

**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)

**HYBRID COUNTING WORKING GROUP FINAL REPORT
SUBMITTED BY SAN DIEGO GAS & ELECTRIC COMPANY (U 902 E)
AND THE CALIFORNIA ENERGY STORAGE ALLIANCE**

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March 11, 2020

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Pursuant to the Rules of Practice and Procedure of the California Public Utilities Commission (the “Commission”) and in accordance with the direction set forth in the *Assigned Commissioner’s Scoping Memo and Ruling* (“Scoping Memo”) issued in the above-captioned proceeding on January 22, 2020, and the *Administrative Law Judge’s Ruling Modifying Track 2 Schedule* issued on February 28, 2020, which extended the filing deadline, San Diego Gas & Electric Company (“SDG&E”) and the California Energy Storage Alliance (“CESA”) jointly submit the attached report (“Final Report”) setting forth consensus and non-consensus items related to development of a hybrid resource counting convention methodology.^{1/}

Respectfully submitted this 11th day of March 2020.

/s/ Aimee M. Smith

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^{1/} Pursuant to Rule 1.8(d), counsel for SDG&E confirms that CESA has authorized SDG&E to file this report on its behalf.

Final Report

Rulemaking 19-11-009 (Track 2)
Resource Adequacy
Hybrid Counting Working Group

March 11, 2020

TABLE OF CONTENTS

I. INTRODUCTION AND BACKGROUND 1

II. SUMMARY OF CO-CHAIR ACTIVITIES 1

III. SUMMARY OF WORKING GROUP ACTIVITIES..... 2

 A. Scheduling and Meeting Notification 2

 B. Meeting Description..... 3

IV. HYBRID RESOURCES COUNTING CONVENTIONS..... 4

 A. Overview of First Working Group Meeting 4

 B. Summary of Party Positions..... 5

 1. SDG&E Proposed Hybrid Counting Methodology 5

 2. CESA Proposed Hybrid Counting Methodology..... 5

 3. Sunrun Proposed Hybrid Counting Methodology 6

 4. SEIA/LSA Proposed Hybrid Counting Methodology 6

 5. SCE Proposed Hybrid Counting Methodology 7

 C. Overview of Second Working Group Meeting..... 7

 D. Consensus Items..... 9

 E. Areas for Further Discussion 13

 F. Conclusion 18

I. INTRODUCTION AND BACKGROUND

On November 13, 2019, the California Public Utilities Commission (the “Commission”) opened the instant Rulemaking (R.19-11-009) to continue to address the 2021 – 2022 Resource Adequacy (“RA”) compliance years and to consider necessary refinements to the RA program. The January 22, 2020 Scoping Memo and Ruling (“Scoping Memo”) directed parties to establish a working group process to address questions regarding RA counting conventions, dividing the working groups into four topical areas: (i) Hybrid Resources; (ii) Hydro Resources; (iii) Demand Response Resources; and (iv) Effective Load Carrying Capacity (“ELCC”).

San Diego Gas & Electric Company (“SDG&E”) and the California Energy Storage Alliance (“CESA”) (together, the “Co-Chairs”) volunteered to co-chair the Hybrid Resources Working Group, which is tasked with addressing the question of whether the Commission should adopt a permanent methodology for counting of hybrid resources. The Scoping Memo directs the Co-Chairs to file a report setting forth consensus and non-consensus items (“Final Report”) on March 2, 2020. The *Administrative Law Judge’s Ruling Modifying Track 2 Schedule* issued on February 28, 2020 by Administrative Law Judge (“ALJ”) Debbie Chiv extended this deadline to March 11, 2020. Issuance of a Proposed Decision on all working group topics is anticipated in the second quarter of 2020.

II. SUMMARY OF CO-CHAIR ACTIVITIES

The Hybrid Resources Working Group Co-Chairs, led by Nuo Tang (SDG&E), and Jin Noh (CESA), held several meetings for the purpose of sharing proposals and determining the agenda for the Hybrid Resources Working Group in-person meetings on February 12 and 24, 2020. Meetings held by the Hybrid Resources Working Group have been collaborative in nature, with each party bringing forth proposals and concepts vetted by their respective constituents. The collaboration process began with a conference call that established the steps necessary to

prepare for the in-person stakeholder meeting, followed by additional conference calls dedicated to proposal review, agenda planning, and report drafting.

Co-Chair Meeting Dates:

- Initial Discussion: January 31 – telephonic
- Working Session #1: February 4 – telephonic
- Working Session #2: February 6 – telephonic
- Working Session #3: February 7 – telephonic
- Working Session #4: February 10 – telephonic
- Working Session #5: February 20 – telephonic
- Working Session #6: February 24 – in-person
- Working Session #7: February 28 – telephonic

III. SUMMARY OF WORKING GROUP ACTIVITIES

A. Scheduling and Meeting Notification

The Scoping Memo directed that the working groups convene in early February 2020.¹ SDG&E provided notice to the R.19-11-009 service list on February 3, 2020, regarding its willingness to co-chair the Hybrid Resources Working Group with CESA and requested that all interested parties notify SDG&E and CESA in order to develop a targeted email distribution list for the Hybrid Resources Working Group. Pacific Gas and Electric Company (“PG&E”) reached out to Energy Division Staff on behalf of all parties to determine meeting space availability; working group meetings for all topics were scheduled for February 12-13, 2020. Southern California Edison (“SCE”) provided notice to the R.19-11-009 service list on February 4, 2020, of all co-chairs and the meeting schedule. A subsequent notice sent by SCE on

¹ Scoping Memo, p. 9.

February 10, 2020, included a web conference option for parties unable to attend the working group meetings in person. The materials to be reviewed at the initial Hybrid Resources Working Group meeting were sent to the Hybrid Working Group’s distribution list on February 11, 2020.

Following the initial meeting, the Co-Chairs determined that a subsequent in-person meeting was necessary to further discuss and identify the consensus and non-consensus items. The subsequent meeting was scheduled for February 24, 2020; the service list was notified of this additional meeting on February 19, 2020. The meeting agenda along with the informal comments (referenced below and attached hereto as Appendix A) were provided to the Hybrid Working Group’s distribution list on February 20, 2020.

B. Meeting Description

The first Hybrid Resources Working Group stakeholder meeting took place on February 12, 2020 from 2:00 PM to 5:00 PM in the Hearing Room A at the Commission’s San Francisco location. In addition to the Co-Chairs’ organizations, the following organizations announced their attendance: Silicon Valley Clean Energy, California Independent System Operator (“CAISO”), SCE, PG&E, Middle River Power (“MRP”), Sunrun, Solar Energy Industries Association (“SEIA”), Large-Scale Solar Association (“LSA”), Avangrid, Center for Energy Efficiency & Renewable Technologies (“CEERT”), and Union of Concerned Scientists (“UCS”). A web conference option was provided for parties attending remotely.

The workshop discussion focused on the following question identified in the Scoping Memo:

- Should the Commission adopt a permanent methodology for counting of hybrid resources?

Nuo Tang (SDG&E) and Jin Noh (CESA) led the discussion. At the conclusion of the workshop meeting, parties were invited to submit informal written comments by February 18.

The second Hybrid Resources Working Group stakeholder meeting took place on February 24, 2020 from 10:00 AM to 1:00 PM in the Hearing Room A at the Commission’s San Francisco location. In addition to the Co-Chairs’ organizations, the following organizations announced their attendance: SCE, PG&E, The Utility Reform Network (“TURN”), CAISO, MRP, CEERT, EBCE, Sunrun, LSA, and SEIA. A web conference option was provided for parties attending remotely. The goal of the meeting was to determine consensus and non-consensus items. The discussion was led by Nuo Tang (SDG&E) and Jin Noh (CESA).

IV. HYBRID RESOURCES COUNTING CONVENTIONS

A. Overview of First Working Group Meeting

The meeting began with a presentation by Mr. Tang and Mr. Noh, which included the current definitions and background of hybrid resources, the Hybrid Resources Working Group scope, questions for informal comments, and next steps. Following the presentation by Mr. Tang and Mr. Noh, five parties presented proposals: (i) SDG&E; (ii) CESA; (iii) Sunrun; (iv) SEIA/LSA; and (v) SCE. These proposals, as well as the Co-Chair presentation, are described in more detail below, and were attached to the Hybrid Resources Working Group Progress Report served on February 14, 2020. The presentations were then followed by additional party discussion and clarification of proposals. Following this meeting, five parties (First Solar, Sunrun, MRP, SCE, and SEIA/LSA) submitted informal comments to the Co-Chairs, which are attached in Appendix A hereto. Issues raised in party presentations and informal comments were explored in the second Hybrid Resources Working Group meeting on February 24, 2020, and are reflected in this Final Report.

B. Summary of Party Positions

1. SDG&E Proposed Hybrid Counting Methodology

SDG&E believes that the Commission should adopt a permanent methodology for the counting of hybrid resources using the results of the Effective Load Carrying Capacity (“ELCC”) study currently being performed by Astrape Consulting under the Renewable Portfolio Standard (“RPS”) proceeding (Rulemaking 18-07-003).² SDG&E recommends that the Commission continue the current interim method for determining qualifying capacity (“QC”), and once the RPS ELCC study is complete in Q4 of 2020, utilize the results to create a permanent methodology.

2. CESA Proposed Hybrid Counting Methodology

CESA proposes a holistic approach to determine the capacity value of hybrid resources. CESA considers that any permanent QC methodology must take into account: (1) the market participation pathway of the hybrid resource (generator vs. non-generating resource (“NGR”)); (2) Investment Tax Credit (“ITC”) -related charging; and (3) the storage-to-generation ratio. CESA proposes a framework that captures the nuances related to charging, market participation, and operational tradeoffs in order to inform the development of a permanent QC methodology for hybrid resources. CESA proposes distinct methodologies for assets operated under: (a) the generator model; (b) the NGR model with a low storage to generation ratio; and (c) the NGR model with a high storage-to-generation ratio. 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. For model (a), CESA proposes a derating of the capacity value of

² The Investor Owned Utilities (“IOUs”) were directed to perform this study and use the results to update the least-cost best-fit (“LCBF”) RPS project valuation methodology.

on-site generation (*i.e.*, ELCC) and the use of an additive approach, capped at the point of interconnection (“POI”). For model (b), CESA proposes the application of an additive methodology, capped at the POI. For case (c), CESA proposes a derating of the storage’s net qualifying capacity (“NQC”) and the use of an additive approach, capped at the POI.

3. Sunrun Proposed Hybrid Counting Methodology

Sunrun proposes that hybrid (solar-plus-storage) resources behind the customer meter (“BTM”) have a QC value, to be the same as for in front of the meter (“IFOM”) hybrid resources initially, based on full resource output. This methodology would apply only to hybrid resources under contract or other obligation to provide capacity to an LSE.

4. SEIA/LSA Proposed Hybrid Counting Methodology

SEIA and LSA propose that the permanent RA counting method for hybrid solar resources should move to the use of the Additive Method originally proposed by SCE, where the RA value is the sum of the NQCs of the individual co-located solar and storage units, capped at the POI capacity. SEIA and LSA presented analysis exploring whether any constraints on the Additive Method might be needed as a result of resource configuration, ratio of storage to renewable capacity, or storage duration. Their analysis finds that the Additive Method may need to be limited only: (1) by the size of the single inverter in DC-coupled configurations; or (2) in winter months for systems where the discharge capacity for 4-hour storage is greater than 75% of the solar nameplate. Finally, SEIA and LSA note that hybrid resource owners have the ability to use up to 25% grid power to fill storage (with some loss of the ITC), so the hybrid owner can make an economic decision whether to supply RA up to the full Additive Method in winter months.

5. SCE Proposed Hybrid Counting Methodology

SCE presented a proposal that would account for the RA value from the combination of a renewable resource combined with a battery where the ability to charge the battery was restricted to the output of the paired renewable resource. The proposal attempts to account for the portion of output from the renewable resource necessary to fully charge the battery to account for the expected remaining capacity available to the grid for RA, and adds to that the QC value of the battery based upon the amount it can be expected to charge from the renewable device.

C. Overview of Second Working Group Meeting

The meeting began with an introduction by Mr. Tang and Mr. Noh, followed by a presentation from the CAISO regarding the exceedance methodology. The CAISO's presentation provided background on hybrid and co-located definition-related issues as well as the CAISO's proposed market participation model for hybrid resource (single resource ID) configurations. The background discussion provided context for the considerations that drive the CAISO's proposal for hybrid and co-located resource QC methodologies. The CAISO proposed that all hybrid resources with single resource ID configurations be assessed under an exceedance-based QC methodology, regardless of any stated ITC charging restrictions. According to the CAISO, this approach is based upon actual production data and more accurately reflects the reliability benefits provided by hybrid resources as scheduling coordinators will be determining when and how charging the storage components will be accomplished from on-site generation or the grid.

The CAISO proposed that co-located resources with multiple resource IDs and no ITC charging restrictions, should each receive their respective QC values, capped at the POI capacity. The CAISO stated that an ELCC-based QC methodology should always be utilized for solar and wind resources, and a 4-hour duration-based QC methodology should be used for storage

resources without charging restrictions. The CAISO proposal also recommended that co-located storage resources with multiple resource IDs with ITC charging restrictions should receive an exceedance-based QC methodology. Alternatively, co-located storage resources with ITC charging restrictions could also be assessed under other approaches that account for the impacts of ITC charging restrictions and the relative sizing of the co-located resources. Any other approaches should also address daily charging limitations based upon the size of the storage and co-located wind or solar resource that is used for on-site charging. The CAISO's presentation is attached to this report as Appendix B.

After the CAISO's presentation, the Co-Chairs initiated a panel discussion. The discussion was guided by the PowerPoint presentation attached hereto as Appendix C, and focused on the following topics:

- Single vs Multi-Resource ID Differentiation
- Proposed Definition of Hybrid and Co-Located Resources
- Panel Discussion of Additive QC Methodology Proposals
- Behind-the-meter resources

The panel discussion yielded a set of consensus and non-consensus items, discussed in more detail below. For reference, the current interim QC methodologies as established in D.20-01-004 are provided in the following table:³

³ D.20-01-004 determines that: "The interim methodology shall only apply to a hybrid resource with ITC-related charging restrictions." The decision thus sets an interim capacity methodology for hybrid and co-located resources that claim any level of the ITC ("ITC limited"). D.20-01-004, p. 8.

	ITC Limited	Non-ITC limited
Hybrid (Single Resource ID)	Greater of or limited by on-site charging capability	Unclear
Hybrid (Multiple Resource ID)	Greater of or limited by on-site charging capability	Additive, limited by POI capacity

D. Consensus Items

- **QC methodologies should be developed for the above four use cases:**

- Hybrid – ITC Limited
- Hybrid – Non-ITC Limited
- Co-located – ITC Limited
- Co-located – Non-ITC Limited

- **Hybrid and Co-Located resources should be consistent in definition between CAISO and CPUC. The working group offers the following recommendations:**

- Hybrid: Two or more resources (one of which is a storage project) located at a single point of interconnection with a single resource ID.
- Co-Located: Two or more resources (one of which is a storage project) located at a single point of interconnection with two or more resource IDs.

- **ITC Limited and non-ITC Limited resources differ in terms of economic incentives:**

- ITC Limited are hybrid/co-located resources that are economically incentivized to charge from the on-site renewable generation in order to receive federal ITCs. Such ITC Limited hybrid/co-located resources are

those that commit to some level of charging from the on-site generation resource (*i.e.*, 100%, 90%, etc.).⁴

- Non-ITC Limited resources do not have such economic incentives for charging from the on-site generation resource,⁵ but it may include other resources as further discussed in the Areas for Further Discussion section.

- **ITC limitations can vary for Hybrid and Co-located resources:**

	ITC Limited (100% on-site)	ITC Limited (75%-99% on-site)	Non-ITC Limited
Hybrid	SCE – starting point	More Discussion Needed	More Discussion Needed
Co-located	SCE – starting point	More Discussion Needed	More Discussion Needed

- **Additional time may allow parties to help develop SCE’s proposal (described above in Section IV.B.5) and reach full consensus.** CAISO, CESA, SEIA/LSA and MRP supported SCE’s proposal as a starting point for the 100% on-site ITC Limited scenario. SCE acknowledged that its methodology, also filed on February 21, 2020, must be revised to account for the CAISO’s stated concerns related to the lack of metering and separate resource ID and consequent inability to institute a must offer obligation consistent with the stated RA counting for a hybrid resource as has been defined in this document. CEERT also submitted a

⁴ Some developers in the working group indicated that they program their battery controllers or other management systems to ensure some level of charging from the on-site ITC-eligible generation resource.

⁵ Such resources either: (1) do not claim the ITC and thus are not subject to charging requirements from the ITC-eligible generation resource; or (2) no longer have charging restrictions apply (*e.g.*, post-ITC period five years after the recapture period).

document entitled Consensus Suggestions on this matter, which is attached hereto as Appendix D.⁶

- **More discussion is needed regarding the ITC Limited (75% to 99% on-site) charging and non-ITC Limited scenarios, because not all parties are sure how a hybrid or co-located resource would respond to the CAISO must-offer-obligation (“MOO”) if such resource is only partially charged by on-site generation.** Parties thought that the CAISO’s exceedance QC methodology could potentially resolve this issue, but questions were raised as to whether the co-located resource’s exceedance value should be calculated only based on 4 pm to 9 pm, and how provision of reserve based services like Ancillary Services (which comply with Must -Offer Obligations but may not involve energy deliveries to the grid) would be treated under that methodology. The Co-Chairs also believe that additional time would permit further modification and improvement of the CAISO’s proposal. Further, the CAISO suggested that it would consider using the Additive Method, as developed in this proceeding, for 1-2 years for each resource until it has actual data on the output of Hybrid resources that it could use to fashion the details of an exceedance approach. The Co-Chairs both agree that QC methodologies developed in this proceeding must be in sync with the MOO that are required to participate in the CAISO markets.

⁶ While CEERT offered its suggested consensus positions at the conclusion of the February 24, 2020 working group meeting, the specific language included in CEERT’s document was not reviewed by stakeholders to determine whether it accurately reflects consensus positions. The contents of CEERT’s document represent the recommended next-step pathways of one party (CEERT), which, due to time constraints in the working group process, was not able to be discussed and vetted during the working group, but is attached for reference for the benefit of the Commission and stakeholders.

- **More discussion is needed in either continued Track 2 Working Group discussions and/or in Track 3 to develop a QC methodology for hybrid resources with less than 75% onsite charging.** While the full 100% charging from onsite generation (*i.e.*, no grid charging) was seemingly more straightforward, the Working Group had insufficient time to work toward a consensus proposal on the partial-charging case. Further discussion is needed, as explained further below.
- **More discussion is needed in either Track 3 or 4 of this proceeding regarding whether and how the QC methodologies for IFOM hybrid resources can be applied to BTM hybrid resources.** At the February 24, 2020 Working Group meeting, while CESA and Sunrun discussed how the similar QC methodologies could be extended to BTM hybrid resources that are contracted to provide RA capacity, the Working Group generally supported the need to discuss various issues related to BTM hybrid resource capacity.
- **CAISO, SEIA, LSA, CEERT, SCE, and CESA agreed that it is reasonable, at this time, to adopt a different QC methodology in the RA proceeding although there is a Joint IOU ELCC hybrid study currently taking place in the Renewable Portfolio Standard (“RPS”) proceeding.** Once parties have reviewed the ELCC study results in the RPS proceeding, those results may inform the RA proceeding. CEERT proposed that a standard “Technical Review Group” consisting of representatives from this working group be added to the Joint IOU ELCC hybrid study to ensure that RA specific issues were considered and to

facilitate buy-in of the results in this proceeding. The CAISO does not support grandfathering of QC in that scenario.

E. Areas for Further Discussion

Rather than characterizing the below areas as non-consensus items, the Co-Chairs note that the areas identified below would benefit from further discussion given the complexity of the issues, the general inexperience of stakeholders with hybrid resources, and the timing constraint of the working group process.

- **Scope of Non-ITC Limited Resources Definition:** SEIA, LSA, and CESA recommend that resources that claim the ITC but do not commit to a charging restriction from the on-site generation resource be defined as a Non-ITC Limited Resource: In such cases, the resource owner and schedule coordinator should be able to manage the Hybrid or Co-Located resources (*e.g.*, storage's state of charge using grid power) to comply with RA must-offer obligations for the combined QC using the Additive Method, and will bear the economic impact of any reduction in the ITC. Unlike ITC Limited Resources, as defined in this working group, these Hybrid or Co-Located resources would not be committing to a specific charging restriction from the on-site generation resource but would instead be making economic trade-offs with the ITC to ensure compliance with CAISO must-offer obligations. However, SDG&E disagreed with this recommendation because, regardless of the ITC status, the Hybrid or Co-located resource must comply with the CAISO's must-offer obligations as an RA resource. This recommendation would suggest that such Non-ITC Limited Resources would not be able or willing to meet the MOO at all is very risky. Additionally, SDG&E believes that the

charging level from the on-site generation resource would be extremely difficult to validate for every one of the new hybrid resources seeking development.

- **ELCC QC Method:** SDG&E proposed to utilize the results from the Joint IOU ELCC Study, as directed by the Commission as part of the RPS proceeding (R.18-07-003). SDG&E favored this approach because the exceedance approach (proposed by CAISO) is unable to capture a resource's contribution to system reliability (loss of load expectation), and the additive approach (variations proposed by SEIA, LSA, CESA, and SCE) may over-estimate the capacity value of hybrid and co-located resources. There was limited time to discuss the merits of this proposal during the working group process, but some issues that were identified in the Working Group include:
 - Can and will the ELCC methodology account for the different hybrid and co-located resource configurations (*e.g.*, storage-to-generation sizing, ITC-related charging, single versus multiple Resource IDs)?
 - Is it feasible to implement an ELCC-based approach given modeling intensity and complexity?
 - If ELCC is adopted, is it more appropriate to apply the marginal or average ELCC value for these paired resources considering an average ELCC is used for RA capacity valuation and marginal ELCC is used for RPS procurement?
 - Discussion: SEIA and LSA disagree with SDG&E's characterization of the additive approach and their proposal ("ELCC") specifically, since all versions of the ELCC method

discussed in the Working Group contain additional limitations based on: (1) maximum output at the POI; and (2) the ability of the on-site generation to fully charge the associated storage.

Moreover, this statement does not consider that projects subject to ITC could manage their facilities to comply with CAISO Must-Offer Obligations.

- **Additive QC Method:** CAISO does not believe the Additive methodologies are appropriate because the exceedance methodology is able to better reflect the resource's actual contribution to grid reliability. However, the CAISO recognizes that a transition period would be required in order to establish the actual historical information to calculate the exceedance QC. In such an instance, the CAISO believes a modified Additive approach may be appropriate, but more discussion is required to develop the solution. SDG&E believes the Additive approach only estimates the QC values based on simplified assumptions of how a resource may operate to charge the storage resource and may over value the hybrid/co-located resource. Several parties disagree, and support either the SCE, SEIA/LSA, or CESA versions of the Additive Method that could be implemented to provide a more accurate QC value for Hybrid and Co-Located resources than the current interim "Greater of" method adopted in D. 20-01-004. These parties are coalescing around support for SCE's version of the Additive Method, as indicated in CEERT's "Consensus Suggestions" circulated after the second workshop. Even as proposed by the CAISO, this version of the Additive Method would be a transition approach that could be replaced with an exceedance method once actual

data on the output and performance of individual Hybrid resources has been gathered.

- **Partial Onsite Charging:** CESA proposed a derate approach for hybrid resources that charge at some level from onsite generation, whether to claim the ITC or not. However, the Working Group found the partial onsite charging use case to be more complex in determining a QC value and discussed how more stakeholder meetings and/or workshops may be needed to resolve several issues, including:
 - What attestations need to be made if QC is established ex ante on a “predetermined” onsite charging level?
 - How will must-offer obligations be established?
 - What should be the QC methodology for hybrid resources after the five-year ITC recapture period? Will hybrid resources choose to switch to become co-located resources with multiple Resource IDs, and what would be the impact?
- **Exceedance Method:** The CAISO proposed an exceedance methodology for hybrid resources with a single Resource ID because it would capture the storage sizing and onsite charging behavior, regardless of whether the onsite charging is an economic (*e.g.*, ITC-related) or physical limitation (*e.g.*, direct current (“DC”) coupled). Some of the key questions surrounding CAISO’s proposal include:
 - What is the appropriate percentage threshold to calculate exceedance? For example, prior to the adoption of the ELCC methodology for solar and wind resources, the Commission adopted a 70% threshold to determine the maximum generation amount that is produced at least 70% of the time.

- What are the appropriate time windows to evaluate exceedance? Should different time windows be assessed for hybrid and co-located resources, as proposed by CAISO? Specifically, CAISO proposed a 5am-9pm window for exceedance calculation for hybrid resources, and a 4pm-9pm window for the storage component of co-located resources.
- Should the solar/wind component for co-located resources retain the full ELCC for co-located resources, as proposed by CAISO?
- Will the exceedance methodology be applied based on historical bids or operations (*i.e.*, dispatch) of the hybrid resource?
- What will be the impact of applying the exceedance methodology if the storage component of the hybrid resource historically has provided Ancillary Services or Flexible Ramping services (*i.e.*, services that may restrict their output in the hours used to establish the exceedance-based QCs)?
- Should grandfathering of QC values be applied to hybrid resources that use a “revised interim” or “transitory” QC methodology if and until an exceedance methodology is developed and/or established?
- **BTM Hybrid Resources:** Stakeholders disagreed on whether it is appropriate, necessary, or helpful to affirm that the QC methodology for in-front-of-the-meter (“IFOM”) hybrid resources could be extended to behind-the-meter (“BTM”) hybrid resources, as proposed by CESA and Sunrun. Another working group or more discussion time should be allotted to tackle this issue. Some of the questions raised in the Working Group include:

- What will the market participation look like for BTM hybrid resources with QC values established (*e.g.*, aggregation, bidding)?
- Will BTM hybrid resources have similar visibility to the CAISO (*e.g.*, metering)? What kind of visibility is needed for these resources, given the Scheduling Coordinator Metered Entity model at the CAISO?
- How will CEC load forecasts and QC of BTM hybrid resources be reconciled to avoid double counting or double compensation (*e.g.*, incrementality issues)?
- How will BTM hybrid resources be assessed for interconnection and deliverability?
- Do all of the other aforementioned issues need to be resolved prior to affirming IFOM hybrid resource QC methodology applicability to BTM hybrid resources?

F. Conclusion

The Co-Chairs circulated a draft of this Final Report for participant review on February 26, 2020. The Co-Chairs recommend that the Commission provide a means for additional stakeholder discussion of modifications to the SCE proposal for the ITC Limited charging case where 100% of the energy is from on-site charging, as there is the possibility of consensus among the parties to move to the use of a version of the Additive Method to replace the interim approach adopted in D. 20-01-004. The Co-Chairs also recommend that working groups should be allowed to continue to resolve the issues noted above, sync up with the CAISO hybrid initiative and review the Joint IOU ELCC study results performed as part of the RPS proceeding.

Appendix A
Informal Comments

- First Solar
- Sunrun
- Middle River Power
- SCE
- SEIA/LSA

Hybrid Resource QC Methodology: Informal Comments



18-Feb-20

<p>1. Are the definitions of Hybrid and Co-located resources appropriate? Please explain any modifications.</p>	<p>First Solar strongly supports the definitions of hybrid and co-located resources developed as part of the CAISO's Hybrid Resources initiative. These were developed over several months of stakeholder discussions and represent a realistic approach to how hybrid resources will ultimately participate in the wholesale market. To that end, First Solar supports a strong connection and collaboration between this CPUC-led process and CAISO's efforts.</p>
<p>2. Are the QC methodologies different for Hybrid and Co-located resources?</p>	<p>First Solar has no comment at this time.</p>
<p>3. Should there be additional methodologies for single resource ID and those that operate under two or more different resource IDs? How would each resource attain its own unique resource QC?</p>	<p>First Solar has no comment at this time.</p>

<p>4. Do ITC charging incentives impact the QC of hybrid or Co-located resources under your definition? If so, how?</p>	<p>First Solar generally agrees with the characterization that the ITC is a financial consideration and not a physical restriction to charging. While it is safe to assume that a project owner would always want to charge the battery component from the renewable resource, thereby maximizing the ITC benefits for the project's economics, the ability does exist to charge from the grid if necessary. This grid charging has meaningful and impactful negative consequences for project economics; however, that should not be viewed in the same manner as a structure that completely excludes grid charging as a possibility. For purposes of this discussion, then, a resource owner could make a decision that their renewable resource would not be sufficient to meet an RA obligation on a given day when the grid is forecast to be near peak, and could decide to incur some level of ITC recapture via grid charging in lower load hours intra-day to ensure the ability to meet its firm deliverability window later in the day.</p> <p>In addition, the ITC restriction is temporal in nature and will not be a consideration after the first (roughly) five years of operation. After that time, grid charging can occur without any ITC recapture risk. First Solar strongly supports this initiative recognizing the relatively short-term nature of ITC risk when determining hybrid resource QC.</p>
<p>5. Are discounts or derate of any component's QC value necessary for multiple resource ID hybrid or co-located resources (ELCC in the case of VERs, NQC in the case of conventional generation and storage)? In what cases should such discounts or derates apply?</p>	<p>First Solar has no comment at this time.</p>
<p>6. Is a storage component's duration an essential variable when determining the QC of a hybrid resource? If so, explain this relationship.</p>	<p>First Solar believes that a four hour dispatch is a reasonable duration for purposes of determining the QC of a hybrid resource. One item to consider would be whether or not, for local RA in constrained regions, if a shorter or longer duration is appropriate, and to provide differentiated compensation to encourage such deployment.</p>

<p>7. Is the storage to generation ratio an essential variable when determining the QC of a hybrid resource? If so, explain this relationship.</p>	<p>First Solar has no comment at this time.</p>
<p>8. Could the any proposed QC methodologies apply to BTM hybrids? If so, how? If not, please explain why.</p>	<p>First Solar has no comment at this time.</p>
<p>9. Among the parties' proposals at the February 12, 2019 working group meeting, which do you favor? Please explain why.</p>	<p>Fundamentally, First Solar believes an additive approach between the components of a hybrid resource is the most representative of the QC value of a hybrid resource. It is most probable that, on peak days, the battery component would be charged in the morning during lower load periods, and then fully dispatched – in conjunction with the renewable component's full capabilities – during the evening peak period.</p> <p>In all instances, the QC of the hybrid resource should be capped at the POI.</p>
<p>10. Are there key improvement areas to any of the parties' proposals from the February 12, 2019 working group meeting?</p>	<p>First Solar shares the concern raised during the working group meeting that an ELCC study may not be apples-to-apples when applied to a dispatchable resource like a hybrid project. While the studies referenced by SDG&E may be informative to this effort, at this time we are not confident that such results would be definitive, and we suggest additional details and discussion on this topic at a future working group meeting.</p>
<p>11. Are there other variables or considerations not covered in the parties' proposals from the February 12, 2019 working group meeting?</p>	<p>As mentioned above, First Solar believes that any methodology should contemplate the <i>long-term</i> QC capability of a hybrid resource, after monetization of the ITC.</p>
<p>12. Please provide any other general comments.</p>	<p>First Solar strongly recommends this working group collaborating with the ELCC working group, as the results of each can impact the other.</p>

Please accept these informal comments from Sunrun Inc. These are in addition to our presentation on February 12th, and our upcoming Track 2 proposal to be filed Friday, February 21.

1) Are the definitions of Hybrid and Co-located resources appropriate? Please explain any modifications.

Yes, the definitions of hybrid and co-located hybrid resources are appropriate. This distinction is not of immediate relevance to Sunrun, as our behind-the-meter hybrid solar plus storage assets are indeed hybrid resources as defined in the working group discussion, as the on-site storage charges entirely from the on-site solar. However, we are supportive of the distinction in the definition as discussed in the working group meeting.

2) Are the QC methodologies different for Hybrid and Co-located resources?

The QC methodology should be applied differently to hybrid and co-located resources, but not in such a restrictive manner as adopted by the Commission in D.20-01-004, which eliminated the QC of the “lesser” resource entirely. Sunrun is generally supportive of this aspect of the proposals of SEIA/LSA and CESA, as both propose a version of an “additive” methodology, wherein a portion of each individual resource’s QC is added together for a blended QC for the hybrid resource.

For BTM resources, if the Commission adopts a version of an additive methodology for hybrid resources, then it will be necessary to revisit the Commission’s determination in D.17-06-027 and D.19-06-026 to not apply the adopted ELCC values for IFM solar, to BTM solar. Sunrun mentioned this in its presentation to the working group on February 12.

5) Are discounts or derate of any component’s QC value necessary for multiple resource ID hybrid or co-located resources (ELCC in the case of VERs, NQC in the case of conventional generation and storage)? In what cases should such discounts or derates apply?

Specific to BTM resources, it may be necessary to derate the QC of existing resources that would be formed into an aggregation for purposes of RA contracting, obligation, and dispatch. It may also be necessary to derate the QC of a BTM hybrid resource based on provision of other services outside of certain customer level services defined in D.18-01-003. However, Sunrun strongly recommends first developing a clear, transparent, and consistently applied incrementality methodology for storage and hybrid resources providing other services in addition to resource adequacy, before making any determinations as to how to discount the QC of BTM hybrid resources.

Middle River Power, LLC Informal Comments on
February 12, 2020 Hybrid Resource Counting Working Group Meeting
February 18, 2020

As requested by the Hybrid Resource Working Group co-chairs, Middle River Power, LLC (“MRP”) submits these information comments to the co-chairs. MRP is sending these comments to the R.19-11-009 rulemaking service list.

1.Are the definitions of Hybrid and Co-located resources appropriate? Please explain any modifications.

Decision (D.) 20-01-004 sets forth (at pages 7-8):

For purposes of the interim QC methodology, a “hybrid resource” is a generating resource co-located with a storage project and with a single point of interconnection. The interim methodology shall only apply to a hybrid resource with ITC-related charging restrictions.

MRP offers that ITC-related charging limitations should be incorporated into the definition of “hybrid” resources. Co-located resources with a single point of interconnection which have no charging interaction should not be considered “hybrid” resources. MRP therefore offers that the definition of a hybrid resource should be: “a resource (1) consisting of a co-located generating resource and storage project; (2) with a single point of interconnection; and (3) with economic restrictions on charging the battery from a source other than the co-located generating resource.”

2.Are the QC methodologies different for Hybrid and Co-located resources?

Yes. The QC value for co-located resources that are not Hybrid resources should be the sum of the separately determined and assigned QC values for each of the co-located resources.

3.Should there be additional methodologies for single resource ID and those that operate under two or more different resource IDs? How would each resource attain its own unique resource QC?

No, other than described above.

4.Do ITC charging incentives impact the QC of hybrid or Co-located resources under your definition? If so, how?

Yes. MRP reiterates that the term “hybrid resource” should be reserved only for those resources that meet the definition offered above, in which case co-located resources would not have ITC-related charging restrictions.

5. Are discounts or derate of any component's QC value necessary for multiple resource ID hybrid or co-located resources (ELCC in the case of VERs, NQC in the case of conventional generation and storage)? In what cases should such discounts or derates apply?

Yes. MRP believes that the ELCC-determined QC value for the charging resource should be discounted by the charging energy that will be dedicated to the storage resource.

6. Is a storage component's duration an essential variable when determining the QC of a hybrid resource? If so, explain this relationship.

The working group discussion and presentations all assumed that only storage of at least four hours duration would have any RA value. The discharge duration of the battery storage device will affect the battery's ability to fully charge from the co-located generating resource, which could lead to having to discount the storage device's RA value, depending on the extent to which grid charging is a viable option.

7. Is the storage to generation ratio an essential variable when determining the QC of a hybrid resource? If so, explain this relationship.

MRP does not support a rule that would allow the charging resource's ELCC value to count in full if the storage resource's MW size was less than some percentage of the charging resource's MW size (e.g., 75%). That rule effectively assumes that there is zero ELCC value for the energy that will be dedicated to the storage device. MRP agrees that the proliferation of mid-day solar generation has driven down the ELCC value of mid-day solar generation, but does not agree that mid-day solar energy has no ELCC value except for charging the storage. Moreover, if the hybrid's charging resource was not a solar resource, the assumption that the charging energy would be provided during the solar surplus hours and therefore has no ELCC value cannot be supported.

8. Could the any proposed QC methodologies apply to BTM hybrids? If so, how? If not, please explain why.

The topic of whether BTM resources should be afforded RA capacity value should not be limited to BTM hybrid resources. The topic requires and warrants a broader conversation which must include things like the value of Net Energy Metering, how BTM performance will be measured, and how the capacity value of non-dispatchable BTM resources would be established (presumably through ELCC analysis).

9. Among the parties' proposals at the February 12, 2019 working group meeting, which do you favor? Please explain why.

MRP believes that SCE's proposal – which assumes (1) four-hour storage that discharges symmetrically across the net load peak and (2) an ELCC value for the charging resource discounted by the amount of dedicated charging energy - sets forth a reasonable approach to

setting QC value for hybrid resources. MRP is not sure whether SCE's assumption that the storage resource will charge uniformly across the day at its minimum charging rate is the right assumption, and the charging profile assumed will have an impact on the amount of discount to apply to the ELCC value of the charge resource. As noted above, MRP does not support the proposal that the QC value for hybrids with storage devices that are less than "X"% (i.e., 75%) of the MW value of the charging resources should include the full ELCC value of the charging resource as if there was no dedicated charging from that resource.

10. Are there key improvement areas to any of the parties' proposals from the February 12, 2019 working group meeting?

MRP believes that the SCE proposal should continue to be explored, including a fuller discussion about what charging profile should be assumed to set the "residual" ELCC value for the charging resource.

11. Are there other variables or considerations not covered in the parties' proposals from the February 12, 2019 working group meeting?

At the working group meeting, several parties made the point that grid charging had a proportional impact on the ITC – that grid charging did not diminish the ITC at risk in a *binary* way, but in a *proportional* way. To MRP's understanding, the ITC is such a critical component of the economics of hybrid projects that financing entities may require that physical steps be taken to ensure no grid charging can be used. Based on this understanding, the extent to which grid charging can be used to support RA value at the expense of ITC is a key fact that needs to be further fleshed out. Moreover, the CAISO's observation that its analysis showed that grid charging was uneconomic under current price profiles warrants further consideration regarding when, how and if grid charging reasonably can be used to support hybrid resource RA value.

12. Please provide any other general comments.

Chase, Tina

From: Wei Zhou <Wei.Zhou@sce.com>
Sent: Tuesday, February 18, 2020 4:24 PM
To: Chase, Tina; jnoh@storagealliance.org
Subject: [EXTERNAL] informal comments on hybrid working group list of questions

Follow Up Flag: Follow up
Flag Status: Completed

Categories: Green Category

*** EXTERNAL EMAIL - Be cautious of attachments, web links, and requests for information ***

Hi Tina, Jin,

SCE would like to submit the following informal comments under Question 12 per the hybrid working group progress report (Appendix A pages 18-20):

While the definition of hybrid and co-located resources has been brought up during the workshop discussion, SCE believes that the key is to distinguish whether a renewable resource, paired with a storage resource, is limited in its ability to charge the storage resource. This is because the receipt of ITC is dependent on the charging of the battery from renewable resources; charging the battery from other than a renewable facility will reduce and ultimately eliminate the ITC.

While some charging of the resource from the grid rather than from a renewable resource may be economic within the CAISO market and doing so could provide for additional value in providing reliability, it is difficult to ensure that such reliability value will be realized in the CAISO market. This is because the CAISO must-offer obligation would be difficult to design to ensure that a resource that will charge at times from the grid and at other times only from a renewable resource is made appropriately available in both cases. Working through such a wide variety of scenarios and perfecting the must-offer obligation will likely take a significant amount of time.

For this reason, SCE has limited its proposal to establish an RA value for a resource receiving ITC assuming that it will only charge from a renewable resource. SCE notes that the nomenclature distinguishing between “hybrid” and “co-located” resources is a distinction without a difference in this case. The issue is really related to the use limitation created when the battery will charge only from a renewable resource whether in a “hybrid” configuration or in a “co-located” configuration. This use limitation should be the focus of the

discussion in developing an appropriate RA counting methodology; when and after an appropriate counting methodology is developed, discussion of “hybrid” and “co-located” would take place only to ensure that the CPUC rules and the CAISO tariff treat them similarly.

Thank you.

Wei Zhou, PhD
Market Design & Analysis
Southern California Edison
Tel: 626-302-3273

This email originated outside of Sempra Energy. Be cautious of attachments, web links, or requests for information.

1. Are the definitions of Hybrid and Co-located resources appropriate? Please explain any modifications.

Response: The CESA / SDG&E definitions of Hybrid and Co-located resources are appropriate and useful to distinguish paired resources that operate with either one resource ID (Hybrid) or two separate IDs (Co-located).

2. Are the QC methodologies different for Hybrid and Co-located resources?

Response: Ultimately, the goal should be no difference. SEIA / LSA submit that the Additive Method, with the conditions proposed by SEIA / LSA, should work for both Hybrid and Co-located resources. In the short-run, if there are differences in the QC methods due to the different visibility of Hybrid and Co-located resources to the CAISO, the CAISO and stakeholders should work in the CAISO's Hybrid Resources Initiative stakeholder process to eliminate these differences.

3. Should there be additional methodologies for single resource ID and those that operate under two or more different resource IDs? How would each resource attain its own unique resource QC?

Response: See response to Q2.

4. Do ITC charging incentives impact the QC of Hybrid or Co-located resources under your definition? If so, how?

Response: ITC charging incentives are a financial constraint for the operator of a Hybrid or Co-located resource. The QC of these resources should be based on the ability of the resource to provide reliable peak capacity and comply with the applicable Must-Offer Obligations (MOO) into CAISO markets, not on how the resource owner has chosen to deal with the financial risks of tax rules such as the ITC.

5. Are discounts or derate of any component's QC value necessary for multiple resource ID hybrid or co-located resources (ELCC in the case of VERs, NQC in the case of conventional generation and storage)? In what cases should such discounts or derates apply?

Response: Yes. First, for Hybrid resources (single resource ID) with a single inverter, the combined QC for the paired resources obviously cannot exceed the discharge capacity of the inverter. Second, the combined QC for all resources at the same Point of Interconnection (POI) cannot exceed the maximum allowed output at the POI, as established through the interconnection-request process.

Third, under the Additive Method, there can be a need to derate the QC of the storage unit in situations where both of the following conditions apply:

(1) the hybrid resource is not configured to charge storage with grid power (i.e. tight DC coupling) or the resource owner chooses not to charge the storage with grid power.

and

(2) the 4-hour storage discharge capacity is large compared to the solar nameplate capacity. SEIA / LSA suggest that the definition of "large" should be a 4-hour storage discharge capacity that is more than 75% of the solar nameplate capacity. In winter months (December-February), it will be difficult for the solar to fill a paired storage unit of this size.

If both of these conditions are met, the storage QC should be derated to the average level to which the storage can be filled by 4 p.m. in each winter month (December through February), based on an analysis using industry-standard solar forecasting tools and typical storage round-trip efficiencies. This limitation would not apply in summer months.

6. Is a storage component's duration an essential variable when determining the QC of a hybrid resource? If so, explain this relationship.

Response: Yes. The QC of storage alone is based on the capacity available over 4 hours. To standardize the evaluation of hybrid and storage-only resources, the capacity of the storage component of a hybrid unit should be based on the amount that the unit can discharge over the standard 4 hours. Thus, a hybrid unit with a 10 MW discharge capacity from storage but only 2 hours (20 MWh) of storage should not receive a QC greater than 5 MW (i.e. 20 MWh divided by 4 hours).

This method also reflects the relative value of storage resources. Clearly, storage that can operate for longer durations is more valuable than storage that can operate for shorter durations; that is why LESRs (Limited Energy Storage Resources), with 15-minute typical discharge capability, do not provide RA value. It also makes conceptual sense, e.g., two 5 MW / 2 hour storage resources count together for the same value as one 5 MW / 4-hour resource.

7. Is the storage to generation ratio an essential variable when determining the QC of a hybrid resource? If so, explain this relationship.

Response: Yes. See Q5 above for how this ratio could impact the QC of a Hybrid or Co-located resource where there are constraints on filling the storage resource with energy from the grid.

8. Could the any proposed QC methodologies apply to BTM hybrids? If so, how? If not, please explain why.

Response: Yes. The proposed QC method also should apply to BTM hybrids that are participating in the RA market or the CAISO energy markets.

9. Among the parties' proposals at the February 12, 2019 working group meeting, which do you favor. Please explain why.

Response: SEIA / LSA obviously favor our own proposal! We continue to believe that the Additive method (capped at the inverter or POI capacity) is appropriate with the limitations / derates proposed for Hybrid resources in winter months where the 4-hour storage capacity > 75% of the solar nameplate and where tight DC coupling does not allow charging from the grid or the resource owner chooses not to charge the storage with grid power. We are no longer proposing a condition that the generation resource should not charge the storage during the 4 p.m. to 9 p.m. peak period, because the MOO for RA resources will ensure that the QCs of both components of Hybrid or Co-located resources will be available when needed by the CAISO, in the same manner as stand-alone resources. In addition, there may be situations where it would be helpful to the CAISO, and/or not impair grid operations, to allow on-site charging in those hours, e.g., when: (1) Grid prices are very low or negative; (2) over-generation conditions are present; and/or (3) the solar component is curtailed due to local congestion. While perhaps not as likely in the early evening hours, they could still occur, and on-site or grid charging would have the same beneficial mitigating impacts.

10. Are there key improvement areas to any of the parties' proposals from the February 12, 2019 working group meeting?

Response: SEIA / LSA are concerned with the time and complexity of the ELCC studies of hybrid resources that San Diego Gas & Electric has proposed. This could result in a significant delay in establishing a permanent counting method for these important and needed resources.

Southern California Edison's proposal is very similar to the SEIA / LSA proposal, with the key difference being that SCE is proposing a slight de-rate in the QC for the generation resource under the Additive Method to reflect the generation used to charge storage. SEIA / LSA submit that the respective MOOs for Hybrid or Co-located Resources, including during the 4 p.m. to 9 p.m. peak period, will ensure that the full QC of the generation resource is available to the CAISO in the same manner as comparable stand-alone resources. We suggest that the Additive Method, as we have proposed it, could be adopted now, with the proviso that a future ELCC study could compare the ELCCs of Hybrid and Co-located resources to the Additive Method QCs using either (1) the SEIA / LSA proposal or (2) SCE's proposal for a small de-rate of the generation QC. This study could be used to further refine the Additive Method, if necessary.

11. Are there other variables or considerations not covered in the parties' proposals from the February 12, 2019 working group meeting?

Response: SEIA / LSA appreciate the robust discussion of these issues at the February 12, 2019 working group meeting.

12. Please provide any other general comments.

Response: None at this time – thanks for this opportunity.

Appendix B
CAISO Presentation



CPUC Hybrid Working Group: Hybrid Resource Capacity Counting

Chris Devon

CAISO Market and Infrastructure Policy

February 24, 2020

CPUC and CAISO definitions should be aligned

- CAISO's proposed definitions attempt to distinguish “co-located” resources and “hybrid” resources:
 - Hybrid resources have a single resource ID and co-located resources have two or more resource IDs
- Maintaining different definitions is problematic because CAISO is developing a market participation model and establishing distinct must offer obligations that are directly tied to these definitions
- **The market participation model MUST be considered when establishing QC methodologies**

Interim “greater of” method and purely “additive” qualifying capacity methodologies are not the best options to accurately reflect reliability contributions

- Neither approach ensures assigned reliability value will be realized in actual operation of resources with ITC charging restrictions
- Additive does not capture on-site charging impacts even if the resource(s) indicate no ITC charging restrictions
- Hybrid and co-locate resources are unable to guarantee charging behavior *ex ante*
 - May choose to charge from grid for a limited time, none of the time, or all of the time – **dictated by price economics**

CAISO hybrid resources stakeholder initiative is establishing a new market participation model

- Current proposal for hybrid resources (single resource ID configuration) will allow resource scheduling coordinator to manage the exposure to ITC charging restrictions
 - Net-to-grid forecast to be provided by SCs that reflects any decisions to charge via on-site generation
 - Allows SCs to dynamically adjust upper economic limit of resource to ensure feasible market awards and dispatch
- CAISO market participation model is important to consider for the development of QC methodology
 - No way to guarantee single resource ID configurations with ITC charging restrictions will be incentivized to actually provide reliability contribution in periods of need that reflects the QC values that have been established under the interim approach

ITC charging restrictions are not directly tied to the CAISO's market optimization or market design

- ITC is an out of market incentive and CAISO can not develop models or market functionality to manage exposure to ITC risk
 - Similar to RPS and PTC – these out of market impacts are not considered directly in the CAISO's market optimization but can be reflected and managed through bids and offers by SCs
- CAISO **will not** provide “on-site optimization” of single resource ID components and will not direct the on-site charging of storage components – only the overall net-to-grid output will be considered by the market
 - Up to the scheduling coordinator to accomplish all on-site optimization and manage any exposure to ITC impacts

CAISO believes the interim definition and QC methodology provides no QC methodology for hybrid resources without ITC charging restrictions

Hybrid Resource QC Methodologies Based on Interim Hybrid Decision

	With Charging Restriction	No Charging Restriction
Single Resource ID	Greater of ELCC VER component or storage component modified for charging capability	None, needs clarification
Multiple Resource IDs	Greater of ELCC VER component or storage component modified for charging capability	Standard QC for individual Resource ID technology

CAISO suggests CPUC adopt a durable counting methodology based on actual production data for all hybrid resources with single resource IDs

- CAISO proposes applying an exceedance based QC methodology to all hybrid single resource ID configuration regardless of ITC charging restrictions
 - Will more accurately reflect reliability benefits provided by hybrids
 - Resource scheduling coordinators will be determining when and how charging storage components will be accomplished
 - Exceedance based QC methodology will capture impacts of charging from on-site generation
- Exceedance better reflects true reliability contribution that resources provided in the past and that can be reasonably expected in the future

Exceedance based QC is important for hybrid resources (single resource ID) to better reflect actual contribution to reliability

- CAISO proposes the exceedance methodology applied for all hybrid resource (single resource ID configuration) should be assessed over a 5am-9pm window
 - Encompasses when a vast majority of system reliability issues occur and also captures production by all resource components
 - Captures the impacts of on-site charging and ITC charging restrictions
- “Additive” approach should be used for new hybrid resources (single resource ID configuration) for one or two years until historic production data is available to assess exceedance based QC value

Exceedance or other methodology that accounts for on-site charging interplay should also be considered for co-located storage resources with ITC restrictions

- For co-located resources (two or more resource IDs) with ITC charging restrictions:
 - CAISO proposes to continue use of ELCC for wind and solar and that an exceedance approach for storage resources is applied
 - Co-located storage exceedance should be assessed during AAH window
 - Will incentivize performance during AAH and shifting energy to greatest periods of need
- Co-located with separate resource IDs should each receive their respective QC values, not interim “greater of” – but any selected approach should capture impact of charging restrictions

Any approach for co-located storage resources (two or more resource IDs) must reflect on-site charging impacts for storage resources

- CAISO suggests the CPUC also consider alternative qualifying capacity methodologies for co-located storage resources with ITC charging restrictions that account for the impacts of charging restrictions and the relative sizing of the co-located resources
- Other approaches, such as a calculated daily charging capability cap for co-located storage resources could also address daily charging limitations
 - Calculations for caps based upon the daily charging capability and/or relative size of the storage and co-located wind or solar resource that is used for on-site charging have also been discussed by other parties (SCE, LSA)

Appendix C
Co-Chair Presentation



HYBRID QC METHODOLOGY WORKING GROUP MEETING 2

FEBRUARY 24, 2020



AGENDA

- CAISO Presentation
- Panel Discussion
- Next Steps

SINGLE VS MULTIPLE RESOURCE ID DIFFERENTIATION

- Single Res ID resources may not need to differentiate the QC between storage and the paired resource
 - The QC translates to a must-offer obligation in the CAISO markets
- Multiple Res ID resources would require individual QC values to ensure proper must-offer obligations (MOO) in the CAISO markets
 - Storage may charge solely from onsite generation or partially from onsite generation and grid energy
- There is general support that one of the resources may require a derate if using Additive QC methodology

PROPOSED DEFINITIONS

- Parties' views on Hybrid and Co-located definitions
 - Single Point of Interconnection and single resource ID
 - Either single or multiple resource IDs, but only if there is an Investment Tax Credit (ITC) charging limitation
 - All storage paired resources, single or multiple Res IDs, are hybrids, regardless of ITC charging limitations
- If ITC charging limitations define a resource as hybrid now, is it no longer a hybrid if it does not achieve the 75% ITC or ITCs roll off but still charge from the paired generator?
 - Are there other factors that create economic use-limitations (e.g. RECs)?

ITC CHARGING RESTRICTIONS AND MOO

- ITCs create an economic constraint or use-limitation for the hybrid resource that cannot be modeled by the CAISO
- Storage resources are incentivized to charge only or partially from the resource in order to obtain the ITC
- If the resource charges from the paired resource, how do the individual resources, if 2 Res IDs, meet the MOO?
 - The storage's MOO is not just during 4 to 9pm and would not be able to discharge outside of those hours because that would require grid charging at night and not qualify for the ITC.

POINT OF INTERCONNECTION

- SEIA/LSA notes that "The combined QC for all resources at the same Point of Interconnection (POI) cannot exceed the maximum allowed output at the POI, as established through the interconnection-request process"
- Is this the deliverability assigned by the CAISO for the paired resource or a different term?
 - Does the CAISO assign deliverability to each resource individually or at the POI?
- If the sum of QCs is greater than the POI, how does the ISO determine the appropriate derate? Which resource gets derated?

ADDITIVE QC METHODOLOGIES

- SEIA/LSA, SCE, CESA all proposed Additive QC methodologies
 - MRP, Sunrun and First Solar all support Additive QC
- Are the proposals only applicable to single resource ID resources?
- Should a 2 resource ID hybrid that's incentivized to charge from the paired resource be treated differently?
 - If yes, would the components of the Additive QC methodology apply to each of the resource IDs?

DERATING RENEWABLE QC VS STORAGE QC

- If charging solely from on-site renewable resource
 - SEIA/LSA proposes to derate the storage QC
 - CESA proposes to derate the renewable QC
 - SCE proposes to derate both the storage and renewable QCs
- If charging from on-site generation and grid energy, CESA proposes to derate the storage QC
- What led you to derate that resource?
- If the storage charges partially from grid energy, do you assume it will be fully charged and therefore would qualify for "full" QC?
 - Does SCE's proposal apply an Effective Solar QC if storage can partially charge from grid energy?

DERATE LIMITATIONS

- SEIA/LSA proposes 2 criteria must be met in order to derate only during winter months (Dec – Feb)
 - Charging only from Renewable
 - Storage is >75% of solar name plate (not wind?)
- CESA derates storage QC if over 50% under the NGR model
- SCE limits the storage QC based on the amount of energy that may charge from the renewable resource over a given period of time, 2 hours before net peak load begins
- Will Energy Division/CAISO have this information to validate the QC request?

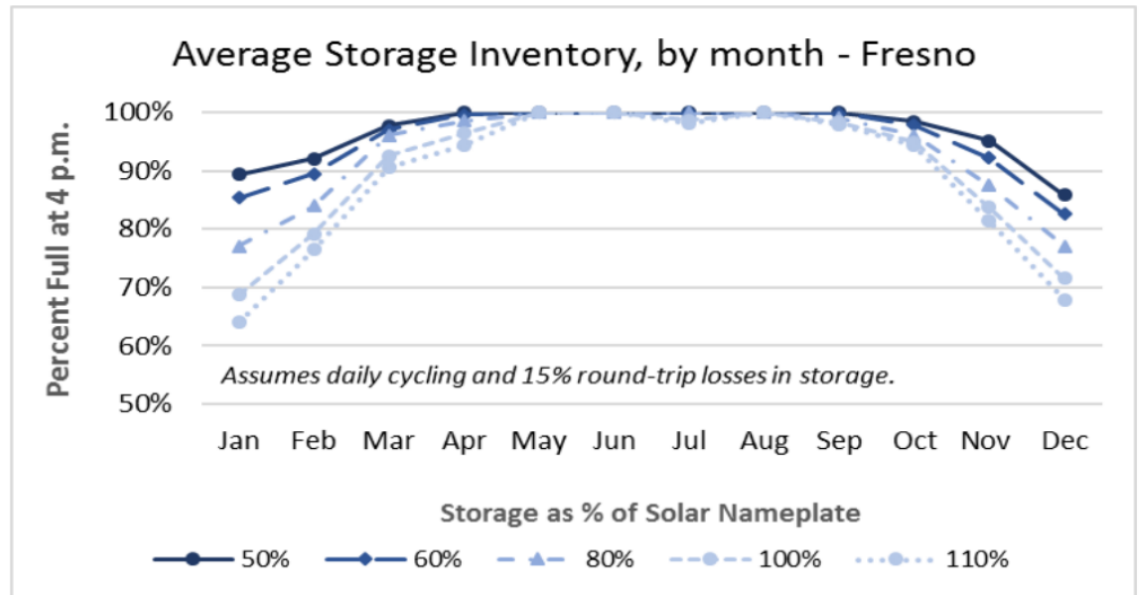
RPS HYBRID ELCC STUDY

- RPS Proceeding ordered IOUs to jointly perform an ELCC study for hybrid resources in order to use for future procurement
- If the RA proceeding adopts a different methodology, would you have any concerns with the inconsistency in QC methodologies?

SEIA/LSA'S PROPOSAL

- Does SEIA/LSA's proposal "require" the Solar resource to "fully" charge the storage until the earlier of 4pm or full, as in a self-schedule? After 4pm, the CAISO would optimize the charging and discharging along with the Solar production?
 - Is it appropriate to compare capacity factor during 4pm to 9pm to the Solar ELCC percentages that's calculated for all hours of the year?
- Should the winter months be November through February?
- Can the QC of the storage + the Solar ELCC during summer months be greater than the POI or deliverability?

Winter Months Are Most Challenging

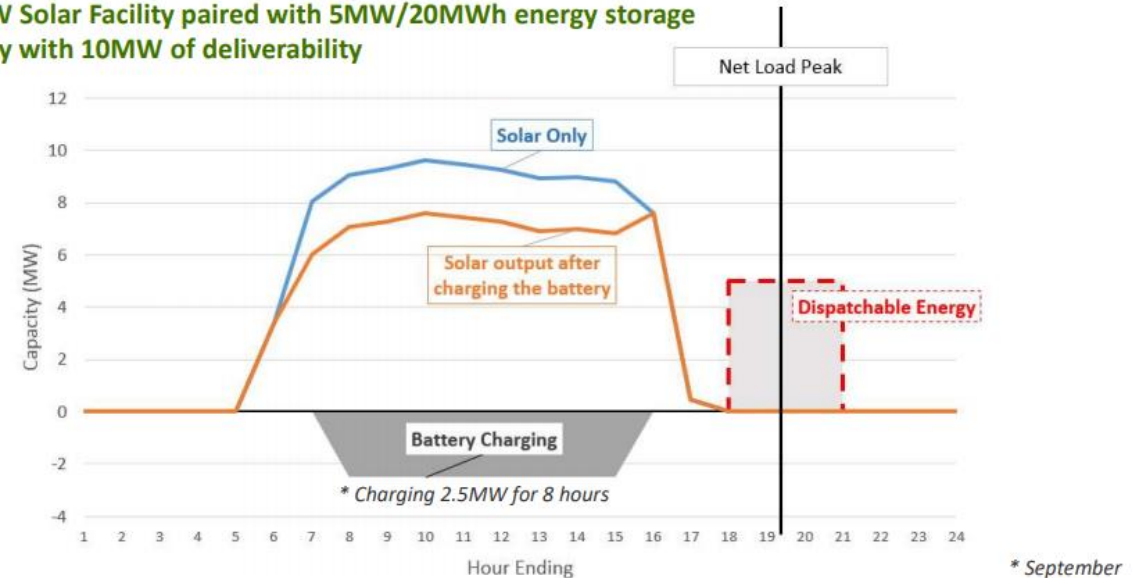


SCE'S PROPOSAL

- Will the storage be required to be charged at a constant rate by the renewable resource until 2 hours prior to the net peak load in order to achieve fully state of charge?
 - What if the storage resource charges fully in the first 4 hours of production and the Solar facility can fully output for the rest of the day?

Detailed Example

10MW Solar Facility paired with 5MW/20MWh energy storage facility with 10MW of deliverability



CESA'S PROPOSAL

- CESA's proposal assumes the storage will be at 100% because the grid can charge the storage
- Can the Charging Restriction (CR) variable be updated in future years based on ex post?
- Can you explain more about the de-rate factor?
- Is this added to the renewable ELCC?

Proposals for NGRs

- The determination of $NQCd_i$ shall be subject to:
 - Expected level of onsite charging (*i.e.*, ITC-related charging restriction)
- For illustrative purposes, an $NQCd_i$ formula could look like this:

$$NQCd_i = NQC(CR * x) + NQC(1 - CR)$$

Full credit for grid charging since this can be deliverable capacity

- CR refers to the ITC-related charging restriction (0.75, 0.8, etc.)
 - CESA notes this is just an approximation provided by owners; real restriction can only be known *ex post*
- X refers to the discount or de-rate factor
 - This is a function of solar generation above $ELCC_i$ and the Pmax of storage

CONSENSUS ATTEMPT – ADDITIVE QC METHODOLOGY

- Given the similarities, would parties consider merging the proposals into a working group proposal?
 - What changes are acceptable?
 - What changes are not acceptable?

BEHIND THE METER

- CESA/Sunrun seek the applicability of the QC methodology of hybrid resources not only to IFOM resources but also the BTM resources
 - Various issues related to BTM hybrid resources can inform the implementation and potential de-rate of their QC, but fundamental affirmation is needed
- What are the concerns/issues with extending QC applicability for IFOM and BTM hybrid resources?
 - Can the QC methodology be separated from the other issues?



NEXT STEPS

- 2/24: Working Group meeting #2
- 2/25: Draft Report to external distribution
- 2/26: External input due to Working Group Co-leads
- 2/27-28: Co-chairs incorporate input/Legal Review
- 3/2: File Working Group Report

Appendix D
CEERT Consensus Suggestions

CEERT “SUGGESTED” CONSENSUS FOR HYBRID RESOURCE RA COUNTING RULES WORK GROUP

FEBRUARY 26, 2020

First, CEERT commends the Commission, the Working Group Co-Chairs and all the participating parties for running a disciplined, fair, inclusive and balanced process for this Track 2 Working Group in spite of a very compressed schedule and all of the concurrent, overlapping working groups that drained time and energy from this working group. We believe that with just a little more effort over the next few days, this group can reach a consensus on both Track 2 issues for a June RA decision and next steps for a more “durable” solution in Tracks 3 and/or 4.

Second, CEERT strongly believes that a consensus step forward in time for a June Commission decision is critical for grid resiliency, the RA program itself, and important progress on SB 100 goals for the electric sector. We believe that the current “interim” counting rules, although meant to be “conservative,” are simply not workable and represent a step backwards in the transition of the grid from near exclusive reliance upon fossil resources towards provision of Essential Reliability Services by preferred resources. Use of the “Greater of” methodology quite simply takes away any economic incentive to nominate preferred resource hybrids for system RA showings. As the CAISO stated in the workshops, their interconnection queue contains roughly 37 GW of these hybrid resources and it would expect that roughly 10% of those would achieve full deliverability interconnection status in time to be relevant to the current IRP procurement of 3.3 GW of incremental RA resources. If any of these resources are actually picked up in this procurement, it will be in spite of, not because of, the interim counting rules. WE simply must gain actual procurement, operating and settlement experience with this critical class of resources in this procurement cycle to inform inevitable future procurements that are sure to come in the short term.

Consider a 100 MW fully deliverable stand-alone solar resource claiming the ITC that decides to hybridize or co-locate with a 50 MW/4hr battery. As a stand-alone resource, it would have an ELCC RA NQC of roughly 10 MW but would lose that NQC under a “greater of” methodology if it adds storage that clearly would increase its capacity value regardless of how NQC is measured. Consider an existing 50 MW/4 hr. battery in a load

pocket that is currently challenged to recharge in a multi day reliability event due to lack of energy production in the load pocket. It decides to build a co-located solar facility to provide a portion of that critical charging energy. That configuration would be clearly more valuable than the stand-alone battery, but would receive no RA credit for supplying this resiliency.

To CEERT's recollection, no party in the working group would dispute these facts. Instead, many parties focused on the potential for over counting the NQC of a hybrid or co-located resource using the "Additive" methodology – especially if that resource has restrictions on source of charging energy in order to claim the ITC. CEERT recognizes this as a legitimate issue, but maintains that the risk and consequences of that risk are less draconian than assumed, and do not warrant simple default to a "Greater of" methodology that clearly consistently severely undercounts the value of co-location or hybridization. CEERT points to the analyses done by Tom Beach for LSA examining ability to recharge the battery from the co-located energy resource at various relative size ranges. In CEERT's view, an even more compelling argument is the fact that none of the proposals account for the ability to charge with unmetered headroom from "clipped energy" during high insolation hours due to standard industry practice of using a high inverter loading ratio to achieve a flatter, broader production profile to maximize revenue under standard PPA terms. Finally, CEERT maintains that if developer/owners are given the opportunity to earn incremental revenue by application of an "Additive" methodology, they will respond by taking "grid friendly" hybrid design measures such as dramatically increasing inverter loading ratio, changing array spacing and orientation to maximize overall energy production of the battery/array combination, and use of more reflective ground cover and bi-facial cells to capture reflected insolation from the bare ground between array strings. These features can be quantified on a case-by case basis during PPA negotiations and their impact on RA value entered into CAISO master file data and measured by standard ELCC techniques.

Nevertheless, CEERT supports the "compromise" proposal forwarded by SCE that derates the "additive" NQC result by assuming that a sufficient amount of energy produced from the co-located resource is withheld and reserved for battery recharging (thus derating its ELCC value) before the late afternoon/early evening peak load hours, and that this energy is then discharged from the battery during that peak period at or after dusk. CEERT believes that this proposal reached a near consensus during the February 24

workshop and that SCE offered to tweak its proposal over the next few days to accommodate concerns expressed by parties. Subject only to seeing SCE's "tweaks" prior to signing onto a consensus position, CEERT strongly recommends SCE's proposal as a consensus Workgroup position for adoption by Commission decision in June.

Almost as important as adopting a fair and workable "interim" counting methodology by June in Track 2, is continued progress towards a more durable solution in the Fall of 2020 in Tracks 3 and/or 4. CEERT believes there is significant merit in CAISO's proposal to allow the Scheduling Coordinator to adopt a "class average" initial NQC value for new resources by the Additive methodology rolling into a "durable" individual NQC based on 1-2 yrs. of actual operating data, battery state of charge management to satisfy Must Offer Obligations handled by the Scheduling Coordinator, and transitioning to an "Exceedance Methodology" for hybrid resources. CAISO stated that the details of this proposal would be fleshed out in an April White Paper in its current stakeholder process, and that this proposal would be vetted and revised by its standard process over the summer. The other event that is already scheduled to occur in this timeframe is the completion of a marginal NQC study by the IOUs for use in RPS "least cost/best fit" evaluations. Most of the parties commenting on this study expressed a strong desire to have this RPS study at least inform the final adoption of a durable RA counting methodology in Tracks 3 or 4 -- whether an exceedance methodology from the CAISO stakeholder process or some form of ELCC developed based on procurement experience in the IRP incremental resource procurement, further LSA analytical work or other process from June to October, or other relevant information. CEERT strongly supports these efforts, and would only add the thought that a standard "Technical Review Committee" consisting of nominated, qualified non-IOU stakeholders in the RA proceeding be added to the IOU ELCC study process. This TRC would enhance stakeholder buy-in for the study and ensure its relevance to use in the RA as well as the RPS silos.

Finally, CEERT is persuaded by SunRun's proposal to apply this IFOM methodology to BTM resources once all the other issues associated with RA market participation by BTM resources are resolved. There is no need to actually calculate specific interim or durable NQC values for BTM resources until these issues are resolved for other than the current PDR process. However, it will be much more difficult to resolve these issues for either aggregated BTM DERs or DR itself without knowing how RA value

will be accounted for. A simple statement by the Commission in its June decision that it intends to adopt an RA counting methodology for BTM resources consistent with the IFOM methodology then in place at the appropriate time, and that this issue is in scope for Track 3 and/or 4 is all that is required.

CEERT couches this “late filed proposal” in terms of “consensus suggestions” and presents them prior to receiving and reflecting on the Draft Workshop report given the very compressed timeline to achieve actual formal consensus by March 2. CEERT does not assume that all or even any other parties agree with either the suggestions or the underlying assumptions/data leading to them. We simply believe that it is incumbent on all parties to try to reach a consensus on the path forward for this issue in this Track of this RA cycle, and this is the best we could think of to accommodate the expressed interests and positions of all parties following the workshops and prior to the March 2 deadline. We support the motion filed today by PG&E on behalf of the Co-Chairs of this working group and the Demand Response Working Group to allow an extra week to reach formal consensus without impacting the final schedule.