# APPENDIX A

# 24-Hour Slice Framework

# Appendix A

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## A. Structural Elements

The 24-hour slice framework requires each load-serving entity (LSE) to demonstrate it has enough capacity to satisfy its specific gross load profile (including planning reserve margin) in all 24 hours on the California Independent System Operator's (CAISO) "worst day" in that month.

**"Worst Day"**

The "worst day" is defined as the day of the month that contains the hour with the highest coincident peak load forecast. This could evolve over time if some other attribute (*e.g.,* steepest ramping requirement) is found to be more challenging to reliability than the coincident peak.

**Need Determination and Allocation**

The California Energy Commission's (CEC) load forecast approach shall be used to establish individual LSE hourly load forecasts. Energy Division is requested to conduct a dry run forecast filing in 2022, in coordination with the CEC, to identify challenges and determine if refinements to the methodology are needed. Any proposed refinements to the load forecast process that may result from the test filing should be incorporated into the identified workstreams.

**Planning Reserve Margin (PRM)**

LSEs must demonstrate sufficient capacity to meet their load requirements plus a PRM percentage in each hour ("Load+PRM"). For initial implementation, one PRM will apply to all hours of the year. As discussed in Section 3.3.2, the PRM will be a minimum of 17 percent for 2024. As such, converting the results of the loss of load expectation (LOLE) study to the counting rules applicable to the 24-hour framework should await the refreshed LOLE outputs from the Integrated Resource Plan (IRP) proceeding. Once refreshed LOLE outputs are available, conversion of the outputs to the 24-hour framework counting rules needs to be completed, and the National Resources Defense Council's "proof of concept" template should be leveraged for the conversion.

**Capacity Required to Offset Storage Usage**

To the extent an LSE uses energy storage to meet its Load+PRM requirement, the LSE must demonstrate it has excess capacity *(i.e.,* capacity that exceeds the LSE's hourly Resource Adequacy (RA) requirement) that offsets the storage capacity plus efficiency losses. In other words, LSEs must bring enough extra capacity to serve their own batteries.

## B. General Requirements and Counting for RA Capacity

### 1. Requirements of RA Resources

**No Unbundling of Attributes**

Resource attributes and capabilities remain bundled across each compliance month and the existing full-capability/all-hour must-offer obligation is retained. Bundling resource attributes (*i.e.,* system, local, flexible) and capabilities across each compliance month aligns with the existing must-offer obligation because it ensures resources that have sold capacity also have a must-offer obligation equal to the sold amount for all hours they can produce. Resources can continue to sell portions of their capacity to different LSEs (*e.g.*, 70% of capacity sold to LSE 1 and 30% of capacity sold to LSE 2), but they cannot sell separate hourly products because that would effectively sell the same RA capacity multiple times.

**Full-Capability Must-Offer Requirement**

An RA resource must offer all its capability to CAISO for the quantity of RA shown by LSEs. CAISO's market will optimize resources consistent with bids and resource limitations across the compliance month.

**Resources Must Be Deliverable to Provide RA**

Resources must be deliverable to qualify to sell RA (and be included in the RA showing), as required today. Resources that are partially deliverable can only provide RA for the portion of the resource that is deliverable.

**Profiles and Net Qualifying Capacity (NQC)**

All resources will still have a single monthly NQC value representing the deliverability-adjusted peak-hour contribution. Most resource types will continue to utilize this NQC for their showing (and for CAISO deficiency determinations) while solar and wind will utilize hourly profiles and NQC in their Commission RA showings. NQC for wind and solar will be based on peak hour deliverable capacity based on their profile for that hour.

**Deliverability**

The current on-peak deliverability study process shall continue to be used, with outputs in the 24-hour framework. A resource is deemed to be "fully deliverable" if its full modeled output can deliver to system load under summer peak load conditions, and "partially deliverable" if something less than its full modeled output can reach the grid. The "full deliverability" amount is not dependent on the Commission's resource counting, only CAISO's modeling.

## 2. Resource Counting

Resource capacity counting should be consistent with expected capacity contribution in the slice. The expected capacity contribution in a slice will depend on resource size, general type, special operational characteristics or limitations, deliverability status, and potentially location. These limitations will be identified through the development of the RA Resource Master Database that will be confirmed against CAISO's Master File data to the extent possible. The database will also include tables reflecting solar and wind profiles.

**Wind and solar resources** will be assigned monthly 24-hour profiles based on Pacific Gas and Electric Company's exceedance methodology that will be further developed in workstreams. Monthly hourly profiles should be based on technology and/or general geographic region.

**Dispatchable resources** (including resources not explicitly discussed elsewhere) will be assigned a single value based on Pmax with ambient derates/Unforced Capacity Evaluation (UCAP)-light applied (if developed). Dispatchable use-limited resources will also be subject to identified daily availability constraints. Development of ambient derates/UCAP-light methodology will take place in the identified workstreams.

**Non-dispatchable resources** will be assigned a single monthly value applied to all hours, based on the existing QC counting methodology, subject to availability constraints for each month.

**Dispatchable hydro resources** will be assigned a single monthly value applied to all hours based on the existing QC counting methodology.

**Energy storage resources** will be assigned value based on Pmax or UCAP-light (if developed), restricted to daily resource capabilities (*e.g.*, maximum daily run hours, maximum continuous energy, and storage efficiency). Excess capacity must be shown to cover battery capacity with efficiency losses.

**Hybrid and co-located resources** will utilize the existing QC methodology updated to use exceedance (rather than Effective Load Carrying Capability) in valuing the solar and wind portion of the resource and to account for charging losses. The methodology will be refined in the identified workstream to consider different hybrid configurations, Investment Tax Credit charging assumptions, and partial deliverability concerns.

**Import Resources.** Resource-specific imports will be assigned value based on the applicable counting rules for that particular resource type. Non-resource-specific imports will count based on the contract value, subject to the requirement that resources be at least four hours in duration.

**Demand Response resource** counting methodologies should be considered in the CEC Working Group.

In addition, all use-limited resources shall continue to be subject to the minimum four-hour availability requirement to qualify as RA.

Elimination of the maximum cumulative capacity buckets will be further discussed in the identified workstream.

## C. Showing Mechanics

### RA Resource Master Database

The Commission will maintain an official database of resources eligible to sell RA that includes their key attributes, as listed below (RA Resource Master Database). Resources must be fully represented in the RA Resource Master Database to be eligible for use in the Commission's 24-hour slice RA showing. The database shall include:

- Resource ID
- Available MW of RA capacity
- Hours available for production—represents the hours of its must-offer obligation and will set the parameters on how it can be shown in the Commission's RA showing
- Other use-limitations (*e.g.,* peaker permit limits)
- Continuous MWh run energy and charging efficiency (storage)
- Configurations (hybrid and co-located)
- Applicable hourly profile for solar and wind
- Additional parameters as identified through Workstreams

The Commission will coordinate with CAISO to the greatest extent possible to utilize the same unit information used by CAISO in its market operations (*e.g.,* aligned with CAISO's Master File).

### Showing Template

A single system monthly RA showing shall cover all 24 slices. LSEs will use a standard template that lists basic resource characteristics (*e.g.,* technology and total contracted capacity that is being shown by the LSE) and tallies how many MW of capacity are being counted in each hour.

### Compliance Verification

The Commission will verify the following to confirm an LSE has satisfied its RA requirements:

- **Resources are being shown within their capability.** The RA Resource Master Database is used to validate that LSEs have represented their contracted resources accurately.

- **Hourly requirements must be met or exceeded.** LSEs must show they have met hourly RA requirements.

- **Excess capacity must be shown to cover shown battery capacity.** LSEs must show they have enough excess capacity to cover all shown battery capacity (plus efficiency losses).

**Penalty Process**

The current Commission penalty framework, including the point system adopted in D.21-06-029, shall be applied when an LSE fails its monthly showing. An LSE "fails" the Commission showing if it fails to meet its requirement in any of the 24-hours; if the LSE fails in multiple hours, the penalty should be assessed based on the hour with the largest deficiency.

## D. Contracting Mechanics

**Existing Contracts**

Existing contracts are expected to continue without modification or with minor changes under the 24-hour framework. RA attributes must continue to be bundled and contracted resources continue to have a must-offer requirement based on their operational capability and the amount of monthly RA capacity sold.

**Transactability**

The 24-hour framework will result in highly transactable RA products. RA capacity will continue to trade as it does today because it keeps all attributes "bundled." All market participants will know the RA capability of all resources on a 24-hour basis because the RA Resource Master Database will be public. This transparency will facilitate both direct contracting and secondary trading and will allow LSEs to pursue RA resources that best fit their needs.

## E. Tools Required for Implementation

Several new administrative tools must be developed to implement the 24-hour framework. The tools ensure that all parties agree on the RA capability of each resource, have sufficient information to design RA portfolios, can submit the showings, and can demonstrate compliance to the Commission. An Excel spreadsheet, or other simple mechanism, should be used to develop and maintain the necessary administrative tools described below:

**RA Resource Master Database**

- Contains a list of all resources (within the CAISO) eligible to sell RA, their resource ID, their maximum RA capacity, and hours of availability within a 24-hour window
- For solar and wind, identifies the profile associated with the resource.
- For storage, includes the charging efficiency and maximum continuous energy
- For hybrid and co-located resources, includes configurations to describe capabilities
- Contains data for each month
- Information is public and available to inform trading and resource portfolio development

**LSE Requirement Database**

- This will populate the LSE allocation tab used in the LSE compliance showing
- Contains the official requirements of each LSE (hourly load + PRM), by month, for all 24 hours
- Is used by each LSE to determine its monthly 24-hour showing requirement
- Is used by the Commission to ensure each LSE meets its monthly 24-hour showing requirement
- Is developed by the Commission in communication with the CEC after the CEC finalizes the monthly, 24-hour load shape for each LSE
- Database is non-public. Each LSE has access to only its requirements; the Commission has access to all data

**LSE Showing Tool**

- Spreadsheet tool used by each LSE to submit their monthly, 24-hour showing to the Commission

- Contains a standard format for listing the resources in an LSE's portfolio including the resource ID found in the Master Database, their MW quantity associated with the must-offer requirement, and the capacity used in each of the 24 hours of the showing

- The tool should include pass/fail logic identical to the Commission Verification Tool, so LSEs know in advance if they will pass Commission verification

- This showing may also be used to provide CAISO the information it will need to determine the must-offer requirements of all resources, and the correct RA capacity values to use when performing their single-hour deficiency test

**Commission Verification Tool**

- The tool is designed to use the data submitted through the LSE Showing Tool

- The Commission uses the data submitted by the LSE in its showing, in conjunction with the RA Resource Master Database, which will include solar and wind profiles to determine if an LSE passes the 24-hour RA requirement in each month

- The tool contains basic logic to ensure the showing is consistent with the capabilities of the resources submitted, that sufficient capacity has been brought to meet the LSE's requirement in all 24 hours, and that sufficient excess capacity has been shown to meet the capacity requirements for storage

- LSEs must pass all 24 hours, all logic tests, and the excess capacity requirement to pass the showing

- The tool notes any hour(s) of failure along with the maximum capacity shortfall within the 24 hours

(END OF APPENDIX A)