December 22, 2021

**Re: Informal Comments of the California Energy Storage Alliance Regarding the Resource Adequacy Slice-of-Day Reform Workshops**

The California Energy Storage Alliance ("CESA") appreciates the opportunity to provide informal comments on the series of Resource Adequacy ("RA") Slice-of-Day ("SOD") Workshops ("Workshops") held September through December 2021. CESA recognizes the dedication and efforts of parties to this proceeding in assembling these meetings and fostering an environment of creative policymaking.

CESA is a 501(c)(6) organization involved in a number of proceedings and initiatives in which energy storage is positioned to support a more reliable, cleaner, and more efficient electric grid. CESA represents over 100 member companies across the energy storage industry. Due to the diversity of our membership, CESA is still in the process of developing a formal consensus position and getting alignment and buy-in among our members. As such, the views and perspectives expressed here are preliminary at this time.

## I. CESA currently favors an SOD structural approach with monthly showings and 24 hourly slices.

When Pacific Gas & Electric ("PG&E") first proposed to establish RA requirements based on a SOD framework, they noted that this approach would ensure load will be met in all hours of the day, not just during gross peak demand hours. This would be achieved by: (1) setting requirements by slice; and (2) reducing compliance showings. PG&E offered two potential durations for establishing these slice requirements: six four-hour slices or four six-hour slices. In addition, to avoid administrative burdens associated with SOD requirements for each month, PG&E recommended moving from a monthly RA obligation to a seasonal obligation. PG&E provided three seasonal options, all of them establishing three seasons across the year.

During the workshops, several parties noted that longer slice durations and seasonal compliance have the potential to induce overprocurement, undercount resources, and generally increase ratepayer costs. Southern California Edison ("SCE") underscored that PG&E's proposal to have multiple-hour slices creates major inefficiencies and additional cost to ratepayers since use- and energy-limited resources cannot be allocated hourly and the hour with the highest load per slice will set the requirements for the entire slice. As a result, an SOD framework with multiple-hour slices is likely to overestimate the capacity necessary to meet the same planning reserve margin ("PRM"), relative to an approach with more granular hour-long slices.

CESA agrees with SCE. Slices and seasons are created to address hourly needs while managing showing requirements and other administrative costs. Currently, proposals consider anywhere between 2, 3, 4 and 12 seasons (showings), as well as 4, 6, and 24 slices. In general, CESA favors accurate representation of needs. Overall, longer slice durations have the potential to induce overprocurement, undercount resources. The same effects occur with fewer seasons, since variance is overlooked by planning for higher load conditions. CESA believes that higher granularity (*i.e.*, more seasons and slices) is consistent with the Commission's mission to retain reliability and minimize ratepayer costs.

In addition, when considering the SOD variations from PG&E, SCE, and Gridwell, SCE's month-hour SOD approach may be the only one compliant with the Commission's guidance regarding RA Reform. In Decision ("D.") 21-07-014 the Commission offered the following principles for the evaluation of reform alternatives (emphasis added):

- To balance ensuring a reliable electrical grid with ***minimizing cost to customers***.
- To balance addressing ***hourly energy sufficiency*** for reliable operations with ***advancing California's environmental goals.***
- To balance granularity and precision in meeting hourly RA needs with a reasonable level of simplicity and transactability.
- To be implementable in the near-term (*i.e.*, 2023).
- To be durable and adaptable to a changing electric grid.

As noted in the above principles, the Commission seeks an RA framework that minimizes cost to customers, addresses hourly energy sufficiency, and advances California's environmental goals. SCE's 24-hourly SOD framework is well-positioned to meet these principles as it allows for the flexible utilization of use- and energy-limited assets, the accurate counting of variable energy resources ("VERs") and the minimization of procurement costs through the establishment of precise requirements. As such, CESA currently favors 12 seasons (monthly showings) and 24 hourly slices, aligned with SCE's proposal.

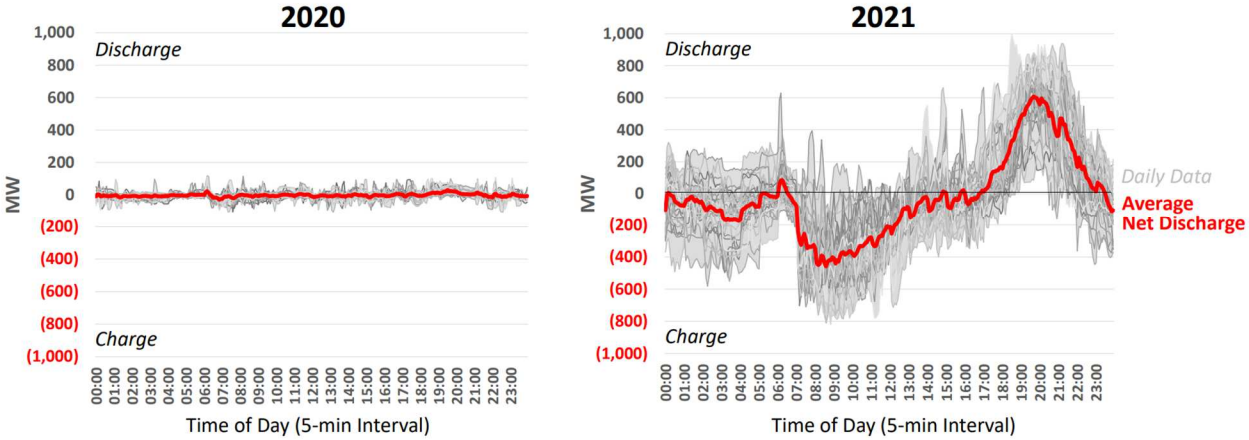
Granted, there are additional considerations that require further development, such as alignment with Local RA requirements and procurement, with backstop procurement mechanisms, and with RA structures in non-CAISO balancing authorities, but CESA does not view these additional considerations as insurmountable.

## II. Storage counting should recognize the flexibility of these assets and the incremental value of assets with longer durations.

Today, the net qualifying capacity ("NQC") value of storage assets is determined by the maximum power output ("Pmax") it can sustain for 4 or more hours, colloquially known as the "*4-hour rule"*. As such, the value of a 100 MW, 4-hour asset is identical to that of a 100 MW, 6-hour asset. During the workshops, parties have noted there are several methodologies to estimate the reliability contribution of energy storage resources and capture the incremental value of resources with durations above 4-hours. Overall, there are four proposals to assess the value of energy storage resources: exceedance; Pmax over a period of time (duration); some form of effective load carrying capability ("ELCC"); and/or some type of unforced capacity ("UCAP") evaluation.

First, counting methodologies that have been historically applied to VERs (*e.g.*, exceedance and ELCC) are not sound for energy storage assets by virtue of their dispatchability and their responsiveness to periods of grid stress. Under an exceedance methodology the qualifying capacity ("QC") of a storage resource would be equal to the minimum output achieved by the resource for at least N% of the hours in the data set of historical generation for each period (season and slice). This may not be adequate for energy storage since dispatchable resources are able to shape their output in response to grid conditions (prices) that change across many different time horizons (*e.g.*, within a day, month by month, over years). As it can be seen in Figure 1, the aggregate output of storage assets has changed dramatically in a single year (2020-2021). To support forward determinations of capacity count, a methodology focused on a historical lookback for a resource class that can change its dispatch over time is limited. As such, QC estimates based on historic performance do not seem readily applicable for these assets.

Figure 1: CAISO Aggregate Battery Output (June 10 – July 10)[1]




Similarly, under an ELCC approach, a single monthly value (percentage) approximates the degree of coincidence between output of the storage asset and the loss-of-load probability ("LOLP"). Despite arguments to the contrary by some stakeholders, CESA is not convinced ELCC is a methodologically sound counting metric for dispatchable resources as they can maximize the degree of overlap between their output and LOLP (*i.e.*, these are not independent events). By

[1] Lumen Energy Strategy, AB 2514 Evaluation Report, 2021.

virtue of their dispatchability, storage assets should not be evaluated in a manner that assumes their output is disconnected from the periods of grid stress (*i.e.*, LOLP). In fact, as storage resources are in essence pure arbitrage products, their response to price signals positions them quite well to align their output with LOLP.

Furthermore, when considering either exceedance or ELCC as alternative storage counting conventions, the Commission and other stakeholders should also consider the practical implementability of the methodology and take into account commercial perspectives regarding whether the counting conventions are not only reasonably accurate but also whether it is durable and provides certainty for the contracting of RA resources. After all, one of the key purposes of the RA Program is to ensure that load-serving entities ("LSEs") have contracted for not only the right resources but also sufficient resources to meet their RA obligations. Under an ELCC approach, the RA Program would be providing greater certainty of the reliability contributions of energy storage resources as a portfolio and asset class, with greater certainty in the immediate and near term and much less uncertainty in the long term. However, for any new resource procurement requiring long-term contracts, many stakeholders are aware that RA counting values must have some degree of certainty to be financeable from the supplier/developer side and for portfolio management certainty on the buyer/LSE side. This will naturally entail ELCC approaches in practice requiring the use of ELCC vintages to specific years, or the use of average ELCC values, which would lead us to the very same problem we have today: solar resources have some non-zero average ELCC value today that can be "counted" or "stacked" across all hours, but we know that their capacity contributions are minimal, if not zero, at the critical summer net load peak hour at 8pm. If proponents of ELCC approaches are instead advocating for marginal ELCC to be used for RA counting purposes, then new procurement for resources like energy storage will be challenging to contract, especially when RA values fluctuate on a year-by-year basis. These questions are on top of the ones CESA has about the ability for ELCC models to capture granular traits (*e.g.*, location, technology type), be updated frequently (*e.g.*, due to computational power required), and ensure the appropriate and most accurate inputs and assumptions (*i.e.*, a robust and complex model is only as good as its inputs and assumptions). In essence, while ELCC proponents state that the model is robust and more accurately captures resources' QC contributions, it may not be accurate in practice.

In this context, CESA is left considering either the Pmax approach (subject to the number of hours shown and interconnection limits) or the UCAP methodology. Critically, the UCAP methodology implies the estimation of a seasonal availability factor to be applied to a predetermined NQC value, which would be based on the 4-hour rule.[2] As such, it is unclear how UCAP could value the different durations of storage without resorting once more to an N-hour rule (*e.g.*, a 6- or 8-hour rule). Thus, given its inherent recognition that storage can be shown and operated in any manner an LSE decides to show it, subject to interconnection limits, CESA currently favors valuing storage based on the Pmax over number of hours shown, subject to interconnection limits. Such an approach recognizes the flexibility of storage assets, is compatible

[2] The formula for UCAP, as last presented by the California Independent System Operator ("CAISO") is defined as *UCAP value (or deliverable qualifying capacity ["DQC"]) = NQC * Weighted Seasonal Average Availability Factor.*

with the 24-by-7 MOO, enables cost-effective usage of assets, and provides clear and certain resource counting rules.

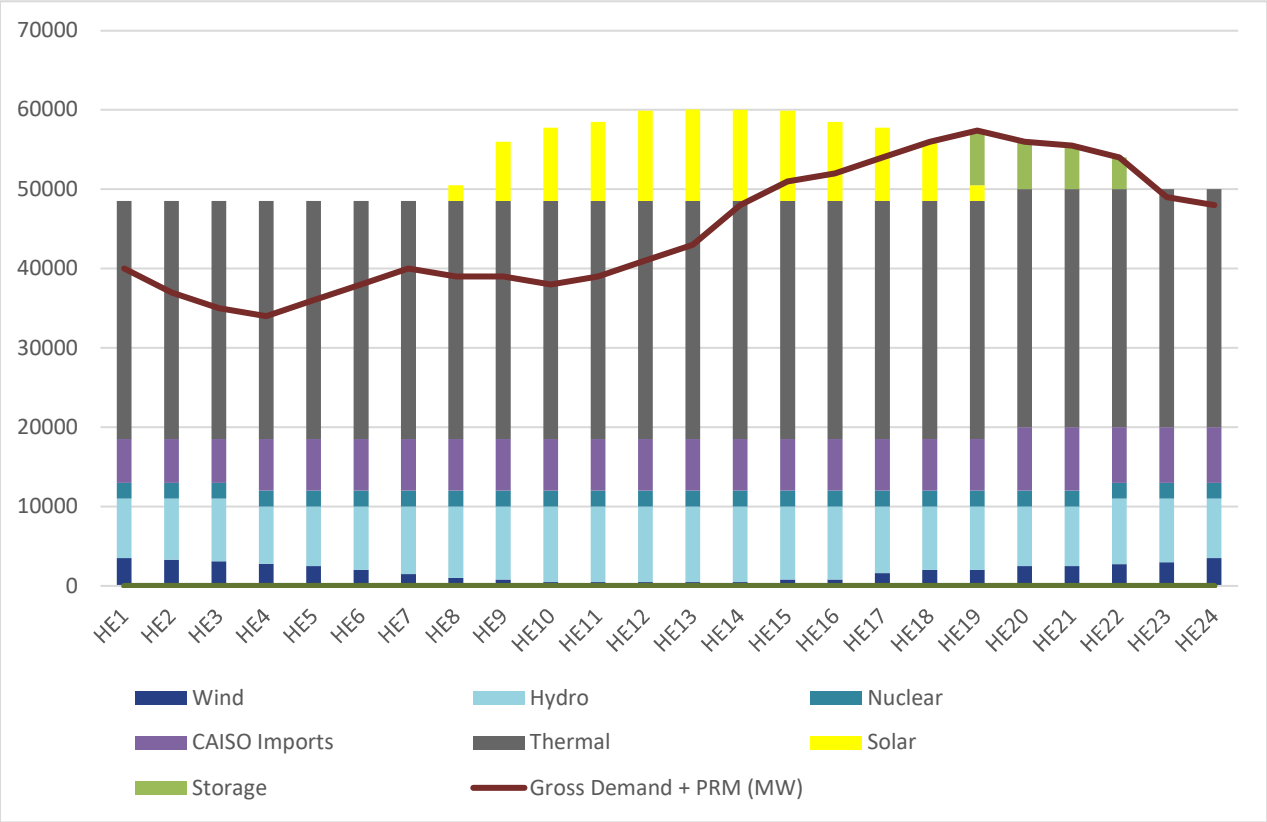
## III. If charging sufficiency verification is required under the RA SOD framework, it should recognize resource-specific operational characteristics.

Currently, two of the three proposals (PG&E and SCE) consider some form of charging sufficiency verification by LSEs that utilize storage assets to comply with their RA requirements. Importantly, this onus would be placed on the LSE using storage to comply with their RA requirements. This requirement would imply that LSEs would need to show storage resources as "positive" RA assets when expected to discharge and "negative" RA assets when expected to charge. Notably, both the PG&E and SCE proposals would not require that storage be charged when shown as charging since such showing is only done as an accounting exercise and for compliance purposes. As such, both SCE's and PG&E's proposals assume that, in the actual day of operations, storage will be charged and discharged based on its bids, as optimized by the CAISO market.

PG&E and SCE propose that charging sufficiency account for round-trip efficiency ("RTE"). For example, if an LSE uses 20 GW to meet RA requirements in evening hours, it should show 24 GW of capacity to charge the storage in hours prior, assuming 20% RTE. Notably both PG&E and SCE proposals would include no limitations for storage to be shown in excess of one cycle, provided the LSE has sufficient energy to charge it.

Currently CESA does not have a position on the inclusion of charging sufficiency verification. Nevertheless, if charging sufficiency is to be verified, resource-specific characteristics should be considered. First, RTE should not be considered on average terms, but on a per-asset or, *ad minimum,* per-technology basis. This will limit the potential for resources with significantly distinct RTEs to overestimate the amount of excess energy needed, affecting other storage assets. Second, as noted by SCE, storage resources should be allowed to be shown as cycling multiple times, with no consideration of "downtime". This allows resources that can cycle more than once to be shown incrementally, consistent with their capabilities and bidding strategies. Moreover, "downtime" verification goes beyond the accounting purposes of RA compliance showings, stepping into CAISO dispatch optimization. Multi-cycle charging sufficiency verification could be accomplished by simply estimating the amount of excess energy required to support one or more cycles of the storage shown, as presented during the December 17, 2021 workshop and illustrated below in Figure 2. This check would not require excess energy to come from specific sources or be shown in intervals prior to the storage being shown since those issues relate to dispatch, not capacity sufficiency.

Figure 2: Illustrative Compliance Showing with Multi-Cycle Sufficiency Verification




| Storage RTE | Storage Shown (MWh) | Excess Energy Shown (MWh) | Energy Needed for One Cycle (MWh) | One-cycle Check | Energy Needed for Two Cycles (MWh) | Two-cycle Check |
|---|---|---|---|---|---|---|
| 80% | 22,440 | 214,351 | 28,050 | PASS | 56,100 | PASS |

## IV. Hybrid and co-located resource counting requires some clarification, but they appear to fit well with the 24-hourly slice framework against gross load requirements.

To date, there has been little clarity on how to count hybrid and co-located resources. Parties have discussed the potential to use the same counting method for both these types of resources. Currently, hybrid and co-located resources may merit separate methodologies due to the way in which they are designed, metered, and operationalized by the CAISO. For hybrid resources, we consider that exceedance-based approaches should be preferred over ELCC approaches as they better account for an asset's output at specific slices or hours. For co-located resources, separate counting may be desirable given the fact that the CAISO will operate the underlaying resources as separate assets. Regardless of the approach or the specific exceedance level, it is important that load requirements be set using gross load instead of net load. In doing so, existing contracts retain their RA value, and it incentivizes hybrid and co-located resources to be designed and developed in a way that co-optimizes for RA capacity as well as other revenue streams and policy drivers. In addition, it provides greater certainty of the capacity value of hybrid and co-located resources when any excess energy and charging requirements, if established, are within the developer's control of the resource, rather than it being required of the LSE to ensure sufficient excess energy in its portfolio, or trading for sufficient excess energy.

## V. The RA SOD framework must include a mechanism to show resources with operational timeframes that exceed 24 hours.

The SOD framework rests on the critical assumption that the interactions between demand and supply can be simplified to a 24-hour timeframe with significant certainty. While this approach might be adequate for a grid largely reliant on conventional fossil-fueled assets, CESA and other parties have expressed concerns regarding the durability of this methodology considering the potential for multi-day reliability events triggered by low solar conditions, drought, or other outlier events.

In a system that relies heavily on variable energy resources ("VERs") and energy-limited assets, the interactions between weather, load, and supply are more impactful for reliability purposes. According to the Commission's IRP proceeding's modeling, the 2021 Senate Bill ("SB") 100 Joint Agency Report ("2021 SB 100 JAR"), and Strategen's *Long Duration Energy Storage for California's Clean, Reliable Grid*, California will require between 140-200 GW of incremental installed capacity to meet its 2045 emissions targets. Crucially, given California's outstanding solar resources and rapidly declining technology costs, the large majority of these capacity will come from solar PV and storage assets: between 70-100 GW of solar PV generation and 40-60 GW of energy storage by 2045. As a result, California's electric grid will largely depend on daily energy arbitrage to meet evening demand, particularly in the net load peak period when the sun has set yet load remains substantial.

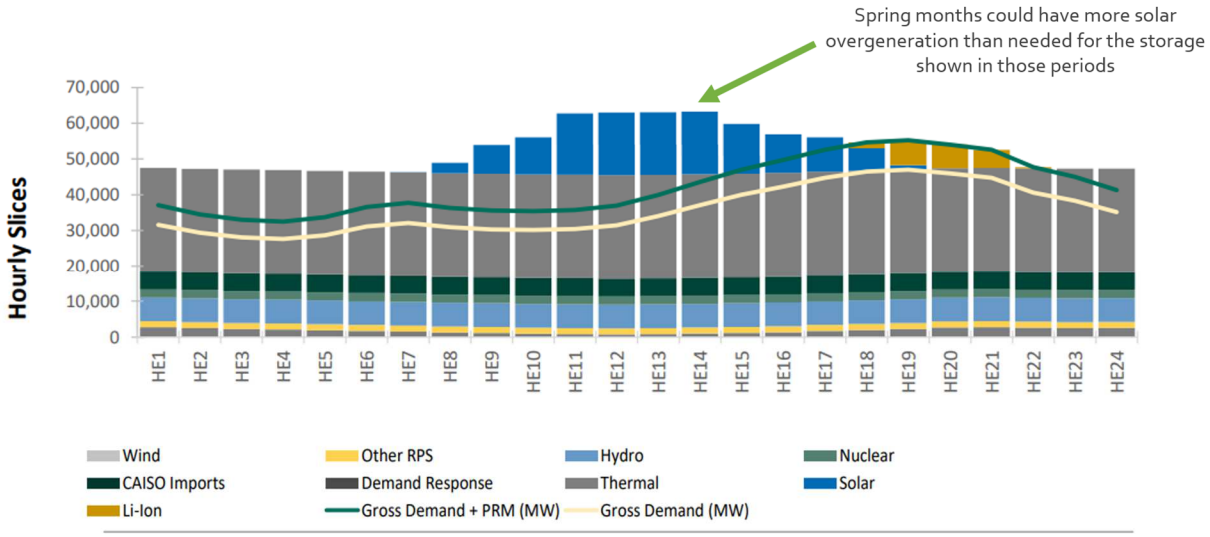
While the daily reliability needs could be easily addressed by refining the SOD framework, the same cannot be said about multi-day interactions. CESA has noted that the currently proposed 24-hour compliance framework might overlook multi-day reliability needs. Moreover, this 24-hour framework is not well-equipped to recognize the value provided by resources with

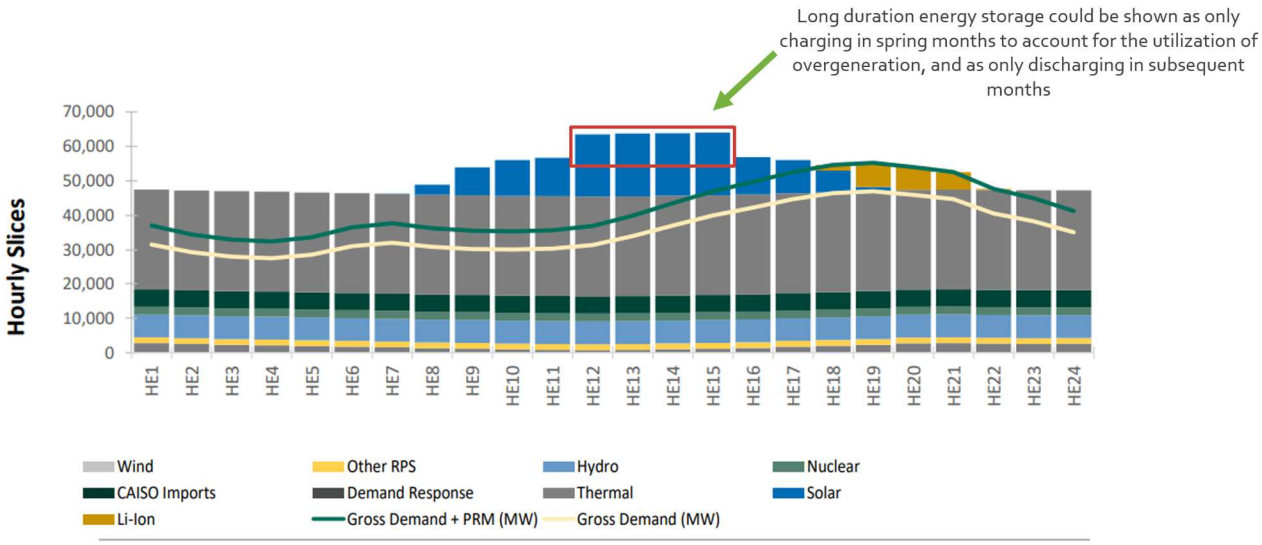
operational timeframes that extend beyond a single day, such as some long duration energy storage ("LDES") technologies, which may focus on weekly or even seasonal arbitrage.

However, at this time, the potential for outlier conditions that may induce multi-day reliability events may be better addressed through sensitivity modeling in the IRP proceeding. This is because the IRP is the venue in which the Commission is able to send long-term investment signals to LSEs given costs and policy targets. While the potential for these events can be modeled for in IRP, the RA SOD framework will still require a means to represent LDES assets with operational timeframes that exceed 24 hours and have a means to count their attributes for RA compliance purposes. To this end, CESA staff recommends the consideration of a "seasonal charge scheme."

The seasonal charge scheme is a mechanism that would allow LSEs to take excess spring-month overgeneration to provide charging sufficiency for storage assets shown in summer or winter months. This approach recognizes that there may be particular value in taking shoulder-month solar overgeneration to not serve spring month loads but to serve summer and winter loads. This solution would allow for carryover excess energy to be used in future seasons (showings) for storage charging. In essence, this would not set a "use it or lose it" approach for excess generation and allow for "banking" of these RA attributes across different showing periods. This way, the charging of LDES can be represented and accounted for as presented during the December 17, 2021 workshop and illustrated in Figure 3 below.

Figure 3: Illustrative Compliance Showing with Seasonal Charge Scheme






## VI. Transactability of load requirements should be further explored.

CESA supports further consideration of transactability elements in the RA SOD framework. Parties have noted the potential to allow LSEs to trade requirements (*i.e.*, fractions of load by slice) among each other in order to enhance resource utilization without unbundling resource characteristics or running afoul the MOO provisions. Allowing requirement trading would allow an LSE that is short on one or two slices to trade that obligation to another LSE that may be long in those hours. There was some debate about the benefits of resource and load diversity as being lost by having an LSE meet its own specific load profile, but these concerns can be addressed by adding transactability to load requirements, thus addressing "leaning" issues that was the basis for establishing Maximum Cumulative Capacity ("MCC") buckets in the first place and having resources more appropriately count and be procured in a way to meet LSE needs and obligations. This way, resources can be fully utilized in a manner consistent with load diversity and without raising questions regarding which LSE holds what RA attributes. If this is paired with a 24-hourly framework the potential for compliance efficiencies is significant.

## VII. Alignment of SOD with demand response and BTM energy storage capacity valuation methodologies are needed.

CESA limits our informal comments on the resource counting questions for demand response and BTM energy storage exports since these proposals are currently being developed within separate working groups. We encourage the Commission and stakeholders to keep these additional resource classes in mind as these other working groups proceed and develop proposals.

It would be illogical to create non-compatible resource counting methodologies as broader SOD reforms are being developed and implemented.

## VIII. Conclusion.

CESA appreciates the opportunity to provide these informal comments on the workshops. We look forward to collaborating with the parties to this proceeding.

Respectfully submitted,

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