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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Oversee the Resource Adequacy Program, Consider Program Refinements, and Establish Forward Resource Adequacy Procurement Obligations.	Rulemaking 19-11-009 (Filed November 7, 2019)

RESOURCE ADEQUACY TRACK 2 PROPOSALS OF THE CALIFORNIA ENERGY STORAGE ALLIANCE

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RESOURCE ADEQUACY TRACK 2 PROPOSALS OF THE CALIFORNIA ENERGY STORAGE ALLIANCE

In accordance with the Rules of Practice and Procedure of the California Public Utilities Commission ("Commission"), the California Energy Storage Alliance ("CESA") hereby submits these *Resource Adequacy Track 2 Proposals* pursuant to the *Assigned Commissioner's Scoping Memo and Ruling* issued by Commissioner Liane M. Randolph on January 22, 2020.

I. INTRODUCTION.

California's grid is in transition. The state's ambitious decarbonization goals have spurred the proliferation of variable energy resources ("VERs") and an increased reliance on energy- and use-limited resources, creating both challenges and opportunities that require innovative policymaking. As California moves toward a decarbonized electric sector, CESA considers it fundamental to, at the same time, ensure the state has enough capacity to provide clean, reliable and cost-effective power. However, in balancing the pursuit of both reliability and decarbonization, CESA believes that the Resource Adequacy ("RA") program needs to evolve such that stark trade-offs between these dual goals are not established but instead to have reliability be ensured through the use of the very resources that also support the state's decarbonization goals. With these challenges in mind, CESA appreciates the opportunity to collaborate with the

Commission and other stakeholders to propose refinements and modifications for the RA program. Considering this, CESA focuses on the following proposals for Track 2 issues, as defined by the Commission:

- **The Commission should adopt a comprehensive framework to value the capacity of hybrid resources that properly reflect their configurations, incentives, capabilities, and market participation approaches:** CESA considers that any permanent qualifying capacity ("QC") methodology for hybrid resources must take into account: (1) the market participation pathway of the hybrid resource (generator versus non-generating resource ["NGR"] models); (2) the storage-to-generation ratio; (3) Investment Tax Credit ("ITC") charging incentives; and (4) the inverter size at the point of interconnection ("POI"). As such, CESA proposes distinct methodologies for assets operated under: (a) the generator model and the NGR model that intend to claim full ITC incentives; (b) the NGR model with a low storage-to-generation ratio; and (c) the NGR model with a high storage-to-generation ratio and intent to claim partial ITC incentives. For some of these scenarios, CESA proposes the creation of derating formulae and the application of an additive approach for the resulting underlying capacity values.

- **The Commission should not adopt a framework based on effective load carrying capacity ("ELCC") for standalone storage resources at this time:** CESA considers the modification of standalone storage QC rules might prove financially disruptive and materially inconsequential at this time. If the Commission decides to explore an ELCC methodology in the future, CESA urges the Commission to set clear vintaging rules in place, evaluate ELCC for different energy storage durations, and perform ELCC analysis under a wide selection of renewable energy penetrations.

- **The Commission should defer modifications to the maximum cumulative capacity ("MCC") buckets to Track 3 of the current RA proceeding:** CESA recommends the Commission delays the discussion regarding MCC bucket modifications to Track 3 of this proceeding, as any modifications on this construct might become redundant or unnecessary considering the Commission's intention to reevaluate the RA program as a whole, especially in regards to energy needs. Furthermore, CESA believes that the application of the Commission's proposal on this subject could hinder California's efforts to transition towards a decarbonized energy sector.

- **The Commission should prioritize transparency and efficiency in the processes required to determine the QC of demand response ("DR") resources:** CESA supports the application of the Demand Response Auction Mechanism ("DRAM") paradigm for all third-party-provided DR. CESA considers this approach would ensure the proper accounting of the reliability provided by DR assets.

II. THE COMMISSION SHOULD ADOPT A COMPREHENSIVE FRAMEWORK TO VALUE THE CAPACITY OF HYBRID RESOURCES THAT PROPERLY REFLECT THEIR CONFIGURATIONS, INCENTIVES, CAPABILITIES, AND MARKET PARTICIPATION APPROACHES.

CESA commends the Commission for including the capacity counting rules for hybrid resources within the scope of issues to be considered in Track 2 of this proceeding. CESA has been an active stakeholder in this issue. On September 27, 2019, CESA, along with Engie Storage, Enel X, Tesla Inc., Sunrun Inc., the Center for Energy Efficiency and Renewable Technologies ("CEERT"), and Vote Solar (together, the "Joint Parties") filed a motion urging the Commission to adopt an interim capacity counting methodology for hybrid resources, both for in-front-of-the-meter ("IFOM") and behind-the-meter ("BTM") assets, in order to expedite the planning and contracting of the 3,300 MW procurement authorized in the IRP 2021-2023 Reliability Procurement Decision, Decision ("D.") 19-11-016. Since then, the Commission has decided on an interim capacity counting methodology for hybrid resources based on the "greater-of" approach.[1] CESA has expressed concerns regarding this methodology, pointing out it does not capture firming benefits associated with hybridization and it systematically undervalues the capacity contributions of hybrid assets. Due to CESA's perceived deficiencies of this methodology, CESA volunteered to co-chair the Hybrid QC Working Group ("WG") alongside San Diego Gas and Electric Company ("SDG&E").

CESA has previously advocated for the use of an additive approach to establish the QC of hybrid resources; nevertheless, CESA acknowledges that any capacity-counting construct for

[1] D.20-01-004 at 9.

hybrid resources must consider a series of economic, operational and physical characteristics; namely:

1. The number of resource IDs associated with the hybrid resource.
2. The market participation pathway of the hybrid resource.
3. The relative sizing of each of the hybrid's components.
4. The use of Investment Tax Credit (ITC) incentives.
5. The inverter size at the point of interconnection (POI).

In this proposal, CESA suggests alignment of definitions from the Commission and the California Independent System Operator ("CAISO") and the use of a flowchart model to determine the applicable QC methodology for a series of possible hybrid resource configurations. A more detailed and comprehensive overview of this proposal can be found in Attachment A of this filing.

In order to create a viable framework for the establishment of capacity values for hybrid resources, CESA believes that certainty and consistency in definitions is essential. Currently, California has two sets of inconsistent definitions for hybrid resources. In D.20-01-004, the Commission established that hybrid resources are "a generating resource co-located with a storage project and with a single point of interconnection".[2] In contrast, the CAISO, in its Hybrid Resources Initiative, has established a clear distinction between hybrid resources as a collection of generating and storage assets operating with a single point of interconnection ("POI") and under a single resource ID, while establishing co-located resources as those that operate under multiple resource IDs.[3] CESA considers that, in a moment where the state is just creating the rules related

[2] D.20-01-004 at Ordering Paragraph ("OP") 2.

[3] See CAISO Hybrid Resources Revised Straw Proposal at 8-9. http://www.caiso.com/InitiativeDocuments/RevisedStrawProposal-HybridResources.pdf

to hybrid resources, we have a rare opportunity to align all definitions and processes used by the Commission and CAISO, effectively minimizing future uncertainties and risks.

CESA recommends the CAISO definition as it better reflects the various configurations and market participation approaches of different hybrid resources. In other words, a hybrid resource should be defined as a resource type comprised of a mixed-fuel type project (*e.g.* solar generation and energy storage), or a combination of multiple different generation technologies that are physically and electronically controlled by a single owner/operator and Scheduling Coordinator behind a single POI that participates in the CAISO markets as a single resource with a single market resource ID. CESA believes this definition most closely reflects the actual operational differences hybrid and co-located resources would face in the CAISO market, as resources under a single resource ID have different bidding and dispatch requirements from those of resources operating under multiple resource IDs with separate bidding and dispatch requirements, even as the two component resources operate in tandem at times due to ITC incentives.

Given this definition of hybrid resources, CESA proposes the establishment of a framework that integrates the aforementioned variables in a coherent manner. CESA bases its proposal based on the following considerations:

- **Market participation pathway:** The selection a hybrid asset makes of participating as a generator or an NGR in the CAISO determines the interactions this resource can have with grid; namely, resources that seek to charge at any level from the grid are required to participate under the NGR scheme. CESA believes this initial choice is essential when considering a capacity counting framework. By contrast, resources modeled as generators have different operational opportunities than those considered NGRs, including not being able to charge from the grid (*i.e.*, charging solely from the paired generation resource) and being subject to self-forecasting requirements. As such, it follows that the capacity counting methodologies for generators should reflect said differences.

- **Relative sizing:** The ability of on-site generation to fully charge the paired storage facility is largely dependent on the relative sizing of each of those components. The relationship between these two components can be expressed in the form of a storage-to-generation ratio. Based on data presented by the Solar Energy Industries Association ("SEIA") and the Large-Scale Solar Association ("LSA") during the February 12, 2020 Hybrid QC Working Group meeting, CESA considers that resources with ratios below 0.75 can be reasonably assured of a full storage charge to enable the full RA delivery of each component, whereas those with higher ratios, some consideration may be needed to capture the potential for the storage resource to be insufficiently charged to meet the full RA obligations.

- **Use of ITC incentives:** CESA would like to clearly state that it does not consider ITC-related charging to be a physical restriction of any kind, unless relays or controllers are specifically configured and programmed; instead, it is merely a financial incentive which, during operation, balances ITC capture with RA revenues and penalties. Nevertheless, CESA understands that these incentives could have an effect on capacity, especially for hybrid resources with storage-to-generator ratios above 0.75. Hence, in the spirit of creating a holistic construct that incorporates all factors relevant to a hybrid resource's capacity, CESA considers the degree of ITC capture should be included in the QC methodology, at least for some of all possible configurations.

- **Inverter size at the POI:** The size of the inverter at the POI effectively limits the output a hybrid resource can provide to the grid. Consequently, CESA proposes that all hybrid QC values are capped at the size of the inverter at the POI.

Considering the effects of all these factors have on the expected capacity provided by hybrid resources, CESA believes it would be beneficial to establish a framework that is able to capture all these interactions while providing certainty and efficacy in the determination of QC values. This framework is presented in the form a flowchart model in Figure 1 of Attachment A. As it can be appreciated, CESA's proposed framework gives rise to three distinct QC counting methodologies depending on a series of operational characteristics and economic decisions. The proposed methodologies shall apply as follows:

A. **De-rated ELCC plus storage NQC capped at the POI:** CESA considers this methodology should be applicable for hybrid resources that: (1) participate as a generator; or (2) participate as an NGR with a storage to generation ratio above 0.75 and intend to capture 100% of ITC incentives. In CESA's view, the main condition to have this methodology apply is the hybrid resource's complete dependence on the energy available on-site. CESA believes this methodology could

be based on the proposal shared by SCE on the February 12, 2020 Hybrid QC Working Group meeting, which recommended an additive approach with a de-rated ELCC in order to account for the tradeoffs perceived by the grid in terms of the generator's output. SCE proposed the following formula: *Hybrid QC = Effective Storage QC + Effective Solar QC* by month.[4] Depending on the sizing ratio, CESA believes that a de-rated ELCC alone would best capture this use case.

B. **Additive approach capped at the POI:** CESA considers this methodology should be applicable for hybrid resources that: (1) participate as an NGR and have ratios below 0.75; or (2) participate as an NGR and have ratios above 0.75 but do not intend to claim ITC incentives. From CESA's perspective, the main condition to have this methodology apply is the hybrid resource's ability to maintain the storage component fully charged, either by the use of oversized on-site generation or by charging from the grid at any level. CESA believes the data presented by SEIA/LSA offers empirical justification for the application of an additive methodology for resources with ratios below 0.75 as a reasonable approximation of capacity value.[5]

C. **De-rated storage NQC plus ELCC capped at the POI:** CESA considers this methodology should be applicable for hybrid resources that participate as an NGR, have ratios above 0.75, and intend to claim less than 100% of ITC incentives. CESA considers that this methodology should capture the expected level of on-site charging in order to accurately de-rate the capacity provided by storage resource. CESA proposes the following formula calculate a de-rated storage NQC, referred to herein as *NQCd*: $NQCd_i = NQC(CR * X_i) + NQC(1 - CR)$. In this formula, *CR* refers to the expected charging requirement,[6] *X* refers to a de-rating factor, and *i* refers to the specific month in question. CESA proposes that *X* be calculated based on the area under the curve representing solar generation minus the ELCC of each month; however, CESA is also open to consider other methodologies to calculate *X*.

In addition to this framework, CESA recommends parties consider the need to determine clear must-offer obligations ("MOOs") for hybrid resources. For the Day-Ahead ("DA") market, CAISO has proposed two options: (1) the storage-driven approach; and (2) the VER-driven

[4] In the formula above, the effective storage QC is defined as the minimum of either (1) the energy production from the renewable resource until two hours before the net peak load assuming charging is done at a rate less than or equal to the storage's capacity over four hours, or (2) the NQC of the storage component. Similarly, the effective solar QC is defined as the remaining solar capacity after charging the storage component, multiplied by each month's ELCC factor.

[5] See SEIA/LSA Presentation at 12.

[6] The CR could be simplified to be approximated to the closest 5% value – *e.g.*, 0.75, 0.80, 0.85, etc.

approach. The former would apply a DA MOO equal to the storage's QC value (or shown MW of RA if only partially shown for RA), while the latter would not have a DA MOO, similar to how VERs currently participate in the CAISO markets. CESA considers that CAISO's proposed alternatives capture rather well two different use-cases for hybrid resources – *i.e.*, the desire to firm output versus the desire to shift renewable output to more valuable times. Thus, CESA believes CAISO's alternatives could be considered and adapted depending on the ratio of storage-to-generation, since the behavior of a hybrid asset with a very low ratio (*e.g.* less than 0.25) would be closer to that of a VER while a hybrid with higher ratios (*e.g.* greater than 0.25) would be closer to that of a dispatchable generator. Hence, with this proposal, hybrids that have deployed storage mainly for firming benefits could continue to have MOO requirements closer to those of VERs, while those opting to shift energy must comply with the requirements set forth for dispatchable generation. The MOOs for hybrid resources require some further thinking and discussion in the working groups, which may be better addressed in the Final Working Group Reports, currently due on March 2, 2020.

Furthermore, CESA notes that ITC incentives are applicable for only five years of operation. Thus, CESA proposes that after five years of operation, all hybrid assets with a QC value established by Methodology C above are to be redirected based on the other variables to Methodologies A or B, as to mitigate the risks of undervaluation.

Finally, CESA recommends that the Commission establish a comprehensive framework that extends the QC methodology of hybrid resources not only to IFOM resources but also the BTM resources. In the past, the Commission and stakeholders have deferred this issue due to concerns about the range of issues that must be resolved prior to establishing a QC methodology for BTM hybrid resources. Some of these aforementioned issues include planning incrementality

(*e.g.*, load forecasting of hybrid resource deployment and operations), compensation-related incrementality (*e.g.*, regarding Net Energy Metering ["NEM"] participation), market participation models (*e.g.*, wholesale-retail billing and settlement issues), and deliverability/interconnection (*e.g.*, Rule 21 versus Wholesale Distribution Access Tariff ["WDAT"]). These issues are valid issues that must be discussed and addressed. However, notwithstanding the resolution of those issues, the QC methodology for IFOM hybrid resources should still apply to BTM hybrid resources given the similarity in technology, operations, and configurations. The only difference is that the QC methodology may need to consider issues unique to BTM resources. For example, the QC methodology may need to accommodate aggregated impacts of BTM hybrid resources if participating in the wholesale market. These are all factors that should be considered for QC values for BTM hybrid resources, but a baseline is needed where the Commission establishes a QC value for such resources, for which there is currently none.

III. THE COMMISSION SHOULD NOT ADOPT A FRAMEWORK BASED ON ELCC FOR STANDALONE STORAGE RESOURCES AT THIS TIME.

During the February 13, 2020 ELCC Working Group meeting, Calpine presented a proposal to modify the QC counting scheme of standalone energy storage assets, wherein the Commission would shift from an NQC-based model (*i.e.* the "four-hour rule") to an ELCC approach. Calpine's arguments were largely grounded on the premise that the peaking capacity of standalone storage is largely dependent on the penetration of storage as a function of peak load.[7] CESA proposes that the Commission does not take such action at this time, since: (1) it is not methodologically appropriate; and (2) it would have a minimal effect on the capacity value of currently deployed energy storage assets.

[7] See Calpine presentation, at 6.

While the need for storage assets with durations over four hours has been demonstrated in the Integrated Resource Planning ("IRP") scenarios constructed to evaluate capacity needs by 2045 and in the technical Local Capacity Requirement ("LCR") studies by the CAISO, CESA believes that the application of an ELCC methodology for the determination of the capacity value of energy storage resources is neither appropriate nor warranted at this time. Firstly, ELCC is a measure of coincidence between supply and demand of electricity. ELCC is a method that has been employed by the state when attributing capacity values for intermittent generators as required by statute. This application is appropriate since VERs are unable to produce electricity at any given point, let alone dispatch it. Nevertheless, this is not true for storage assets. Energy storage is dispatchable and it relies on economic signals and opportunities to optimize the periods in which it would take energy from or inject energy into the electric grid. Hence, CESA considers that the application of an ELCC methodology would not be appropriate, as it is not reflective of the dispatch capabilities of energy storage assets.

Furthermore, the application of such a methodology is not warranted at this time. As Calpine stated in their proposal, the capacity contribution energy storage under an ELCC framework is largely dependent on the systemwide portfolio of resources. In a 2019 study, National Renewable Energy Laboratory ("NREL") points out that the peaking capacity of storage assets is primarily influenced by the penetration of storage technologies and the penetration of wind and solar generation.[8] NREL's analysis concludes that, for California, a system with 35% PV penetration and 0% wind penetration could have up to 8 GW of 100% NQC four-hour storage.[9] Considering that battery energy storage currently represents around 150 MW of all assets fully

[8] See NREL, *The Potential for Battery Energy Storage to Provide Peaking Capacity in the United States*, available at https://www.nrel.gov/docs/fy19osti/74184.pdf

[9] *Ibid*, at 20.

integrated to the CAISO system, CESA believes this issue is not an urgent matter and it can be explored further in future RA proceedings.[10]

IV. THE COMMISSION SHOULD DEFER THE DISCUSSION ON MCC BUCKETS TO TRACK 3 OF THE CURRENT RA PROCEEDING.

On February 7, 2020, a Ruling was issued that attached a Staff Proposal on potential modifications as well as staff-recommended modifications to the MCC buckets. While acknowledging that this issue was scoped into Track 2 of this proceeding, we believe these modifications are closely linked with potential revisions to the RA construct that will be considered in Track 3 of this docket, where the Commission has scoped in the issue of the need for and application of energy attributes and hourly capacity requirements in the RA program. Since both these issues are related to the risks MCC buckets seek to mitigate, CESA recommends that the Staff Proposal be evaluated in the same forum as other party proposals in Track 3. Thus, in the spirit of efficacy and reform cohesiveness, CESA urges the Commission to table this proposal and integrate it to the scope of Track 3 of R.19-11-009. Based on what is proposed and potentially adopted in Track 3, the Commission may soon find that the MCC framework is obsolete.

CESA observes that the modifications proposed by the Commission staff may tie California to a future that is largely dependent on fossil-fueled capacity, an outcome that would run afoul to the state's energy and environmental goals set forth in Senate Bill ("SB") 100, as well as other legislative acts. Namely, in their proposal, Commission staff recommend the adoption of Option 4b, an alternative that would require LSEs to fulfill at least 56.1% of their RA requirements

[10] Even as the Commission considers capacity counting approaches for storage to value longer durations, it may be preferable and more appropriate to pursue modified QC methodologies as opposed to ELCC-based approaches for various reasons. CESA generally agrees with the benefit of establishing methodologies that value different durations of storage (*i.e.*, beyond 4 hours), but before even considering the application of ELCC methodologies, it will be important to establish vintaging rules to provide certainty and fairness in the process.

with Category 4 resources that are able to run 24 hours per day.[11] CESA is concerned that this modification would increase the reliance on fossil-fueled resources, especially at a time when the state has launched an ambitious and interconnected set of electrification and decarbonization targets. CESA believes this proposal would hinder the state's climate goals rather than creating the conditions necessary to ensure a successful transition to a more sustainable grid. As shown in the IRP proposed Reference System Plan, the future of California's resource mix will likely involve significant amounts of intermittent and energy-limited resources, such as solar and storage resources. Instead of forcing these tradeoffs between long-term decarbonization and reliability, CESA believes that the RA program must evolve to enable the use of the very resources that support decarbonization to also be aligned with reliability requirements. With storage resources, such vision could be achieved as a portfolio of energy storage resources are dispatchable and can be charged and discharged to align with reliability needs given the right obligations, price signals, and incentives. The MCC framework does not appear to promote such innovation in the RA program.

Additionally, CESA has concerns with the characterization and limitations placed on DR resources, which represent responsive "generation" in the form of "negawatts" or load reduction that offsets the need for generation at certain time periods, contrary to staff's characterization of DR as not providing generation and thus not supporting reliability. The past performance of DR resources should not be used to limit the portion of DR in RA portfolios, considering the importance of DR as a preferred resource, but instead be the basis for modifying the performance requirements of DR resources in DR programs or other mechanisms such as the DRAM.

[11] See MCC Proposal, at 8 through 9.

CESA has a number of questions as well to the Staff Proposal that should be considered in Track 3 of this proceeding, including, but not limited to, the following:

- Are there alternative approaches to incentivize reliability performance from various energy- or use-limited resources to ensure reliability?
- Is it necessary to establish a requirement that Category 1, 2, and 3 resources must operate in consecutive hours given the potential for energy-limited resources to be aggregated into a portfolio to address certain longer-duration needs and/or the reliability benefits of providing capacity in, for example, 8 non-consecutive hours?
- How can MCC buckets or alternative approaches be adapted to incentivize resources that provide multiple uses or services (*e.g.*, deferral and RA)?

V. THE COMMISSION SHOULD PRIORITIZE TRANSPARENCY AND EFFICIENCY IN THE PROCESSES REQUIRED TO DETERMINE THE QC OF DR RESOURCES.

CESA is supportive of the modification of current RA provisions and requirements for third-party DR resources. CESA believes that increased transparency, optionality, and flexibility is necessary to foster the timely deployment and effective operation of behind-the-meter ("BTM") resources. For these purposes, CESA believes the framework used in the DRAM program is a good starting point. Currently, per D.19-06-026, the QC value of third-party DR resources is determined by the application of load impact protocols ("LIPs"). LIPs have been historically used to assess the capacity provided by utility-run DR programs; nevertheless, this paradigm is complex to apply to the dynamic market and composition of third-party DR assets. Perhaps the most relevant barrier to this application is the lack of historical data that would verify the responsiveness of a DR resource, an issue faced by both consolidated providers and startups as customers and technologies in a third-party portfolio or aggregation can change and evolve over time. Furthermore, it is unclear whether and how LIPs could be applied to storage-backed DR, where sub-metering approaches are available to directly measure performance, as opposed to using

regression-type analysis through LIPs. Given the limitations and concerns of LIPs for the determination of third-party DR QC, CESA supports the use of more direct-measured QC methods, such as the dispatch and testing requirements of the DRAM.

VII. CONCLUSION.

CESA appreciates the opportunity to submit these proposals to the OIR and looks forward to working with the Commission and stakeholders in this proceeding.

Respectfully submitted,

Alex J. Morris
Executive Director
CALIFORNIA ENERGY STORAGE ALLIANCE

Date: February 21, 2020

ATTACHMENT A

CESA's Hybrid Resource QC Methodology Proposal

Introduction

In this proposal, CESA outlines a holistic framework to evaluate the capacity value of hybrid resources. CESA's experience with the storage and renewable generation industries; as well as the participation and engagement all stakeholders in the Hybrid Qualifying Capacity (QC) Working Group (WG), were fundamental in the development of the framework suggested in this document. CESA has favored the use of an additive approach to establish the QC of hybrid resources; nevertheless, CESA acknowledges that any capacity-counting construct for hybrid resources must consider a series of economic, operational and physical characteristics:

1. The number of resource IDs associated with the hybrid resource.
2. The market participation pathway of the hybrid resource.
3. The relative sizing of each of the hybrid's components.
4. The use of Investment Tax Credit (ITC) incentives.
5. The inverter size at the point of interconnection (POI).

In this document, CESA presents an overview of how each of these factors should be considered when establishing a capacity counting methodology for hybrid resources. First, CESA establishes the definition of hybrid resources for the purposes of this proposal. Subsequently, CESA describes the impact each of the aforementioned variables could have on the capacity value of hybrid resources. Later on, CESA presents and explains a flowchart model that integrates the impact of different factors and attributes a capacity counting methodology for a series of hybrid configurations. Finally, CESA presents a set of additional reforms stakeholders should consider in order to guarantee the successful and efficient deployment and participation of hybrid resources.

Definition of hybrid resources

In order to create a viable framework for the establishment of capacity values for hybrid resources, CESA believes that certainty and consistency in definitions is essential. Currently, California has two sets of inconsistent definitions for hybrid resources. In Decision (D.) 20-01-004, the Commission established that hybrid resources are "a generating resource co-located with

a storage project and with a single point of interconnection".[12] In contrast, the California Independent System Operator (CAISO), in its Hybrid Resources Initiative, has established a clear distinction between hybrid resources, a collection of generating and storage assets operating with a single POI and under a single resource ID, and co-located resources, those that operate under multiple resource IDs.[13]

CESA considers that, in a moment where the State is just creating the rules related to hybrid resources, we have a rare opportunity to align all definitions and processes used by the Commission and CAISO; effectively minimizing future uncertainties and risks. CAISO has argued that the difference between hybrid and co-located resources in their definitions are warranted since resources with one or multiple resource IDs participate differently in CAISO markets. CESA agrees with the CAISO's intent. Resources operated under a single resource ID would have a sole set of must offer obligations (MOOs) and other bidding requirements; on the other hand, co-located resources participating under multiple resource IDs would be visible as standalone resources from the CAISO's perspective, hence receiving individual bidding and dispatch obligations.

Thus, in this proposal, CESA follows CAISO and defines a hybrid resource as a resource type comprised of a mixed-fuel type project (*e.g.* solar PV generation and battery storage), or a combination of multiple different generation technologies that are physically and electronically controlled by a single owner/operator and Scheduling Coordinator behind a single POI that participates in the CAISO markets as a single resource with a single market resource ID. CESA encourages all stakeholders in this WG to consider this definition as it most closely reflects the actual operational differences hybrid and co-located resources would face in the CAISO market.

Factors related to hybrid capacity

I. Market participation pathways

The first factor that may determine the operational conditions a hybrid resource would face in the CAISO markets relates to the selection of a market participation pathway. According to CAISO, a hybrid resource can participate in the CAISO markets in two ways: as a generator, and

[12] D.20-01-004, Ordering Paragraph 2.

[13] See CAISO Hybrid Resources Revised Straw Proposal at 8-9. http://www.caiso.com/InitiativeDocuments/RevisedStrawProposal-HybridResources.pdf

as a non-generating resource (NGR). This selection is reflected in CAISO's Master File, and it determines the interactions resources can have with grid. The selection of any of these pathways is related to the expected charging behavior of the on-site storage component. This relationship is defined as follows:

- If on-site storage only charges from on-site generation, the hybrid can be either a generator or an NGR.
- If on-site storage only charges from the grid, the hybrid can only participate as an NGR.
- If on-site storage charges both from on-site generation and the grid, the hybrid can only participate as an NGR.

As it can be seen, resources that seek to charge at any level from the grid are required to participate under the NGR scheme. This is because only NGR resources are able to bid for negative power; that is, bid in order to charge. Resources modeled as generators cannot bid to charge and are thus completely limited to use the energy available on-site, behind the POI. Considering the Commission's concern about the dependence hybrid resources can have on on-site energy, CESA believes this initial choice is essential when considering a capacity counting framework. Since resources modeled as generators have different operational opportunities than those considered NGRs, it follows that their capacity counting methodologies should reflect said differences.

II. Relative sizing

The ability of on-site generation to maintain on-site storage fully charged is largely dependent on the relative sizing of each of those components. The relationship between these two components can be expressed in the form of a storage-to-generation ratio, where, for example, a hybrid with 100 MW of solar PV and 50 MW of four-hour battery storage would have a ratio of 0.5. CESA considers it is reasonable to assume there is an inverse relationship between the storage-to-generation ratio and the on-site generation's likelihood to fully charge on-site storage. Thus, as it has been pointed out by other stakeholders such as Southern California Edison (SCE) since the previous RA proceeding, a potential de-rate of the cumulative capacity of one or all components of a hybrid resource would be warranted for resources with higher ratios. CESA included this distinction in the proposal presented in the Hybrid QC Working Group meeting, recommending further analysis to determine a cut-off ratio where de-rating would be in order.

Incidentally, during the February 12, 2020 Hybrid QC Working Group meeting, the Solar Energy Industries Association (SEIA) and the Large-Scale Solar Association (LSA) presented data that corroborated this assumption and provided a viable framework. According to the analysis shared by SEIA and LSA, for resources with ratios below 0.75, on-site solar generation is able to maintain a state of charge above 80% for all months of the year, reaching 100% for the months of May through September.[14] It is worth noting that this analysis assumed the components would be AC coupled, a configuration that would not maximize the amount of clipped energy captured by the storage system. This means that both the data and the conclusions we can draw from it would be conservative in nature.

Considering the empirical proof provided by SEIA and LSA, CESA considers that resources with ratios below 0.75 should be treated differently than those with higher ratios. For the purposes of establishing a QC value for hybrid resources, CESA believes this could be a viable cutoff point, as it would minimize the risk of hybrid resources not being able to provide the addition of their capacity values due to the lack of on-site energy.

III. Storage duration

The duration of the storage component impacts the ability to deliver capacity over longer periods of time. At the September 6, 2019 workshop, CESA presented some preliminary and directional ELCC study findings around how, unsurprisingly, four-hour duration storage pairings provided higher capacity value than two-hour storage pairings. However, no modifications are needed to reflect the impact of storage duration on capacity value if relying on the QC value of storage based on the "four-hour rule" that attributes full capacity value to four-hour duration resources and de-rates the storage capacity accordingly for shorter durations. In leveraging the QC methodology for storage under a modified additive approach, such differences in capacity value based on storage duration are reflected. In the future, as the Commission considers capacity methodologies for longer-duration storage, the continued use of the QC methodology for storage for hybrid resources under a modified additive approach has the appeal of recognizing this additional load shifting capability, though some additional discussion may be needed to consider the rate of charge of the paired storage resource to determine RA delivery capabilities.

[14] See SEIA/LSA Presentation, at 12.

IV. The use of ITC incentives

Storage assets that charge from renewable generation for over 75% of the time can qualify for ITC incentives, with incentives established on a sliding scale from 75% to 100%. In D.20-01-004, the Commission explicitly mentioned ITC-related charging practices as an operational restriction faced by a number of hybrid resources. The Commission's decision to view the capture of ITC incentives as an operational restriction has shaped the conversation around hybrid QC and a number of parties have included this consideration in their proposals and comments. CESA would like to clearly state that it does not consider ITC-related charging to be a physical restriction of any kind, as this charging practice is not enforced during the operation of the asset; instead, it is analyzed and settled *ex post*. In other words, CESA views ITC-related decisions as a financial incentive which, during operation, are balanced against RA revenues and penalties. In this sense, operators are aware of and able to manage the risks and tradeoffs related to ITC incentives.

While CESA does not consider ITC incentives to be physical or operational limitations that need be reflected in the capacity counting methodology for hybrid resources, CESA understands that these incentives could have an effect on capacity, especially for hybrid resources with storage to generator ratios above 0.75. This is because those resources would have both a decreased likelihood of fully charging from on-site generation paired with an incentive to maximize the level of on-site charging, thereby potentially limiting the amount of capacity that could be provided by a hybrid operating under these premises. Hence, in the spirit of creating a holistic construct that incorporates all factors relevant to a hybrid resource's capacity, CESA considers the degree of ITC capture should be included, at least for some of all possible configurations.

V. Inverter size at the POI

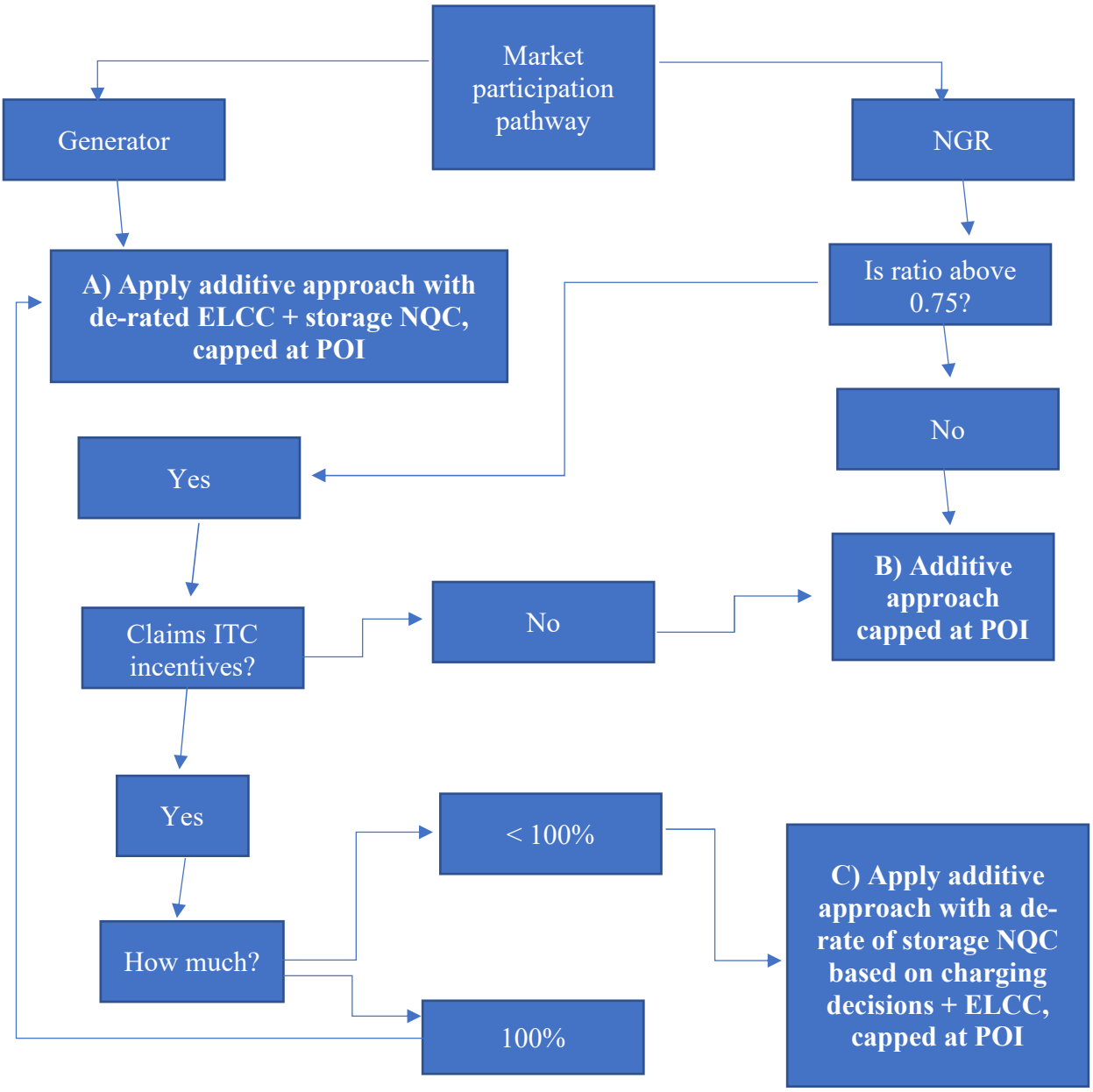
The final factor to consider when determining the capacity value of hybrid resources is the inverter size at the POI. This variable effectively limits the output a hybrid resource can provide to the grid. While CESA has been supportive of applying an additive approach for hybrids, it is evident that no resource can have a QC value above the size of the inverter at the POI, as it would be physically impossible to provide capacity beyond that level.

Consequently, CESA proposes that all hybrid QC values are capped at the size of the inverter at the POI. We believe this restriction is reasonable and necessary as it properly reflects the maximum output a hybrid resource can provide to the grid.

CESA's proposed framework

Considering all the aforementioned variables, CESA proposes a flowchart framework that seeks to provide certainty and efficacy for the determination of hybrid QC values.

Figure 1. CESA's proposed flowchart model



Since the February 12, 2020 RA Hybrid QC Working Group meeting CESA has revised its proposed framework by incorporating the proposals and information shared by Southern California Edison (SCE) and SEIA/LSA. In the following sections, CESA explains the rationale behind and the proposed application of QC methodologies A, B, and C, as defined in Figure 1.

A. *De-rated ELCC plus storage NQC capped at the POI*

CESA considers this methodology should be applicable for hybrid resources that: (1) participate as a generator; or (2) participate as an NGR with a storage to generation ratio above 0.75 and intend to capture 100% of ITC incentives. In CESA's view, the main condition to have this methodology apply is the hybrid resource's complete dependence on the energy available on-site. Since in both cases previously mentioned the storage component of the hybrid resource would be limited to charge exclusively from on-site generation, it is reasonable for to de-rate their capacity based on the difference between the total potential output of the on-site generator, and the output required to maintain a full charge. Since the renewable ELCC is determined based on 8,760 loss of load expectation (LOLE) study, storage charging from the paired renewable would reduce the energy available and attributable to the renewable generator at all times of the day – thus some derate to the renewable ELCC could apply. Meanwhile, the full storage QC value can still apply due to the ability to deliver stored capacity when needed.

This methodology could be based on the proposal shared by SCE on the February 12, 2020 Hybrid QC Working Group meeting. In essence, SCE's proposal focused on the determination of a capacity value for hybrid resources that charge exclusively from on-site generation. SCE proposed an additive approach with a de-rated ELCC in order to account for the tradeoffs perceived by the grid in terms of the generator's output. SCE proposed the following formula: *Hybrid QC = Effective Storage QC + Effective Solar QC by month*

In the formula above, the effective storage QC is defined as the minimum of either (1) the energy production from the renewable resource until 2 hours before the net peak loaf assuming charging is done at a rate less than or equal to the storage's capacity over four hours, or (2) the NQC of the storage component. Similarly, the effective solar QC is defined as the remaining solar capacity after charging the storage component, multiplied by each month's ELCC factor.

In sum, CESA considers this methodology as appropriate for the configurations discussed because:

- The hybrid resource is unable to charge from the grid.
- The tradeoff in output perceived by the grid is related to the generator's output, not the output of the storage component.
- It allows for a proper assessment of the level of capacity that could be provided by resources with ratios above 0.75.

B. *Additive approach capped at the POI*

CESA considers this methodology should be applicable for hybrid resources that: (1) participate as an NGR and have ratios below 0.75; or (2) participate as an NGR and have ratios above 0.75 but do not intend to claim ITC incentives, such as in cases when the hybrid resource has moved beyond the five-year ITC recapture period. From CESA's perspective, the main condition to have this methodology apply is the hybrid resource's ability to maintain the storage component fully charged, either by the use of oversized on-site generation or by charging from the grid at any level. As previously noted, this second condition can only be fulfilled if the hybrid resource is registered as NGR and has no ITC-related incentives.

CESA believes the data presented by SEIA/LSA offers empirical justification for the application of an additive methodology for resources with ratios below 0.75. As it can be seen in SEIA/LSA's presentation, resources with ratios below 0.75 consistently maintain states of charge (SOC) above 80% throughout the year. More importantly for grid reliability and the RA program, these resources achieve 100% SOC during the summer months, which are the most concerning in terms of peak load.[15]

It is worth noting that CESA believes this approach, as all others discussed in this proposal, shall be capped at the size of the inverter in the POI. This will provide certainty regarding the maximum output a hybrid resource could achieve.

C. *De-rated storage NQC plus ELCC capped at the POI*

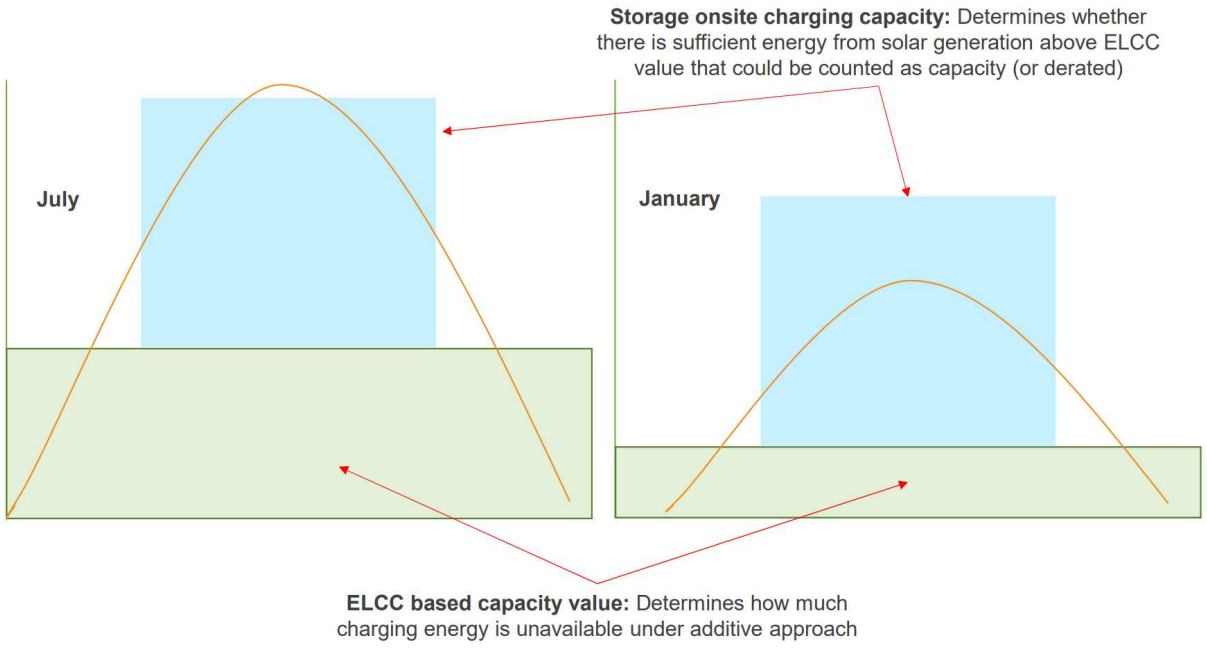
CESA considers this methodology should be applicable for hybrid resources that participate as an NGR, have ratios above 0.75, and intend to claim less than 100% of ITC

[15] See SEIA/LSA Presentation, at 12.

incentives. CESA considers that this methodology should capture the expected level of on-site charging in order to accurately de-rate the capacity provided by storage resource.

As CESA mentioned on the February 12, 2020 Hybrid QC Working Group meeting, the level of on-site charging is not known on an *ex ante* basis; however, CESA members have commented that most developers have an expected level of charging considered in all financial calculations prior to asset deployment, which can be achieved through the use of, for example, battery controllers and software. Thus, CESA considers the provision of this data is possible, hence enabling its application in a formula to calculate a de-rated storage NQC, *NQCd*. CESA proposes the following formula for determining NQCd: $NQCd_i = NQC(CR * X_i) + NQC(1 - CR)$.

In the formula above, *CR* refers to the expected charging requirement, *X* refers to a de-rating factor, and *i* refers to the specific month in question. Such a methodology would account for the energy available for the storage component in each month. Specifically, the *NQC(1 – CR)* component of the formula above would attribute full QC credit for grid charging since this is fully deliverable and would not be limited by the onsite generation. Since *X* is dependent on the month of the year, CESA proposes that *X* be calculated based on the area under the curve representing expected average solar generation minus the ELCC of each month since ELCC values attribute an equivalent "perfect capacity" value. This would prevent over-counting capacity and provide some assurances that there is sufficient solar generation to assign the appropriate storage QC value. To illustrate, see the below figure on how this would be accounted for:



CESA is also open to consider other methodologies to calculate *X,* provided that it is related to the energy available in each month since NQC values are established on a monthly basis.

Additional considerations

I. Must-offer obligations (MOOs)

CESA believes any viable proposal would also need to consider the bidding requirements hybrid resources would face in the CAISO markets, particularly the determination of MOOs. Currently, there is no existing MOO provisions for these resources, but CAISO intends to establish the MOO provisions through its Hybrid Resources initiative. The CAISO has proposed to allow hybrid resources to self-provide forecasts that would be utilized to ensure feasible awards and dispatches. The CAISO proposed to set the Real-Time (RT) MOO for hybrid resources equal to their self-provided forecasts. This results in a variable MOO similar to the treatment for variable energy resources (VERs). CESA believes this proposal is sound as it would provide both operational certainty and flexibility.

Unfortunately, the CAISO has determined that the self-provided forecast functionality would only be applied in the CAISO's RT markets. On the other hand, Day-Ahead (DA) bidding requirements would need to be fulfilled by means of economic bidding or self-scheduling. CESA considers this disconnect between RT and DA requirements could cause confusion for both operators and buyers of RA. Based on the current interim methodology provided by the Commission in D.20-01-004, CAISO has proposed two options for the establishment of DA MOOs: the storage-driven approach, and the VER-driven approach. The former would apply a DA MOO equal to the storage's QC value (or shown MW of RA if only partially shown for RA), while the latter would not have a DA MOO, similar to how VERs currently participate in the CAISO markets.

As California transitions from the interim approach issued by the Commission and adopts a permanent methodology, CESA recommends reconsidering the application of both the schemes proposed by CAISO. CESA considers that CAISO's proposed alternatives capture rather well two different use-cases for hybrid resources: the desire to firm output, and the desire to shift renewable output to more valuable times. These two use-cases are closely related to the storage to generation ratio, since the availability of storage capacity on-site would determine its most valuable usage. Thus, CESA believes CAISO's alternatives could be applied depending on the ratio of storage to

generation, since the behavior of a hybrid asset with a very low ration (*e.g.* less than 0.25) would be closer to that of a VER while a hybrid with higher ratios (*e.g.* greater than 0.25) would be closer to that of a dispatchable generator. Hence, with this proposal, hybrids that have deployed storage mainly for firming benefits can continue to have MOO requirements closer to those of VERs, while those opting to shift energy must comply with the requirements set forth for dispatchable generation.

II. ITC Compliance

As it has been previously mentioned in this document and CESA's presentation during the February 12, 2020 Hybrid QC Working Group meeting, CESA does not believe ITC-related charging is a physical limitation that should be considered for all QC calculations for hybrid resources. CESA is further concerned with the implications the inclusion of ITC-related charging could have for resources after the five-year applicability period has concluded. In order to mitigate this risk, CESA proposes that after five years of operation, all hybrid assets with a QC value established by Methodology C are to be redirected based on the other variables to Methodologies A or B.