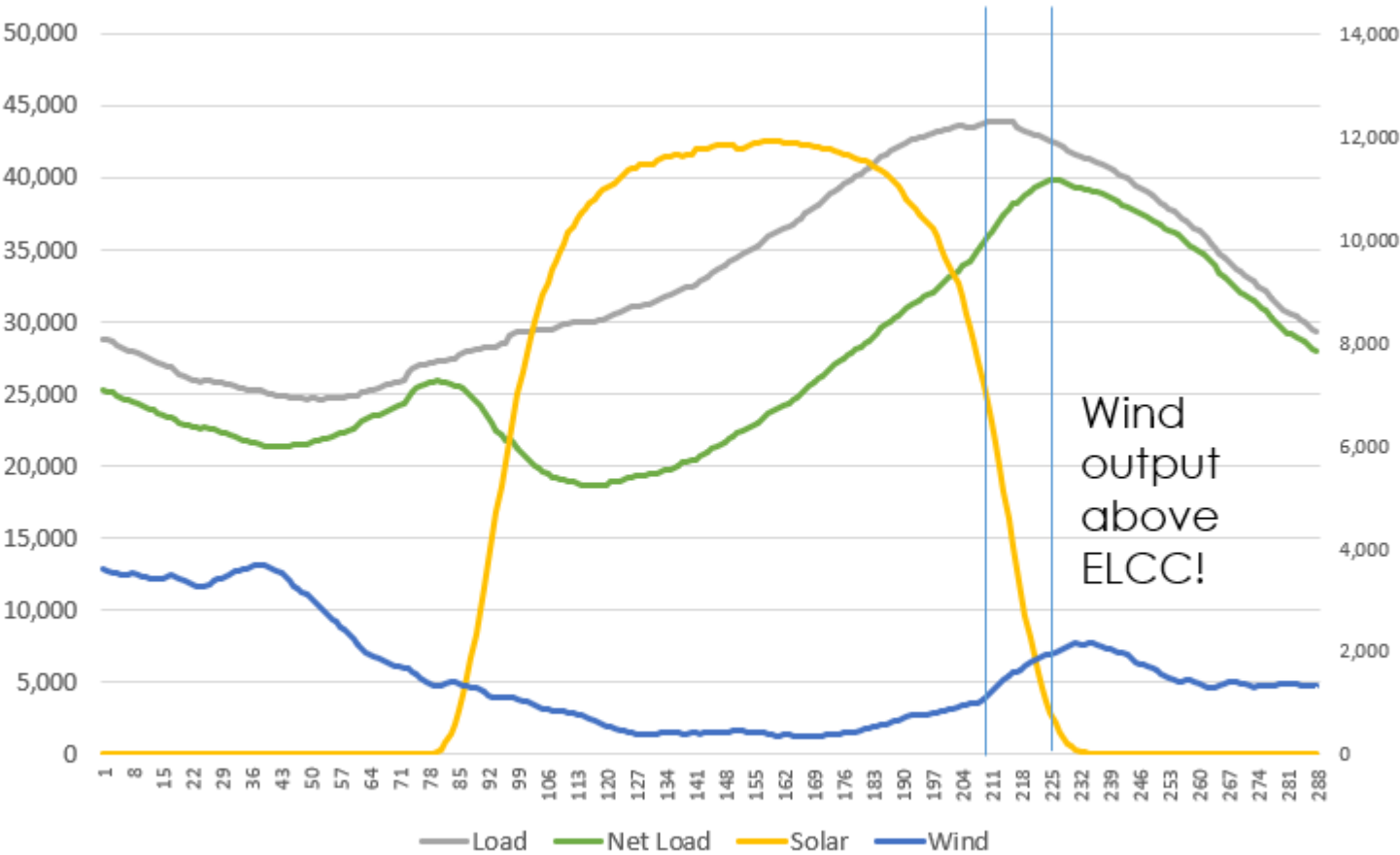
- Gridwell has posted resource outage data scraped from the CAISO website in a single excel spreadsheet for transparency
- Our initial findings show there is no correlation between medium-large forced outages and future forced outages
- Our findings show there is a strong correlation between what is likely ambient derates due to temperature outages from year to year
- Seasonal slice therefore does not propose to move to UCAP, but proposes non-use-limited thermal assets can be rerated for RA by their expected ambient derates due to temperature

4. Slice validation

Slice validation

- Seasonal aggregate net peak load validation
 1. For compliance purposes only, solar RA is removed from all LSE's RA showing
 2. Remaining aggregate RA is validated against seasonal aggregate net peak load
 3. If there is a deficiency, each LSE non-solar RA portfolio is compared against their coincident net peak load
 - Deficiency is allocated to short LSEs based on percentage short
 - LSEs have a 30-day opportunity to cure
 - Any remaining deficiency is considered a system RA shortfall under existing rules

September 2021 Peak Net Load



Do we need to ensure battery charging energy sufficiency in RA program?

- Yes, but by the time we're in RA space it is too late, the batteries have already been built and are going to be in the market
- Currently majority of batteries are hybrid with ITC, which have their RA discounted if insufficient solar/wind to charge batteries, so not an immediate reliability issue
- This must be resolved within IRP and cannot simply be energy sufficiency
 - The goal of only building batteries to use excess renewable energy on the grid can only be ensured in IRP

But what if this is not resolved in IRP?

- Majority of batteries are hybrids under the ITC, which already have their RA discounted based on renewable availability, so we have some time
- If not resolved in IRP, then we must acknowledge that transmission constraints and existing renewable contract structure will make any meaningful analysis of energy sufficiency incredibly complicated
- Seasonal slice evaluation will have to consider all LSE renewable contracts (which far exceed those on RA plans) and transmission constraints

Seasonal Slice recap

- Gridwell's Seasonal Slice proposal is a pragmatic approach that minimizes transaction costs and preserves benefits of joining an ISO
- RA is complicated under the existing framework, and we should seek to simplify, not increase complexity
- There are pros and cons to all options
 - Prior slice proposals use hourly or sliced requirements to ensure hourly reliability
 - Seasonal slice proposal offers an option to use counting rules and peak net load validation to ensure hourly reliability
- Seasonal Slice prioritizes CAISO/CPUC coordination, market transactability, and robust statistical tools and analysis

Appendix

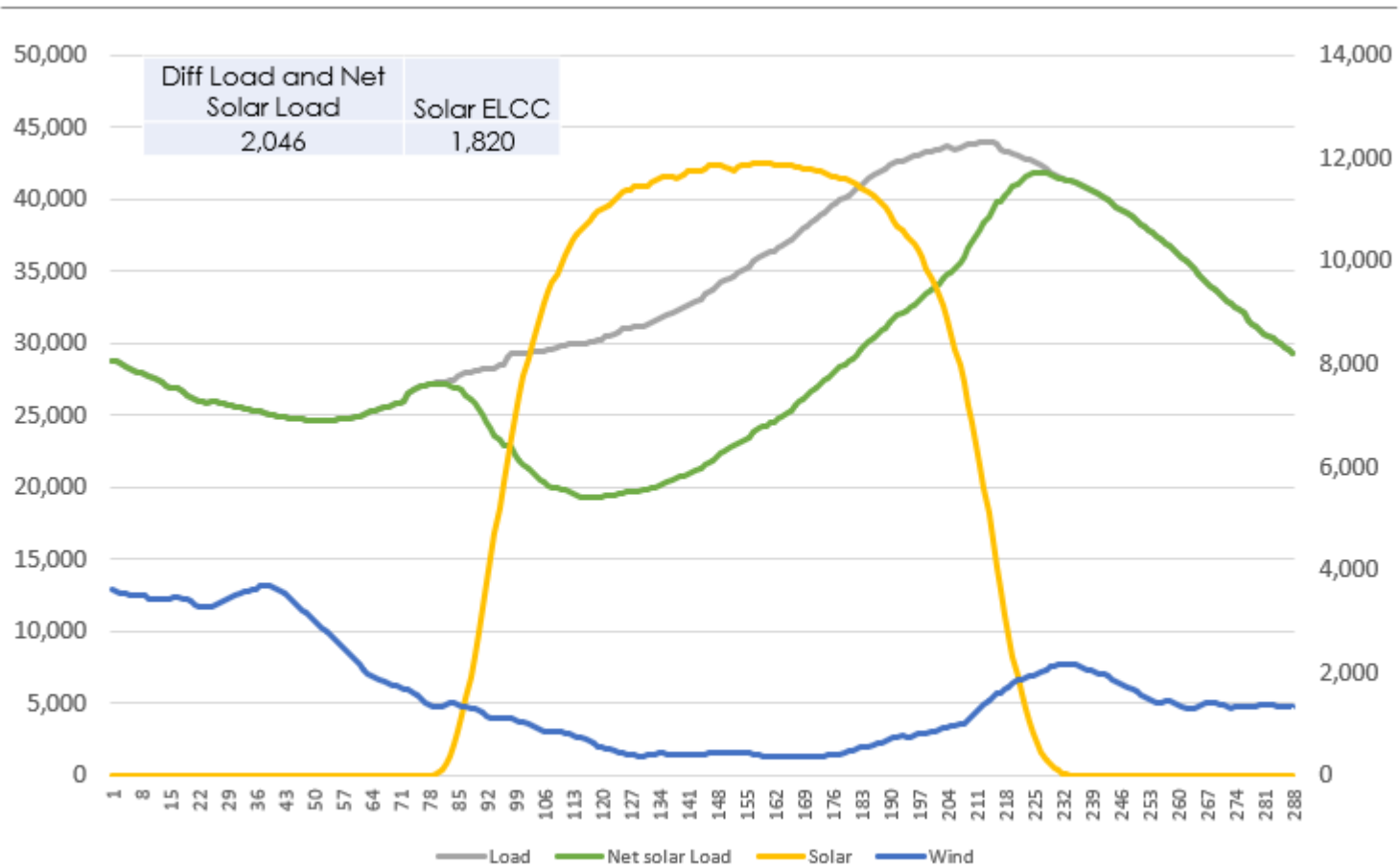
Goals translated into proposal considerations

1. Process that makes hard decisions about what *must* be in scope this year
2. Framework that is
 - ✓ coordinated with CAISO rules
 - ✓ preserves portfolio benefits
 - ✓ minimizes administrative and transaction costs
3. Requirement that balances reliability against potential for over-procurement
4. Counting rules that reflect resources realistically expected contribution to reliability
5. **Not required by goals: hourly or slice-of-day requirements**

Prior framework options have significant downsides

- Option to shift to an hourly NQC and RA requirement will increase transaction and RA costs without commensurate reliability benefits
- Option to have individual hourly energy compliance obligation may eliminate some of the largest monetary savings from being in an ISO
- Option to implement exceedance means moving to an outdated and poor statistical measure of resource reliability (and is not consistent with California law that requires ELCC for renewables)

September 2021 Peak Net Solar Hour



Monthly planning too granular to allow for efficient planned outages

- CAISO has a 100% planned outage requirement
- Seasonal requirement
 - Summer, shoulder, winter
 - Determine based on resource counting and whether it solves the planned outage issue

5. Portfolio Effect

WHY IT WOULD BE COSTLY AND INEFFICIENT
TO REQUIRE EACH LSE PROCURE CAPACITY
TO ITS HOURLY LOAD FORECAST

Benefits of a system RA program

- A main benefit of joining an ISO is that a joint system RA requirement among many participants is more efficient and lower cost than individual LSEs procuring to meet their own load profile
- It is not leaning – everyone gets benefits from a diverse resource set and load profiles
- To efficiently ensure reliability within an organized market, aggregate capacity must meet aggregate demand
 - Allows region to take advantage of load and supply diversity
 - Therefore, the CAISO only backstops with CPM if there is an *aggregate* shortage

Benefits of a jointly administered system RA requirement

- Portfolio benefits are one of the largest cost-savers of joining an ISO
- Load diversity
 - Non-coincident peak loads
 - Very significant savings; \$150 million in benefits/year assuming a \$4/kW-month RA price
- Supply diversity
 - Diversity benefits within and between resource types