CESA
CALIFORNIA ENERGY STORAGE ALLIANCE

September 9, 2019

Email to: docket@energy.ca.gov
Docket Number: 19-IEPR-04
Subject: CESA's Solar+Storage Modeling Tool Comments

Re: Comments of the California Energy Storage Alliance (CESA) Following the August 19, 2019 Solar+Storage Modeling Tool Workshop

CESA appreciates the opportunity to comment on the development of E3's Solar+Storage Modeling Tool and to provide feedback to the California Energy Commission (CEC) following the discussions at the August 19, 2019 workshop. The development of this tool is timely as the state is already seeing significant behind-the-meter (BTM) solar-plus-storage project development and will begin to see many in-front-of-the-meter (IFOM) solar-plus-storage projects being deployed in the coming years.

CESA is a 501(c)(6) organization representing over 80 member companies across the energy storage industry and is involved in a number of proceedings and initiatives that address the various strategies and barriers related to growing the energy storage market to support a more reliable, cleaner, and more efficient electric grid. With our background and expertise, CESA hopes to help inform the CEC/E3 staff on the effective development of a modeling tool that can advance the valuation and modeling of plus-storage resources.

General Feedback on the Solar+Storage Modeling Tool

CESA believes the development of this tool is timely given California's procurement trends and ambitious policy goals. The tool is accessible, intuitive, and able to model complex scenarios from the perspective of different stakeholders interested in the evaluation of solar-plus-storage projects, tariffs, and programs. The asset evaluation use case is the most important from CESA's perspective since it allows the estimation of benefits in the form of rate savings and system avoided costs. CESA is also pleased with the inclusion of non-wires alternative (NWA) evaluation for transmission and distribution deferral within this model since this is a use case that has been seldom quantified with such ease. In CESA's view, other use cases, such as rate design and DER program design, are less likely to be used in a widespread fashion by utilities or policymakers, which we elaborate on further below.

While CESA appreciates these efforts to develop a tool that enables users to estimate most theoretical value streams for a solar-plus-storage project, this value-stacking is not reflective of the current regulatory and market panorama. Specifically, the tool generally does not account for CAISO rules on participation of paired resources when providing different grid benefits such as

ancillary services, energy arbitrage, and T&D deferral. This limitation is likely to hinder the usage of the tool for procurement or project development since it may overestimate the benefits derived from a solar-plus-storage project, making its adoption by IOUs and developers less probable. While the theoretical value stack may be beneficial for policy purposes to identify the potential value that could be realized by removing barriers, the utility of the tool would be limited, and its usage may not be widespread for real-world procurement and project development. Thus, CESA encourages E3 and the CEC to refine the Solar+Storage Modeling Tool to better reflect market participation rules by introducing additional variables to account for possible value-stacking that is consistent with CAISO rules.

Considering the potential for improvement, CESA welcomes the idea proposed by CEC and E3 at the August 19, 2019 workshop to schedule an additional workshop before the final meeting scheduled for December. Such a workshop could be used to evaluate the tradeoffs associated with more detailed modeling and collect feedback on the tool's performance under specific circumstances.

Response to Questions Following June 13, 2019 Workshop

CESA did not have an opportunity to submit comments following the June 13, 2019 workshop but thought it may be helpful to submit our belated responses here for the CEC staff's benefit. To the degree possible, CESA would appreciate consideration and incorporation of our feedback to the questions.

1. **What use cases are you most interested in? (e.g., behind the meter/front of the meter solar and storage asset evaluation, non-wires alternative evaluation, rate design, DER program design)?**

CESA is interested in each of the use cases mentioned from the workshop. CESA believes that the asset evaluation for BTM and IFOM resources is the most relevant use case of the model since it provides a thorough estimate of all benefits associated with the procurement of a paired resource. This information would enable stakeholders, such as individuals interested in installing a paired solution or utilities interested in evaluating IFOM projects or a BTM DER portfolio, to properly assess the benefit-to-cost ratio associated with solar-plus-storage pairings. Thus, this use case has the most potential to incentivize procurement by providing a detailed panorama of the tradeoffs related to paired resources.

A second relevant use case relates to the evaluation of NWAs for T&D deferral that offers utility staff working on their Distribution Deferral Opportunity Reports (DDOR) to assess the benefit-to-cost ratio of an NWA relative to a traditional wire upgrade. While this use case is appreciated by CESA, it is relevant to highlight the risks associated with its preliminary technology screening process, as it could hinder the probability of a project from being shortlisted in a potential request for offers (RFO) if operational and/or market capabilities are no accurately modeled. CESA elaborates on this issue further in its subsequent responses.

However, CESA finds that the rate design and Distributed Energy Resources (DER) program design rate cases might be the less impactful use cases of this tool. While this use case can be employed to inform decisions within utilities or policy agencies, it is unlikely that the stakeholders involved would rely on this tool considering rate/program design processes rely heavily on cost causation principles and ratemaking processes independent of solar-plus-storage optimization and operations. This tool likely should not be used to assess rate designs, though it may be helpful to provide relevant supplemental data to support the direction rate and program design processes should go in. Rather, this use case may only be useful for certain parties to assess how their solar-plus-storage resource could operate in response to new and upcoming rate designs.

2. **Which capabilities of the tool are most useful and compelling?**

Please refer to CESA's answer to Question 2 following the August 19, 2019 workshop.

3. **What essential features or capabilities is the tool missing to be most useful to you?**

Please refer to CESA's answer to Question 3 following the August 19, 2019 workshop.

Response to Questions Following August 19, 2019 Workshop

CESA appreciates the opportunity to provide these comments and feedback on the Draft Roadmap. We look forward to collaborating with the CEC and other stakeholders in this proceeding.

1. **Is the tool intuitive to use? Which part(s) of the tool do you want to be more user-friendly?**

Yes, the tool is reasonably accessible and intuitive despite its ability to model several complex use cases from the perspective of different stakeholders. The included user manual is detailed and comprehensive, allowing a user to quickly familiarize one with the tool and employ it for a variety of assessments. Additionally, CESA appreciates E3's willingness to provide the tool in the Excel-fronted version and its Python-based source code. The first allows users without programming experience to easily use the tool while the second enables experienced users to better understand the mathematical processes behind calculations.

2. **Which capabilities of the tool are most useful and compelling?**

As mentioned previously, CESA believes the asset valuation use cases are the most helpful for developers and aggregators to understand how competitive their offers could be in terms of benefit-to-cost ratios. It also useful for utilities that seek to evaluate and shortlist projects in competitive solicitations. The fact that the tool can also optimize the sizing of the project by making the size of both the solar PV system and the storage system decision variables is a compelling capability. This enables potential users to easily identify the arrangement that best suits their needs, from any stakeholder perspective. Another compelling feature of this model

relative to other similar tools developed by E3 is the granularity of time data supported. Considering that the value batteries provide to the grid depends largely on their ability to rapidly respond to market signals or grid needs, it is appropriate to allow users to use load data with time resolutions of less than an hour.

CESA believes that the adoption of this model substantially depends on its performance relative to their in-house models employed by developers and utilities. By basing the benefit-to-cost analysis on an avoided cost basis, the tool allows for resources to be evaluated from the perspective of different stakeholders within a single optimization run. This, however, might not align with the way developers and utilities vet projects since they are likely to favor a profit maximizing objective function based fully on applicable market participation rules. This observation links directly to CESA's general feedback on the model since one of the main weaknesses of the tool might be its overestimation of revenues to be stacked.

3. What essential features or capabilities is the tool missing to be most useful to you?

CESA identifies three fundamental areas of opportunity within this model:

i. An accurate estimation of capacity values for IFOM projects;

ii. Integrating weather data to the evaluation of reliability benefits; and

iii. An accurate depiction of market participation rules in order to properly asses potential revenues.

The first issue relates to the use of the avoided cost methodology to attribute avoided capacity cost benefits to the evaluation of IFOM paired resources. Currently, the accurate methodology to estimate the capacity value of paired resources involves ELCC calculations for the solar component and the usage of Resource Adequacy (RA) counting rules for the storage component. By using avoided costs to define capacity benefits, the tool might not accurately reflect the actual payments or benefits a paired project would receive, nor capture the stochastic reliability contributions of IFOM solar-plus-storage resources under ELCC modeling runs. Avoided costs should not be used for IFOM resources that provide supply-side benefits and services, unlike demand-side resources. The modeling documentation is unclear on whether IFOM resources will be assessed according to avoided cost methodologies.

The second point relates to the evaluation of reliability benefits. Currently, the tool evaluates reliability benefits considering three variables: the loss of load probability (LOLP), the value of lost load (VOLL), and the technologies ability to cover load in terms of energy. While CESA believes this approach is fundamentally correct, it would be beneficial to include a weather parameter in the calculation in order to assess if reliability benefits are likely to increase due to more extreme weather events.

Thirdly, the proper consideration of market participation rules might be the most important issue related to the adoption of this model by different stakeholders, particularly

developers and utilities interested in paired resource procurement. This evaluation is an overarching component of the model since it serves to optimize the dispatch of resources and ultimately provide insight regarding the economic viability and overall benefits associated to a project. E3 stated in the workshops that their model seeks to provide directional insight on the potential benefits of a paired project; nevertheless, by not properly limiting revenues given market participation rules or other real-world constraints, the model might actually hinder procurement of resources if benefits are consistently overestimated.

4. **Are the tool's assumptions, default values, and results accurate and appropriate for each use case?**

CESA generally agrees with the tool's assumptions and default values. CESA also appreciates that most of the preloaded values within the technologies, T&D, and avoided cost parameters can be modified by the user directly in the Excel-fronted version to easily test hypotheses under varying assumptions. Nonetheless, CESA also identifies several areas where improvements are possible. Firstly, CESA believes it would be valuable to reconsider the estimation of avoided Renewable Portfolio Standard (RPS) benefits. According to E3's user manual, currently the avoided RPS is set to zero for BTM resources. This might not be in line with the effect paired resources would have on California's long-term resource planning as modeled in the Integrated Resource Planning (IRP) proceeding.

Another, albeit more challenging, assumption to reconsider relates to the dispatch optimization done by the model. The model currently acts with perfect foresight. This may not be true for BTM projects focused on maximizing rate savings where there may be a certain level of uncertainty related to customer loads. Additionally, it may be less accurate when assessing the operation of an IFOM project that participates in several markets. This assumption, along with the fact that revenue streams are not accurately restricted relative to market participation rules, might overstate the benefits a paired resource thus providing erroneous expectations.

As it has been mentioned above, CESA considers a proper definition of market participation rules as essential to properly estimate revenue streams. The impact of this assumption and CESA's recommendations regarding it are further explained in the following response.

5. **Does the tool and analysis capture the revenue streams you examine in your own project development or evaluation process? If not, what is missing?**

The tool does a formidable job at capturing and including most of the theoretically possible revenue streams a paired resource can take advantage of. This tool clearly shows all the potential benefits paired resources can offer to users, utilities, policy agencies, and ratepayers in general. However, as it has been mentioned by the CAISO in the June 13, 2019 workshop and by CESA in its previous responses within this document, these revenue expectations might not align with the possibilities currently contemplated in the applicable market rules since these rules have yet to unlock the potential of storage and paired resources.

A clear example of this relates to how the tool models the ability of a resource to seamlessly transition from providing regulation, reserves, energy, and capacity within the CAISO. For example, if participating as a resource under Regulation Energy Management (REM), the CAISO optimizes the usage of the battery for system needs, which will, by definition, not be foreseeable to the battery owner. Thus, it is highly unlikely that a resource owner will be able to plan its participation in such a market while also considering the state of charge (SOC) needed to capture other revenue sources. In addition, under this scheme it is fundamental that the storage resource is capable of charging from the grid since the CAISO will rely on this resource to fluctuate its SOC constantly to maximize grid benefits. This is not compatible with a paired resource, which is likely to be limited to charging solely from the solar PV system it is paired with.

This operational scheme contrasts with the Regular Frequency Regulation format, where resource owners do not allow CAISO to determine the operation of the resource based on grid-wide needs and instead actively bid in the different potential markets. However, in this case, assuming the user has perfect foresight will also render overestimations of benefits, especially when the model does not account for potential penalties associated with participating in several markets.

The model allows users to select which revenue streams are available to their resource. While this is a viable proxy to obtain more conservative and realistic revenue estimates, it requires users to have a considerable understanding of the CAISO market participation rules to do so. Hence, CESA would appreciate if the model was fitted with a variable or a series of variables that enables users to select a participation scheme and estimate revenues given that scheme. This would facilitate the interpretation of outputs and establish more reasonable expectations regarding the available revenue streams.

6. Which results and outputs do you find to be the most useful?

CESA finds the graphs related to benefit-to-cost ratios, solar and storage dispatch, and rate optimization as the most useful outputs from the model. CESA appreciates the work done by E3 and the CEC in ensuring this tool provides clear and easily interpretable outputs for a plethora of use cases, especially in the form of graphs.

7. For which regulatory proceedings or policy discussions could the tool provide useful insights?

CESA believes this tool has great potential to provide useful insights regarding the value storage resources and paired resources can provide to the grid and to ratepayers across the State. Specifically, CESA considers this tool can be of use in the consideration of paired resources as a resource class within the Integrated Resource Planning (IRP) proceeding, the RA proceeding and the discussions of multi-use applications for energy storage, both within the CPUC and the CAISO. Furthermore, CESA sees the inclusion of the T&D deferral use case as an opportunity for utilities to design RFOs and streamline their solicitation process, providing more openings for NWAs to be considered in their distribution planning.

CESA agrees with E3's reading on the applicability of the tool. As it stands, the tool provides a *prima facie* overview of the economic viability of a project, not a conservative and detailed estimation of future revenues and benefits. Hence, CESA believes that this tool can serve as a data point to demonstrate the potential of these resources and inform where policies and market rules should go in order to fully exploit the potential of paired resources. If this tool is to be adopted by stakeholders for more robust future estimates, it will need to better incorporate dispatch reliant on imperfect foresight (*i.e.*, chronological dispatch) and market participation schemes for paired resources.

Conclusion

CESA appreciates the opportunity to provide these comments and feedback on the modeling tool and the workshop. We look forward to collaborating with the CEC, E3, and other stakeholders in this proceeding.

Sincerely,

Jin Noh
Policy Manager
CALIFORNIA ENERGY STORAGE ALLIANCE (CESA)
jnoh@storagealliance.org
510-665-7811 x 109

Sergio Duenas
Policy Consultant
CALIFORNIA ENERGY STORAGE ALLIANCE (CESA)