DOCKETED

Docket Number:	21-ESR-01
Project Title:	Energy System Reliability
TN #:	247836
Document Title:	California Solar & Storage Association Comments
Description:	N/A
Filer:	System
Organization:	California Solar & Storage Association
Submitter Role:	Public
Submission Date:	11/30/2022 2:54:22 PM
Docketed Date:	11/30/2022

Comment Received From: California Solar & Storage Association
Submitted On: 11/30/2022
Docket Number: 21-ESR-01

CALSSA CEC 21-ESR-01 RFI Responses

Additional submitted attachment is included below.

November 30, 2022

California Energy Commission
Docket Unit, MS-4
715 P Street
Sacramento, CA 95814

Re: Docket No. 21-ESR-01—Responses to Request for Information on Clean Energy Alternatives for Reliability

California Energy Commissioners and Staff:

The California Solar & Storage Association (CALSSA) appreciates the opportunity to submit responses to the Request for Information (RFI) issued by the California Energy Commission (CEC) on November 7, 2022.

The RFI seeks information about resources and attributes to be considered in analysis required pursuant to SB 846 and AB 205 from the 2021-2022 Legislative session, as well as information regarding the potential design of the Distributed Electricity Backup Assets (DEBA) program.

CALSSA's responses to the RFI and input on DEBA focus on battery energy storage and most specifically on customer-sited and distribution-connected storage. Storage, both behind the meter (BTM) and in front of the meter (FOM), addresses multiple state policy goals, including clean energy and climate goals, energy affordability goals, and grid reliability goals. We urge the CEC to treat energy storage as a central element of its efforts to expand clean energy resources for reliability, including by moving past existing demand response paradigms and developing policies that make the most of battery storage's characteristics as highly controllable, dispatchable, and versatile energy resources.

A. List of Resource Types and Evaluation Attributes

1. Categories in Tables 1-3

The categorization into supply, demand, and supply/demand resources may be of some value, but these categories should not be used in a rigid way. There are many resources for which the distinctions among supply resources, demand resources, and supply/demand resources are not clearcut, such as energy storage. Different categorization may be possible depending on which use cases are being considered, where the resource is interconnected, or the lens through which the resource is viewed.

3. Other Attributes to Consider

The CEC should consider as a possible attribute for qualitative evaluation a resource's ability to shift load from net peak hours to times when the grid supply has a high proportion of zero-carbon resources. This ability to reduce the grid's net peak and avoid the use of carbon-emitting energy resources serves reliability and clean energy goals.

4. Weighting of Attributes

Attributes can and should be weighted in the qualitative analysis. Weighting can be conveyed visually by changing the size, number, or color of symbols such as Harvey Balls.

Dispatchability should be prioritized, given that the focus of the CEC's work is grid reliability. A reliability program must incentivize resources that can respond to events with a high level of control and confidence. Resources that can be precisely controlled to provide energy discharge nearly instantaneously in response to rates, program events, or other price signals can provide a greater level of certainty in their response to reliability events, compared to resources that do not have these types of control capabilities.

The CEC should consider and potentially modify the definition and scope of Dispatchability as an attribute, to avoid creating a screen suggesting a resource has less value than it in fact has. If a resource is selected to provide a specific grid reliability service, its ability to respond to different event frequencies, durations, and notification periods other than those relevant to that specific service is immaterial. Additionally, because understandings of *firmness* vary, we recommend omitting or replacing the term in the definition of Dispatchability.

Cleanliness should be weighted more highly than other attributes as well. The need to transition away from energy resources that worsen the climate crisis is at the center of all energy planning and development in California today. Resources that do not emit greenhouse gases (GHGs) should be weighted more favorably than low-GHG resources.

Equity should also be given greater weight, as it must be central to all energy policy making. The definition of Equity should also be modified to explicitly include energy, environmental, and economic benefits to communities of concern, not only negative impacts.

5. Data/Information Sources

The recently released 2021 SGIP Energy Storage Market Assessment Study completed by Verdant Associates is a useful source of information about BTM energy storage.[1]

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[1] 2021 SGIP Energy Storage Market Assessment Study (Verdant 2021 SGIP Study), Nov. 10, 2022, https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-

B. Resource Characterization

1. Overview: Customer-Sited and Distribution-Connected Energy Storage

Customer-sited BTM and distribution-connected FOM battery energy storage is a distributed resource that can act as both a supply and demand resource. Storage is extremely versatile, able to provide demand reduction to the grid while serving customer load, and also able to serve as a generation resource that injects energy onto the grid.

Storage is highly dispatchable and, coupled with control software, can respond to numerous event triggers and price signals. It can be directly metered with a high degree of accuracy. Batteries can be operated for multiple types of use cases that provide value to both customers and the grid. Batteries can help achieve state climate and reliability goals.

Battery storage can be installed at all types of customer sites, including single- and multifamily residential sites and commercial and industrial (C&I) sites. C&I includes, but is not limited to, governmental and not-for-profit entities, school and university campuses, manufacturing, and retail.[2] Storage system sizes vary from small residential systems to large scale systems of 2 MW or greater. Portfolios of batteries enable smaller systems to be aggregated into larger-scale grid resources, and portfolios and aggregations should be included in the understanding of customer-sited energy storage as a resource. Furthermore, BTM storage provides critical resilience services and attributes during power outages.

2. Comparison with Conventional Generation

Unlike conventional generation, batteries do not have direct GHG or priority pollutant emissions from their operation. Energy storage can enable a long-term cleaner energy mix. As explained in the 2020 SGIP Energy Storage Impact Evaluation, energy storage reduces emissions when the system charges during cleaner grid hours and discharges during grid hours with greater emission levels.[3] The evaluation found that emissions reductions have been substantial since 2018, when SGIP incentives began to be provided for residential systems, and that with

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division/documents/self-generation-incentive-program/sgip-2021-market-assessment-study.pdf

[2] Multifamily residential is often categorized within the commercial market segment.

[3] 2021 SGIP Energy Storage Market Impact Evaluation (Verdant 2020 SGIP Impact Evaluation), Oct. 1, 2022, https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/self-generation-incentive-program/sgip-2020-energy-storage-impact-evaluation.pdf

greater system efficiency and utilization, there are more GHG emission benefits in both residential and non-residential sectors.[4]

3. Reliability Support

Batteries are versatile and can provide numerous reliability services. It is important for the CEC to determine in advance what services it wants batteries to provide and then design a program and incentive structure to encourage those services.

Services that batteries can provide include:

- Supply
- Demand
- Permanent load reduction
- Load shifting
- Net peak reduction
- Backup
- Ancillary services (e.g., reserves, regulation)
- Renewables integration

While customer-sited batteries are often conceptualized as demand reduction and treated as a demand response (DR) resource that provides grid services through existing DR programs, batteries have distinct characteristics and will provide the greatest level of reliability when programs are designed to take advantage of those characteristics.

One of the key differences offered by batteries compared with DR is their ability to discharge above host site load and export energy to the grid. From a grid standpoint, BTM batteries provide reliability support regardless of whether their discharge solely serves onsite load or instead exports to the grid and serves load on the same circuit.

Another difference is that the performance of BTM batteries can be measured directly using direct metering without the need to use baselines. This provides greater certainty in projecting and planning how to meet grid reliability needs and streamlines measurement of performance after the fact.

Programs should focus on battery dispatch capabilities independent of load. Keeping energy storage within a demand response framework reduces its effectiveness in achieving program goals. When treated as DR, not only are batteries limited by customer load in real-time operation, but they are also forced to underestimate their potential contribution when committing capacity to program participation. If resources can only commit to participating up

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[4] Verdant 2020 SGIP Impact Evaluation, p. 84.

to an amount of customer load that are certain will occur, they will commit much less than if they were only limited by actual storage system power and capacity.

a. On-Call Emergency Resource

Customer-sited batteries can easily serve as incremental on-call resources during grid emergencies, through the use of clear price signals and program design.

Batteries can provide demand reduction/supply during emergency events, while also reducing load during peak hours on a routine basis. To ensure maximum emergency response from batteries that routinely provide peak load reduction/supply, a program should not use baselines that create a disincentive for response during emergency events. Rather, a battery's performance during an event should be determined by the measured kW/kWh discharged during the event window.

4. New MW and MWh per Year

To date, California has approximately 1 GW of BTM energy storage installed, more than half of which has been installed since 2020.[5] Much of this capacity was installed through the Self-Generation Incentive Program (SGIP), which is largely depleted. Incentives are an important driver of the amount of new resources that can be deployed going forward.[6] Given the uncertainty around the current landscape of BTM storage incentives and several other factors affecting customer adoption, it is difficult to predict the future MW and MWh that can be provided between now and 2035. However, the following projections offer some guidance.

Bloomberg NEF's 2H 2022 Energy Storage Market Outlook projects over 7,000 MW of customer-sited solar will be installed in California by 2030.[7] This projection will be realized only with strong policies, but it provides an indication of the potential.

CALSSA did internal projections based on solar interconnection trends, assuming storage attachment rates will approach 100% by 2035, additional storage will be installed as retrofits with existing solar and as standalone storage, and MWh will average approximately 3x the installed MW capacity. These estimates show the achievable potential assuming a strongly supportive policy environment for BTM storage, particularly in the nearer term as supply chain and cost constraints continue to affect deployments, and while solar and storage developers

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[5] https://www.californiadgstats.ca.gov/charts/

[6] Verdant 2021 SGIP Study, p. 139

[7] See https://about.bnef.com/blog/global-energy-storage-market-to-grow-15-fold-by-2030/. BNEF forecasts that customer-sited storage will be approximately 1/4 of global storage installed by 2030, or about 100 GW/300 GWh of the total global 411 GW/1,194 GWh forecasted.

educate customers to the value of including storage with solar systems and as standalone assets. These values are consistent with the Bloomberg NEF forecast.

BTM Storage
Projected MW and MWh per Year
With Strong Policy Support

Year	MW	MWh
2023	300-350	900-1,050
2024	375-450	1,125-1,350
2025	450-550	1,350-1,650
2026	575-700	1,725-2,100
2027	750-900	2,250-2,700
2028	950-1,150	2,850-3,450
2029	1,200-1,400	3,600-4,200
2030	1,400-1,650	4,200-4,950
2031	1,550-1,800	4,650-5,400
2032	1,650-1,950	4,950-5,850
2033	1,700-2,000	5,100-6,000
2034	1,700-2,000	5,100-6,000
2035	1,700-2,000	5,100-6,000

The CEC can also use the National Renewable Energy Laboratory's Distributed Generation Market Demand (dGen) model, which analyzes factors affecting market demand and customer adoption, to evaluate deployment potential under different scenarios.[8] With dGen and drawing on reports analyzing technical, economic, and market potential, the CEC can reach reasonable projections that will serve its current analytical, planning, and program objectives.

Concurrently, FOM system capacity is growing, and there is a potentially untapped market for FOM customer-sited storage that is able to be used entirely as a grid resource and also provide customers (residential and non-residential) with backup during an outage.

a. Emergency Asset

Because storage is an inherently flexible resource, program design can enable maximum dispatch when needed during grid emergencies. Substantial storage capacity could be dispatched during extreme heat events, provided the program is correctly structured to incentivize discharge during these hours.

8 https://www.nrel.gov/analysis/dgen/index.html

If an emergency program paired with DEBA measures performance during emergencies like extreme heat events based on measured kW/kWh discharge during the event rather than using baselines, then all new energy storage installed through the DEBA program will be incentivized to discharge its full capacity. These new storage resources can be considered fully "incremental" even without a baseline because their deployment represents an incremental grid resource that would not have been installed without the support of the DEBA program

If, instead, a program uses baselines to measure only the incremental performance above battery cycling on non-event days, battery assets that would have otherwise cycled for grid benefit on non-event days would be incentivized to not cycle on non-event days, to show a higher response during emergency events. This would deprive the grid of beneficial storage cycling to reduce net peak demand across the delivery season. In either case the actual amount of power and energy delivered during an extreme heat event is the same and provides reliability service, but by reducing the amount of recognized performance, baselines could have the unintended consequence of higher net peak loads on non-event days.

5. Levelized Cost

Future costs depend on variables that are unknown and that can change for unforeseen reasons, so projections of costs into the future can only be speculative. This is true not only for customer-sited energy storage but for all energy resources, even where stakeholders offer projections.

With respect to nearer-term costs, CALSSA members report different costs depending on market segment and other specifics of their business models and customer bases, as well as individual project circumstances. Information provided here is generalized.

Commercial & Industrial

The table below presents an estimate of the 15-year levelized cost of BTM C&I energy storage in 2023, for systems of different sizes, provided by CALSSA members in the C&I market. These costs do not necessarily include grid service aggregation, market participation, or measurement and verification (M&V) costs. The values could typically vary in a range of approximately 20% plus or minus those shown here.

	Ultralight 40 kW 4 hr	**Light 120 kW 4 hr**	**Small 250 kW 4 hr**	**Medium 1 MW 4 hr**	**Large 2 MW 4 hr**
NPV CAPEX	$180,000	$450,000	$770,000	$2,500,000	$4,700,000
NPV OPEX	$30,000	$60,000	$285,000	$850,000	$1,300,000
NPV TOTAL COST	$210,000	$510,000	$1,055,000	$3,350,000	$6,000,000
MW	0.04	0.12	0.25	1	2
MWh	0.16	0.48	1	4	8

$/MW	$5,250,000	$4,250,000	$4,220,000	$3,350,000	$3,000,000
$/MWh	$1,314,000	$1,063,000	$1,055,000	$838,000	$750,000
$/MW/year	$350,000	$283,000	$281,000	$223,000	$200,000
$/MWh/year	$88,000	$71,000	$70,000	$56,000	$50,000

Residential

In the residential segment, end cost to the customer typically ranges from approximately $1,200,000 to $1,400,000 per MWh, again with substantial variation by product, site, customer needs, and other factors.

6. Time to Operation

Currently, C&I storage companies are experiencing average times of 12 to 18 months to deploy. This timing is highly dependent on interconnection timelines, construction permits, and product availability. After interconnection is approved, the time to launching operations can be around 6 months.

The time from purchase to operation is longer than pre-COVID, when timelines were typically substantially shorter. With streamlined interconnection and permitting, sufficient supply, and available labor, C&I storage has the potential to be operational in 6 months from ordering.

Residential storage can be deployed more quickly than C&I systems, with a typical time for a solar-plus-storage system averaging approximately 2.5 to 3 months, although this time can be lengthened substantially if the project encounters obstacles such as permitting issues. While residential storage systems are faster to deploy, building MW aggregations of new systems can take time to ramp up customer sales and programs. It takes longer to sign up customers and operationalize MW-scale residential aggregations. However, the residential market will move quickly once appropriate incentives become available and streamlined grid services program requirements are understood.

8. Target Customers

Batteries are suitable for all types of customers. While in both residential and non-residential segments, customer needs differ across sites, batteries are optimized to accommodate the specific needs of a given customer, and the CEC should therefore allow and encourage all customer classes to participate in its programs.

Furthermore, policy support is needed in both the C&I and residential segments. SGIP funds for non-residential customers are mostly depleted. The lack of incentives has meant many projects are not viable. For that reason, the DEBA program should ensure that funds are made available for deployments at non-residential sites.

Residential customers also face a lack of SGIP funding and should also be eligible for DEBA. Although each individual residential battery is small, aggregations of residential batteries can provide substantial reliability benefit. These resources can often be developed more quickly, with more predictability of adoption rates.

While the focus of the CEC's RFI and related efforts is on reliability, work to increase deployment of energy storage at customer sites in both the residential and non-residential sectors will create substantial co-benefits in increased resilience. Government, educational, and hospital sites that need to provide critical services and can serve as resilience centers are important targets for this reason.

Additionally, inverter-based FOM systems of 10 kW and below are eligible for the CAISO interconnection fast-track process and may suit the CEC's desire for systems able to fully deliver grid resources, specifically for customer-sited residential and ultralight commercial customers where reliability has value but the BTM retail value is less impactful.

9. Key Non-Financial Barriers

Battery energy storage is an established technology that does not face barriers to development like more nascent technologies do. Barriers exist to deployment of storage resources, but several of the barriers discussed here can be overcome through policy changes and cooperation among policy makers, developers, utilities, and jurisdictions governing permitting.

Supply Chain

Supply chain issues for battery components are a current drag on deployment, as they both slow the pace of installations and increase costs. These supply chain issues are not unique to energy storage, and stem in large part from the Covid pandemic's disruptions to the global economy, as well as inconsistent policy support over the past several years.

The pace of customer-sited battery installation in California continues to grow even with the current constraints on supply. BTM storage installations in 2022 have already exceeded the installations in 2021, according to the California Distributed Generation Statistics website.[9]

Recent, planned, and projected increases in manufacturing capacity will increase in supply. The Inflation Reduction Act will be a major driver of new production capacity, particularly as a result

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[9] https://www.californiadgstats.ca.gov/charts/

of its incentives for domestic manufacturing. New manufacturing facilities are already coming online or are planned.[10]

CALSSA members hope that recent policy changes, manufacturing capacity growth, and other trends will ease supply constraints in the near to medium term, while recognizing that future demand for battery storage raw materials and components may continue to constrict supplies.

Interconnection and Permitting

While interconnection queues for distribution-connected energy resources are typically shorter than for transmission-connected resources, interconnection timelines and backlogs can delay projects. Efforts to streamline interconnection processes and to address backlogs will be important to lessening the impact of interconnection-related delays.

In the C&I segment, Fire Protection Permitting with Authorities Having Jurisdiction (AHJs) has been challenging for batteries greater than 500 kW. Despite having relevant certifications and standards on storage equipment, project developers at times must engage in lengthy discussions with local authorities to educate and find a compromise on fire protection compliance.

Customer Acceptance

There is a need to educate customers about the use and opportunity of energy storage as a reliability and grid service resource. To date, residential customers have primarily been encouraged to think of storage as a resilience asset, providing backup power in grid outages.[11] C&I customers primarily use batteries to reduce energy bills through cycling for demand charge management. Customers therefore prioritize maintaining a higher level of reserve energy in their batteries, over cycling their batteries to reduce the grid's net peak demand. Operating customer batteries for grid reliability can provide a new value stream that customers are not yet familiar with but which they come to value when they are educated about it.

Customer-sited batteries will continue to need to serve the customer's specific needs, and customer economics will play a large role in the decision whether to adopt storage. Customers will benefit from access to financial incentives at the time of purchase.

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[10] See, e.g., https://insideevs.com/news/618643/tesla-megapack-factory-lathrop-california/ (Tesla Megapack factory in Lathrop, CA, with 40 GWh/year of production capacity); https://pv-magazine-usa.com/2022/11/11/freyr-plans-the-giga-america-lithium-ion-battery-manufacturing-facility-in-georgia/ (multiphase project in Georgia whose first phase will produce approximately 34 GWh)

[11] Verdant 2021 SGIP Study, Figure 5-26, page 102.

The key opportunity to educate a customer and gain their acceptance of battery operation for both personal and grid reliability is before they have purchased and installed a battery system. A program aimed at deploying new resources can take advantage of that opportunity and will enable those new resources to be sized and operated in a way that can easily contribute to emergency reliability while also serving the other primary use cases that typically drive deployment.

Labor Supply

CALSSA members are currently experiencing some labor shortages that have slowed their ability to quickly bring new storage systems online. This is partly a result of the Covid pandemic and is expected to ease in coming months and years. Additional focus on training and recruiting workers will help in overcoming this barrier.

10. Key Financial Barriers

Given recent supply constraints, costs for energy storage have increased. Developers surveyed for the Verdant SGIP study generally reported that capital and labor costs have increased, and many also reported increased costs for permitting and interconnection.[12] Factors include Covid and the economic shutdown, supply chain issues, increased shipping costs, and labor market tightness. Developers expect higher costs to continue but not to increase at the rate they have in recent years. On the other side, incentives through the SGIP program have become unavailable for many customers.

The cost of an energy storage system is a barrier, and BTM battery customers generally will not install a system unless they can recover their investment through bill savings and revenue after installation.[13] Customer savings provided by a battery often do not cover the entire cost of the system. Thus, additional revenue streams, through incentives and/or grid services programs, are needed to support battery deployment. Some customers may consider entering into a site lease for a customer-sited FOM system in exchange for backup power during grid outages, providing an opportunity for incentives to support such installations.

Financing is another important consideration, particularly in the C&I segment, where nearly all systems are financed. Financing batteries is very difficult if the revenue streams are uncertain. For example, if a program’s compensation rates are dynamic and changing hourly, daily, seasonally, or yearly, projecting revenue is difficult and uncertain and therefore makes obtaining financing difficult. Certainty is key to financing, which in turn is key to deployment.

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[12] Verdant 2021 SGIP Study, p. 97.

[13] Up-front cost is the primary barrier to adoption for a large portion of customers in both residential and non-residential sectors. Verdant 2021 SGIP Study, p. 112.

11. Benefits to Low-Income and Disadvantaged Communities

Batteries can provide numerous benefits to low-income and disadvantaged communities and tribes, including:

- bill savings,
- resiliency/backup power, and
- onsite renewable integration.

Benefits also include resilience and backup power for critical service providers such as water agencies, healthcare facilities, schools, and transit districts.

C. Input on Distributed Electricity Backup Assets Program Design

When the DEBA program was created through the passage of AB 205 (in Public Resources Code section 25791), it was paired with the Demand Side Grid Support program (Public Resources Code section 25792). The former provides an incentive for deploying new distributed energy assets that use zero- or low-emission technologies and requires funding recipients to participate as on-call emergency resources during extreme events. The latter incentivizes customer participation in a program for on-call emergency supply and load reduction during extreme events.

CALSSA's responses to the RFI's questions on the DEBA program design understands DEBA through this lens: it is meant to focus on deployment of new clean energy resources, and to be paired with a program through which those resources serve grid reliability needs. It is best to view these two elements as part of a cohesive program design, while recognizing that each element serves a specific purpose and that the program development for each is necessarily somewhat separate, including because they are funded from separate sources.

1. Resource Size and Customer Types

One of the greatest advantages of energy storage is its flexibility. Technology to aggregate smaller individual assets into larger grid resources is well established, and aggregated storage resources are in operation throughout California today.

For this reason, the DEBA program should target any size of battery storage located behind or in front of the meter at any type of customer class (e.g., residential, non-residential including commercial, industrial, multifamily, and government) as long as it can operate as required, either individually or as part of a fleet. If the program offers a standard $/kWh incentive, then it will ultimately fund the same amount of MWh regardless of the individual system sizes. SGIP limits on system size for residential systems have not benefited the program but rather have created unnecessary complexity for some residential storage developers, and such limits should be avoided.

The CEC may wish to consider allocating funds for residential and non-residential storage separately or take other measures to enable customers in both segments to participate.

2. Incentive Structures and Amounts Needed to Accelerate Deployment

As noted above, DEBA incentives and the compensation through a companion program for participation as on-call emergency resources ideally will be considered together and appropriately balanced. Both an incentive to reduce the cost of deployment (DEBA) and an ongoing payment to keep customers engaged in a grid services program (DSGS) are important elements.

The incentive and program design should make participation simple and attractive. For financed systems, customers must save money with the system compared to without it. For cash purchases, customers must recoup their investment within a reasonable number of years.

The DEBA program should provide incentives either entirely upfront or with upfront incentives as a significant element. The upfront cost of energy storage is the primary barrier to customer adoption.[14] Reducing that barrier must be a top priority. Additionally, an upfront incentive design is simpler and easier to administer than ongoing incentive payments.

We recommend that an upfront incentive represent at least 50% of the total amount of the value provided from the combined DEBA and companion grid-reliability program.

As the main source of incentives for BTM storage in California, SGIP offers useful guidance for evaluating successful and less successful aspects of a BTM incentive program design. We recommend that the CEC set incentive levels to support a higher level of deployment through the DEBA program than exists with the current SGIP incentive levels. SGIP step 3 may be a useful starting point, although CALSSA members generally believe incentive levels will need to be higher to accelerate deployment, as discussed further below.

The CEC should also consider setting incentive rates specific to IOU territories, to account for differences in their tariff rates.

There are additional considerations in determining the appropriate incentive level and the balance between the DEBA incentive and compensation through the paired program.

If the CEC approves any other emergency reliability programs for DEBA recipients to participate in beyond DSGS, the CEC will also need to account for potential differences between the DEBA-

[14] Verdant 2021 SGIP Study, p. 112.

paired programs in terms of compensation levels and mechanisms.[15] Ideally, equipment receiving funding through DEBA will be able to select among different DEBA-eligible programs to participate as emergency resources during extreme events. The level of DEBA funding must account for the fact that some programs may contribute less to the resource's overall value proposition than others will. That said, to the extent possible, DEBA incentive levels should be set in a way that simply, sufficiently incentivizes development and deployment regardless of the program in which the equipment participates and the level of grid services commitment, to simplify the program.

Additionally, developers and customers need to have sufficient certainty about the complete value proposition to deploy new resources. In designing the DEBA program, the CEC must consider that incentive levels must be higher if performance payments through the reliability program are uncertain, to provide the needed certainty. DEBA could offer lower incentive levels if the corresponding reliability program offers greater certainty.

The length of time over which DEBA recipients will be obligated to participate as grid resources must also be considered in setting incentive levels. The incentive level must take into account the operational costs to dispatch resources for reliability needs. Moreover, resources will be limited in their ability to operate for the customer's primary needs over the duration of program participation, and that limitation must also be included in valuing the incentive.

The following observations are offered as preliminary guidance on appropriate total levels of compensation from the DEBA incentive program. We will provide further input as the CEC's work to develop the DEBA program continues and as there is greater clarity about the program or programs through which DEBA resources provide reliability services, including compensation levels and structures.

- On average, C&I developers estimate that the total DEBA incentive would need to be in the range of $300-$400/kWh to be attractive to customers and accelerate deployment above current levels.
- Residential developers estimate an incentive range, on average, of $400-$500/kWh could attract customers and accelerate deployment.

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[15] Public Resources Code section 25792(c) states that entities with generation or load reduction assets incentivized through DEBA must participate in DSGS. If that provision is interpreted to enable participation in programs other than DSGS, or if the provision is amended, CALSSA supports the CEC enabling DEBA-funded resources to participate in the Emergency Load Reduction Program (ELRP) and potentially other programs for emergency reliability.

Each project has different economics and incentives in this range would be low for many projects, but CALSSA members believe this could be a reasonable range to meet the DEBA program's objective of deploying new resources to provide emergency grid support. This range presumes a generally certain level of compensation through program participation, and with less certainty or lower compensation, a higher DEBA incentive would be needed.

For reference, here are three programs that offer upfront incentives for residential battery systems providing grid services.

- Green Mountain Power BYOD Program—$850/kW for 3-hr discharge, $950/kW for 4-hr discharge
- Hawaiian Electric Battery Bonus Program—$850/kW for 2-hr discharge
- NYSERDA Long Island Energy Storage Incentive—$250/kWh in exchange for enrolling in LIPA/PSEG's Battery Rewards Program

3. Conditionalities, Measurement, and Verification

Conditions

To meet with the legislative intent, the primary, and preferably only, condition should be that DEBA recipients participate in a program that provides reliability services to address emergencies and avoid outages.

The condition of participation should be for a set term, which may be limited by the term of the companion program. We recommend that the term be no less than 5 years and no more than 10 years. A 5-year term is probably more reasonable and practical given the expected duration of available companion programs.

To keep the DEBA program simple and focused on its main objective of deploying more clean energy resources for emergency reliability, the CEC should avoid imposing other conditions on recipients. The CEC might prefer DEBA-funded resources to cycle during a broader set of hours beyond the most extreme events, if it determines that meets the statutory objectives and serves California policy goals. Doing so could increase the program's cost-effectiveness. The incentive structure would need to appropriately value the additional hours of dispatch to adequately incentivize participation and deployment.

Measurement and Verification

Measurement and verification of performance during emergency events should be part of the companion program design rather than of the DEBA program itself.

For BTM systems, measured discharge should include both discharge that serves onsite load and any discharge beyond the premises meter, exported to the grid.

Batteries should be directly metered at the device level rather than using whole-premise meters. Additionally, event performance should be determined by kW/kWh discharged by the battery during the event without comparing that to discharge on non-event days. While baselines may be appropriate for traditional demand response programs, batteries can be accurately measured to determine exact performance during events.

It is particularly important not to add complicated, time-consuming, and costly baseline measurement methodologies like the Load Impact Protocols, which will impede the program's goal of accelerating deployment and having resources participate as emergency grid resources to their full potential.

For verification, system owners or operators/aggregators can provide operational data such as 15-minute interval data for called event days, on a monthly or annual basis. An approach with a dashboard like that used in the SGIP program is an option, to enable automated verification of performance after data are uploaded.

We presume that performance requirements would be imposed through the companion reliability program instead of DEBA itself. If so, penalties should be part of the reliability program design where appropriate. Penalties are not appropriate for programs like ELRP that are voluntary and do not entail a commitment to perform. Where penalties are appropriate, they could be calculated on a prorated basis for event shortfalls. Additional penalty provisions within the DEBA program itself are likely not needed but could be considered during the program development process. If DEBA were to include penalty provisions, this could include terms for the clawback of upfront incentives in the event of performance shortfalls over multiple months.

4. DEBA Program Recommendations

CALSSA welcomes the opportunity to provide input into the design and implementation of the program. As noted above, we believe the best approach is to consider DEBA and DSGS (or another companion program) as a cohesive whole, while recognizing that many elements of the ongoing program are best included in the DSGS design. Because these elements are critical to success of the total program package and will greatly impact how many new resources can be deployed through DEBA, we offer some observations here.

Program Dispatch

Certainty has great value for customers being asked to allow a battery operator to manage their battery system for grid benefit. Both the amount of compensation and the time when program dispatches are likely to occur should be reasonably certain. Pure emergency and market signals do not offer much certainty, so a program that includes dispatch based on these signals must have certainty in compensation through other means, such as a higher upfront incentive.

There is also value in bringing clean resources online before a true emergency, to avoid such emergencies to the extent possible and to minimize the use of last-resort resources like diesel generators. Dispatch during a broader set of hours may be appropriate for this reason.

A narrower dispatch length than 4 or 5 hours—as in current DSGS options—is better able to take advantage of the value of battery storage technology. Program design should reflect the higher value to the grid of a dispatch that more precisely delivers energy during the critical hours of a peak event than dispatching at lower output over a longer period. The optimal dispatch length of BTM energy storage at full rated capacity is more typically 1 to 3 hours.

Discharge Inclusive of Exported Energy

The program should be designed to enable all discharge from a battery to be counted, not only discharge that serves onsite load and that is thus limited to the load at the time of discharge. From the perspective of supporting grid reliability, it should not matter whether the resource supplies energy to meet demand behind the meter or serves load beyond the meter on the same circuit

Restricting storage discharge to solely reducing customer load greatly inhibits the reliability value of storage, often substantially reducing performance and leaving energy stranded when it is most needed.

For many C&I customers, load drops significantly in the evening, after workday hours. This is especially true of schools, which can also provide significant exported energy during the summer, when most reliability events occur. Including exported energy means that many more customers in C&I market segments will find the value proposition attractive enough to install a new storage system.

Baselines

As previously discussed, the use of baselines has posed obstacles to deployment and the participation of BTM batteries as grid reliability resources. Baselines that account for customer load introduces substantial uncertainty and leads to conservative estimates of storage capacity that can be committed to grid reliability programs.

We recommend using directly metered storage discharge to determine event performance rather than using baselines that compare event days to non-event days, to calculate the response that a resource provided. There are several reasons for this recommendation:

- Not including baselines in a new program will greatly simplify it and better enable resources to be deployed and participate quickly.
- New storage resources incentivized through DEBA will be incremental in that they are being deployed to provide response during event hours, and it should be assumed they are available as emergency reliability resources because of the incentive. If new batteries cycle during non-event days, that does not diminish the emergency response for which they were deployed.
- A battery that routinely reduces peak load during non-event days and likewise reduces peak load during emergency events provides more value to the grid than a resource that provides the same load reduction only on event days and never reduces peak load any other day. Subtracting the discharge on non-event days from that on event days reduces the incentive for the resource to cycle during non-event days in order to avoid reducing the comparative, deemed performance during events. This could lead resources to stand inactive on non-event days.
- If baselines are included, compensation for program participation will be lower than without baselines. A higher incentive will need to be provided through other means to reach the threshold of financial viability for many customers and achieve the desired level of new deployments.

If baselines are included, an approach measuring performance at the device (similar to the Meter Generator Output approach but enabling exports to be counted) is preferable to a baseline that considers whole-site load in comparison with load on non-event days.

Conclusion

This RFI is an important tool for the CEC's work to expand deployment of clean energy resources to support reliability of the California grid. The need is urgent given fast-accelerating climate change impacts and the imperative to reduce greenhouse gas emissions and slow the pace of climate change. Customer-sited battery energy storage can provide significant reliability benefits without emissions and must be part of these efforts to ensure the grid is both green and reliable.

We appreciate the CEC's energy leadership and look forward to continuing to provide input as this important work continues.

Sincerely,

/s/ *Kate Unger*

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