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SEIA and CALSEIA comments on August 22nd workshop

Additional submitted attachment is included below.

September 11, 2017

To: California Energy Commission – Docket No. 17-BSTD-01

Re: 2019 Residential Standards: Residential Solar Photovoltaic, Storage, Energy Design Rating and Grid Impacts

I. INTRODUCTION

The Solar Energy Industries Association (SEIA®) and the California Solar Energy Industries Association (CALSEIA) appreciate the efforts of the California Energy Commission (Commission) to promote energy efficiency and to promote the development of renewable energy in striving towards Zero Net Energy (ZNE) goals.

SEIA and CALSEIA submitted joint comments in response to the April 22nd CEC Workshop on ZNE. We would like to reiterate those comments, as amended and expanded here.

II. ZNE, SOLAR & STORAGE, CALGREEN

The 2019 standards should take California all the way to Zero Net Energy for new homes, as discussed, debated, and promoted for almost a decade.

As stated in our previous comments, SEIA and CALSEIA encourage the Commission to carry through all the way to ZNE goals with the 2019 development cycle. In the past decade, hundreds of articles have been written about California reaching residential ZNE by 2020, and enthusiasm about California's ZNE goal continues today. In press releases and public statements, Governor Brown has made clear that California will continue to be a leader in climate goals even after our federal government has indicated a withdrawal from the Paris agreement.

We applaud the Commission's innovative work on a multi-faceted approach to achieving results that are "almost ZNE," and providing tools to encourage and assist communities to achieve ZNE independently. We still think we can do even better, and can achieve a statewide ZNE standard in this cycle. There is no reason that this cycle shouldn't result in residential ZNE by 2020, as California has the technology, policy leadership, public support, and political will to get there. We believe energy storage paired with photovoltaic generation can reduce any grid impacts and enable residential ZNE by 2020, as discussed in subsequent sections of these comments.

SEIA and CALSEIA recommend that the compliance credit for PV systems be maintained in the 2019 standards, as modified by a PV plus storage strategy.

Flexibility in energy codes and standards ensures a builder has the discretion to include innovative technologies in a compliance path that meets California's energy conservation goals

as well as carbon-reduction goals of AB 32. SEIA and CALSEIA strongly support flexibility for the builder to choose the most cost-effective solution that leads to ZNE. We support a holistic approach, where energy efficiency (EE) and renewable energy (RE) measures are fully integrated into a whole-building compliance model, such that EE and RE have equal importance and equal standing.

As stated in our previous comments, the compliance credit for solar thermal systems has existed in the BEES for decades with no controversy. It is only because of the success of renewable energy systems and the growth of the PV market that this one technology is being singled out and treated by some as a threat instead of a market-ready, cost-effective solution.

We recommend the Commission transition the existing PV compliance credit into a PV-plus-storage compliance credit. PV paired with battery storage provides a demand reduction benefit at the meter that is similar to an efficiency measure. At a minimum, the existing scheme could be modified such that PV plus storage is given the same compliance credit constraint as in the current cycle, based on the energy savings of high performance attics (HPA) plus high performance walls (HPW).

However, we encourage the Commission to give further consideration to cases where this constraint seems counter-intuitive. For example, in mild climates such as San Diego, HPA plus HPW would not have much benefit and would therefore result in a very small or nonexistent PV-plus-storage compliance credit. A compliance credit should be available even in mild climate zones, to encourage deployment of PV paired with battery storage in those regions. In the case of custom homes, PV-plus-storage compliance credit can provide architects and designers a greater amount of artistic and architectural freedom.

SEIA and CALSEIA continue to be concerned about cost estimates used in justification of compliance measures.

PV system costs have steadily decreased, and are expected to decrease further by the effective date of the 2019 standards. We recommend a continued dialogue to update assumptions for cost of PV and storage systems. The research team at SEIA can provide the latest historical data and can provide some projections. We also recommend the Commission work with CBIA to refine the cost assumptions for efficiency measures to make sure they are not underestimated.

SEIA and CALSEIA support the Commission's recommendations in Part 11, CalGREEN.

We agree with revision of CalGREEN to provide two tiers, with one tier reaching all the way to zero time dependent value (TDV). To simplify the goals of the intermediate tier, we are in favor of a uniform goal across climate zones, rather than a "split-the-difference" goal for each individual climate zone.

III. ENERGY STORAGE SHOULD BE FULLY INCORPORATED AS A MEASURE FOR BUILDING CODE COMPLIANCE

SEIA and CALSEIA appreciate that the Commission recognizes the benefits of solar plus storage for grid harmonization and for the contributions it can make to the goal of ZNE homes. Not only can storage balance the local load and ensure the homeowner is always using locally-produced solar, but any excess energy can be used to relieve grid needs and displace fossil fuel generation. The state still has work to do to make price signals align with grid needs, but this is being discussed in various forums and mandatory time-of-use (TOU) rates for new solar plus storage customers will ensure storage is utilized in concert with grid needs.

A) Local Storage can help with grid benefits and GHG reductions.

Because the marginal cost to generate electricity is positively correlated with emissions, using batteries to store energy when it is inexpensive for use during times when costs are high can significantly reduce emissions and strain on the grid. Energy storage coupled with solar PV is a dynamic solution that will be critical to meeting the state's ZNE goals and overall greenhouse gas (GHG) targets. Solar PV paired with storage enables the generation and storage of renewable energy during the day, the discharge of the battery storage system when energy is more expensive during peak periods, and the ability to participate in utility grid services or potentially wholesale markets to maximize benefits for customers and the grid.

The 2025 California Demand Response (DR) Potential Study, which looks at grid needs and demand response, found that "traditional demand response – that which reduces hot summer peak demand – may be of limited value in the future…In its place, the study finds a need to shift customer usage patterns to complement abundant day-time solar generation."[1] The study goes on to find that when "combined with a battery, any load can provide flexible services that meet the requirements of the Shed, Shift, and Shimmy service types. Residential and Commercial batteries have the potential to provide significant services to the distribution and transmission grid along with highly-valued site-level reliability and bill savings benefits."[2] When evaluating storage within the EDR framework, the Commission should therefore recognize its ability to provide unique grid benefits beyond lowering electricity load.

To address any concerns about grid issues due to high penetrations of renewables, we recommend that the Commission consider provisions and compliance options in the performance pathway that pair solar with storage systems. One way to achieve this is to allow storage to provide an overall energy design rating (EDR) credit value, acknowledging that storage paired with solar can dynamically and reliably reduce overall electric load at any time of day. This reduces overall energy consumption and has the potential to provide significant grid and GHG benefits. Solar plus storage can also meet the dynamic needs of the grid in the way that typical reductions in electricity needs cannot. For instance, storage has the potential to export during ramping periods or absorb energy during over-generation periods. This is the type of dynamic activity the 2025 Demand Response Potential Study identifies for responding to urgent grid need. Not only is the impact of solar and storage minimal to the grid, but it can provide benefits that other methods cannot.

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[1]Final Report on Phase 2 Results, 2025 California Demand Response Potential Study, March 1, 2017 2025 California Demand Response (DR) Potential Study, introductory remarks.

[2] Final Report on Phase 2 Results, 2025 California Demand Response Potential Study, March 1, 2017, 5-56.

B) **Storage should have an EDR credit value.**

Current target EDR proposals allow builders to use more efficiency and less solar to reach their target. SEIA and CALSEIA are very supportive of high-quality building envelopes and of offering builders the flexibility to choose cost-effective solutions. This flexibility should also apply to solar plus storage as a compliance option. We support the standards requiring energy efficiency measures as the first priority to reducing overall building load and a primary ZNE strategy. However, as storage prices continue to decrease, they will reach a point where they become cost-competitive with efficiency measures in specific circumstances and, eventually, more broadly. To seamlessly handle this transition, compliance through solar plus storage solutions should be permitted after baseline energy efficiency standards have been met. This would mean allowing solar and storage to offset prescriptive energy efficiency measures as discussed below and as outlined in Tesla and CBIA's May 2017 comments. The cost of meeting more stringent energy efficiency measures may exceed the cost of installing a solar plus storage solution. As discussed above, a solar and storage system can effectively reduce electricity load much in the way energy efficiency can.

The proposed 2019 standards approach includes increasing energy efficiency requirements. Allowing builders to flexibly combine solar and storage and energy efficiency measures under a performance based approach that goes beyond the 2016 standard efficiency requirements would allow a builder to have the flexibility to include both solar and storage to meet grid efficiency and cost effectiveness standards and obtain an acceptable EDR target. The Commission contends that currently, storage "is still too expensive to be cost-effective for the 2019 Standards, but this rapidly changing and can be cost-effective in a future cycle of Standards."[3] However, declining prices and increasing customer benefit from TOU arbitrage, backup power, and other value streams could make solar plus storage a worthwhile investment for builders and homeowners in the 2019 Standards. The staff report from the Public Utilities Commission (PUC) on ZNE standards found that "in some cases, customer or homebuilder installations of storage for other purposes, such as demand charge mitigation and TOU bill management, may be able to provide the necessary grid integration services at little additional cost."[4]

Moreover, feedback from builders indicates that the cost-effectiveness of many efficiency measures is variable and many efficiency measures may not be cost-effective for some homes. Adding solar-plus-storage as an additional compliance pathway would give builders the flexibility to meet the requirements at the lowest possible cost to the customer. It is important to note that the exact cost-reduction trajectory for energy storage is not known and cannot be predicted. Excluding solar-plus-storage from the 2019 Standard cycle – for all customers – based on current storage costs ignores the possibility than this solution could become the lowest cost solution – at least for some customers – before or shortly after the 2019 standards take effect. The cost decreases seen in the solar industry have conclusively shown how new technologies can decrease cost faster than even the most optimistic expectations. Rather than exclude solar-plus-

[3] Proposed 2019 Building Energy Efficiency Standards ZNE Strategy, CEC slides, August 22, 2017 workshop, slide 8.

[4] "Residential Zero Net Energy Building Integration Cost Analysis," California Public Utilities Commission, Issued July 26, 2017, p. viii.

storage from the 2019 standards based on current and expected pricing, it would be far wiser (and more beneficial to builders, homeowners, and the grid) to devise a standard that allows the option for solar-plus-storage to be smoothly incorporated into ZNE home designs where it provides the best value.

IV. A MOVE TOWARDS HIGHER PENETRATIONS OF SOLAR IN THE TITLE 24 BUILDING CODE IS CONSISTENT WITH STATE'S CLIMATE GOALS

We understand "Grid Harmonization" as defined by Commission Staff to have two components: 1) meeting the needs of the bulk energy system, particularly addressing concerns related to over-generation and power plant ramping needs in the evening associated with the "duck curve"; 2) addressing any impacts to the distribution system of higher penetrations of distributed solar, which was the focus of the DNV-GL study presented by PUC Energy Division staff.

Title 24's expanded use of solar energy is consistent with meeting needs on the bulk system

Any concerns about grid harmonization should be put into context of California's larger energy policy landscape. The 2016 Integrated Energy Policy Report (IEPR) mid case assumes 16 GW of behind the meter solar, up from 5.6GW at present.[5] In the 2015 IEPR, it is determined that a zero net energy standard will only add 1.056 GW by 2026. The scale of the building code's incremental solar deployment is relatively small compared to the amount of solar we will need to deploy to meet the state's climate goals. Given Commission Staff's proposals for allowing for batteries and other technologies to meet code under the performance track, Title 24 will be well aligned to help integrate higher penetrations of renewables while also helping offset infrastructure needs on the transmission and distribution system.

The National Renewable Energy Laboratory has demonstrated how California can generate 50% of the state's electricity from both distributed and utility-scale generation within the state.[6] Simply put, we need to make the fossil generating fleet more flexible, electrify transportation (and manage its charging), enhance demand response both in response to system events and time of use rates, and regionalize operation and planning of the generation and transmission system. The state, through various initiatives, is pursuing these strategies and we are far from reaching 50% of our state's generation coming from in-state solar. Indeed,in 2016, California received 13% of its generation from rooftop and utility-scale solar generation[7].

Distributed generation will be key to realizing the state's climate goals, particularly as loads grow to electrify building energy uses and transportation. Any consideration of upgrades to the distribution system must be made in the context of an overall strategy for achieving our climate goals and must be balanced with the benefits that those distributed generators provide, including avoiding upgrades to the distribution and transmission system which would otherwise be needed. Indeed, these benefits to the transmission and distribution grid are sizable.

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[55] http://www.californiadgstats.ca.gov/
[6] https://www.nrel.gov/docs/fy16osti/66595.pdf
[7] http://www.seia.org/state-solar-policy/california

California recently passed a milestone of 700,000 distributed solar systems in California.[8] At the same time, there is growing deployment of local clean energy technologies like batteries, energy efficiency and demand response. These resources are saving California utility ratepayers money by avoiding costly utility upgrades. A few notable recent examples, include: 1) the California Independent System Operator (CAISO) determined that the Central Valley Power Connect project, which would have cost between $115 to $145 million to construct, may no longer be necessary due to the forecasted increases in the development of distributed energy resources, including distributed solar, and a later peak energy demand in the greater Fresno area;[9] 2) In 2016 PG&E announced the cancellation of 13 CAISO-level transmission projects due to energy efficiency and rooftop solar, resulting in $192 million in transmission cost savings for PG&E customers.[10]

Moving towards greater amounts of solar generation in Title 24 is consistent with cost-effective portfolios for meeting the state's climate goals

Senate Bill 350 (De Leon 2015) requires the PUC and the Commission to develop an Integrated Resource Planning (IRP) process for the load serving entities and publicly-owned utilities, respectively, which achieves a resource portfolio consistent with the utility sector's contribution to an economy-wide 40% reduction in greenhouse gases by 2030. The PUC recently released analysis showing that between 4 GW and 10 GW of new solar generation on line by 2026 is cost effective for meeting carbon targets consistent with that goal and in light of the benefits of procuring renewable energy before the expiration, or step-down, of the federal renewable energy Production Tax Credit and Investment Tax Credit[11]. This is in addition to the 16 GW of rooftop solar presumed in the model, based on the mid-scenario case in the 2016 Commission IEPR. As noted above, a ZNE building code is assumed to add slightly over 1GW in incremental capacity by 2026.

[8] http://californiadgstats.ca.gov/
[9] http://www.fresnobee.com/news/local/article122063189.html
[10] https://www.greentechmedia.com/articles/read/Californians-Just-Saved-192-Million-Thanks-to-Efficiency-and-Rooftop-Solar
[11] CPUC, Integrated Resources Planning proceeding (R.16-02-007), preliminary modeling results: http://www.cpuc.ca.gov/irp/prelimresults2017/

Figure 1: Default Case Results for CPUC IRP Modeling

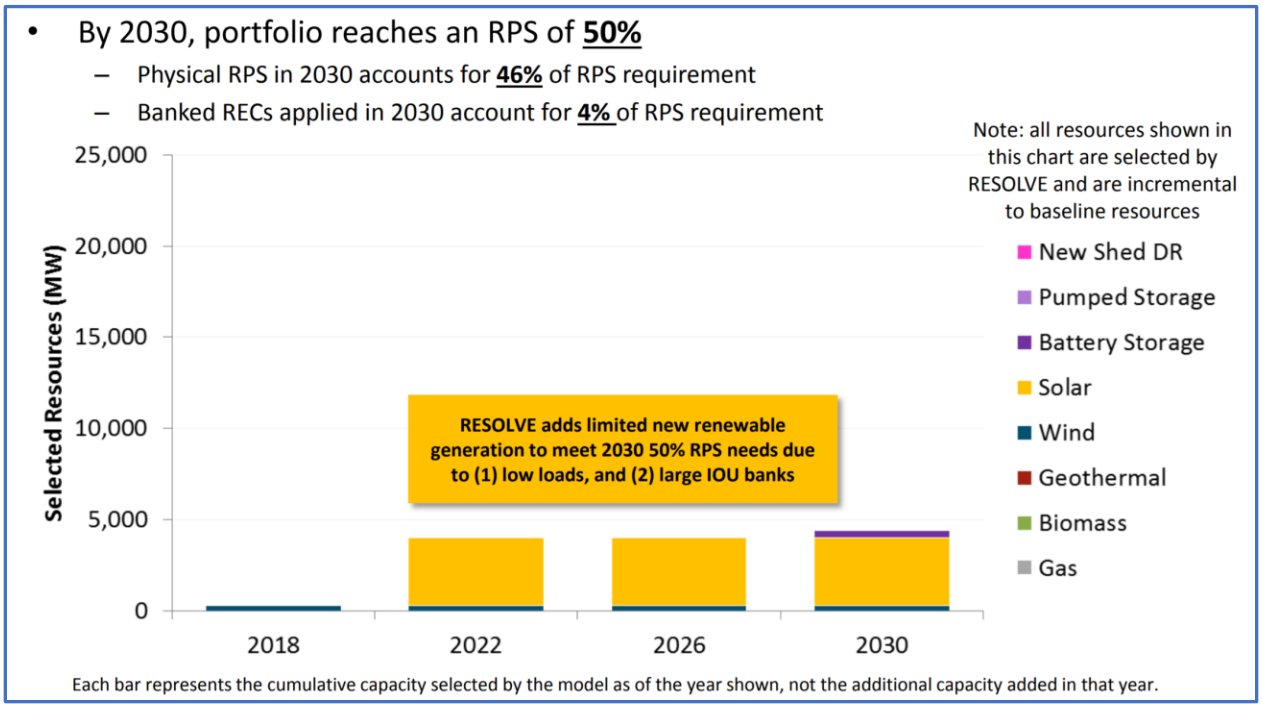
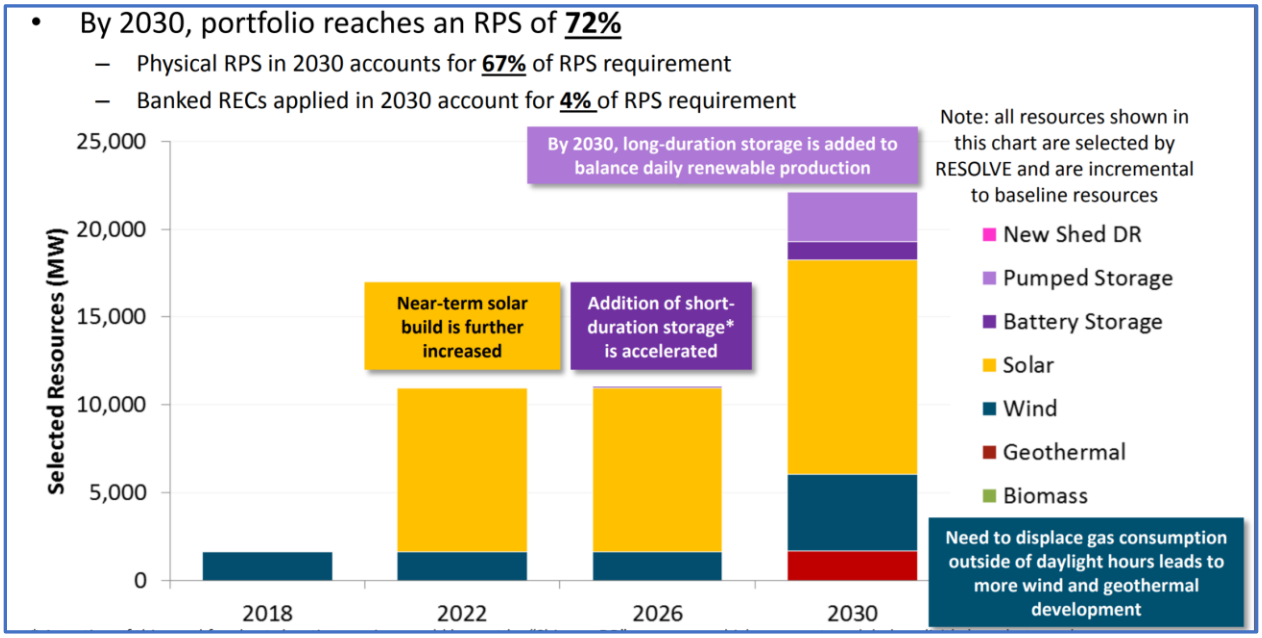


Figure 2: CPUC IRP Modeling 30MMT GHG Target



The DNV-GL Study provides a useful analysis for discussion but is deficient in ways that overstate impacts of distributed generation based on assumptions that are unrealistic.

We thank the PUC for commissioning this report from DNV-GL. Though we disagree with some of the estimates and the assumptions underlying them, it is useful to have a methodology and analysis to inform discussion about possible costs. We included our full informal comments submitted to the PUC on August 10th as an appendix, but we expand upon a few key points relevant to the Commission's deliberations over the 2019 code.

1) Cost-benefit analyses need to include all relevant costs and benefits

   In the paper and the PUC's presentation on August 22nd, there is a caveat that the study is not a cost benefit study. However, the premise of the presentation is that DER integration costs need to be considered as part of deliberations over whether to move to ZNE homes, because the costs of DER integration are not included in the Commission's evaluations. This is a true statement, but the Commission's analysis is purely an assessment of the cost-effectiveness from the perspective of the *participant* (i.e., the homeowner). Unless rules about upgrades for behind the meter systems change, customers do not bear the costs of these upgrades directly.

   If the Commission is going to consider costs outside those borne directly by homeowner, they must also consider benefits. For example, distributed solar generation avoids transmission and distribution expenditures and generates societal benefits. These are all benefits being considered as part of the PUC's revamp of its avoided cost framework for distributed energy resources in the Integrated Distributed Energy Resources proceeding (R.14-10-003).

2) Solar on new home construction may have different impacts than if it is installed on existing buildings and existing distribution equipment

   Since many new homes will be part of new communities requiring new distribution feeders, there should be an opportunity for utilities to take into account the ZNE mandate and the existence of new generation in the design of distribution feeders, which in turn should reduce integration costs. The study performed its analysis using a sample of 75 existing circuits throughout the utility territories in California without considering that line extensions to serve new housing development might be designed differently to account for the ZNE mandate if that mandate were in place when the distribution equipment was being built.

3) In the DNV-GL study storage is presumed to be deployed in a manner that is unrepresentative of how storage is likely to be deployed

   The study assumes that storage is deployed solely to manage overvoltage and backflow conditions ***after*** distribution system upgrades have been deemed necessary to mitigate impacts. As the study notes, it does not consider how storage used for other use cases by customers, such as TOU arbitrage. This is an unrealistic assumption, particularly given that industry's expectation is for wide deployment of customer-sited storage by 2020.

Indeed, customers will use batteries for a range of functions that will provide a wide range of benefits of benefits to customers and the electric grid, including system and local capacity, energy benefits, peak shaving and backup power. To attribute the entire cost of a battery solely to the mitigation of distributions system impacts ignores the additional benefits batteries will provides and would not be a sound means to evaluate cost-effectiveness.

Staff's proposals around how "grid harmonization" strategies will count towards compliance also makes unrealistic assumptions about how storage will be deployed.

Designed correctly, rate design could encourage customers to store daytime solar energy for high cost, high carbon hours in the evening, thus reducing exports during the low-load hours which can drive distribution grid integration challenges. Indeed, in PG&E's general rate case, SEIA has proposed a revenue neutral and cost-based set of solar-plus-storage rates which could be economically viable if adopted today.[12]

The Commission is currently considering whether to include battery storage as a measure in the next cycle of the Title 24 code update, since storage can significantly improve the time-differentiated value of energy consumption. If storage is included in the Title 24 code, then storage should be considered as the "default" case in the integration study, rather than a mitigation measure that is added if and when mitigation is required.

V. SEIA AND CALSEIA APPLAUD THE COMMISSION FOR EXPLORING OPTIONS FOR TITLE 24 COMPLIANCE OUTSIDE OF USING THE GREEN TARIFF SHARED RENEWABLES PROGRAM

1) As needed, the Commission should move forward in developing multiple, flexible offsite renewable energy options for compliance with the 2019 code in collaboration with the PUC

There are multiple ways, including some of those outlined by staff, by which offsite projects could be built as an alternative mechanism for compliance with the building code in instances where a builder is unable to build solar onsite to meet the code. This could include projects where homeowners have long-term contractual relationships for power with the project owner; indeed, many builders will offer solar on new homes paid for with leases as part of new homes sales. Alternatively, homeowners could own portions of a solar system; this is a common business model in some states with thriving community solar markets.

The contractual or ownership models for offsite solar already exist. What is needed is for the PUC to develop an appropriate tariff for conveying the benefits of the offsite generator to the homeowner. As staff noted in their presentation, currently Virtual Net Metering (VNM) tariff could serve this purpose, but it is currently limited to customers on the same property, and Net Metering Aggregation is only applicable to buildings on contiguous properties owned by the

[12] Prepared Direct Testimony of R. Thomas Beach on behalf of the Solar Energy Industries Association, Pacific Gas & Electric General Rate Case Phase 2 Application 16-06-013 (March 15, 2017), https://pgera.azurewebsites.net/Regulation/ValidateDocAccess?docID=405494

same property owner. However, as Vote Solar, SEIA, and CALSEIA have demonstrated in the PUC's on-going net-metering proceeding, the Commission could expand the VNM program to serve customers beyond those on the same property[13].

2) The Green Tariff Shared Renewables Program is Inappropriate as a Tool for Compliance with Title 24

During their presentation, staff considered a number of different options for providing offsite solar options for meeting the building code. Staff's presentation suggested that the Green Tariff Shared Renewables Program was unlikely to meet the requirements for a successful offsite renewables option for compliance with the Title 24 building code. SEIA and CALSEIA wholeheartedly agree that the Green Tariff Shared Renewables (GTSR) program is inappropriate.

GTSR Challenges the Economics of Title 24 Compliance by Undervaluing Distributed Generation

Staff envisions local distribution-sited projects that provide many of the same benefits to customers and to the grid as behind-the-meter systems. However, GTSR makes the cost-effectiveness of such options for customers challenging. Indeed, the program currently results in multiple cents-per-kilowatt premiums over standards rates. This is a result of GTSR's rate design structure, which undervalues distributed generation. While some will argue that GTSR's rate design was established to achieve "ratepayer indifference", this indifference was achieved not thorough examination of costs and benefits, but instead by applying a departing load charge to participating customers even though they remained bundled customers of the utilities. At the same time, GTSR provides no benefits for avoided transmission or distribution, which are substantial benefits of distributed generation. GTSR only provides credit for short run benefits: avoided generation costs (including a time of delivery adder/subtractor) and resource adequacy credit. This is not how we value other resources (which are valued over the life of the resource).

Using GTSR for code compliance would be extremely cumbersome for builders if not infeasible

Presumably ZNE offsite options would use the Enhanced Community Renewables (ECR) component of the program if GTSR was used for compliance, since ECR is intended for subscribers who are located in close proximity to the solar array. However, the ECR program is cumbersome in addition to being uneconomic. Developers need to participate in a solicitation process just like a renewable portfolio standard resource. This PPA, however, is only so the utility has contractual rights to any unsubscribed energy; the PPA is purposely designed to be non-financeable. Projects are viable based on the customer agreements a developer is able to secure. This is difficult given the cost premium associated with the program and pre-solicitation requirements, such as demonstrating customer interest from a defined geographic area. The minimum size limit for ECR projects – 500 kW – may be too large for some new housing developments. The requirement that ECR project off-takers are enrolled prior to interconnection

[13] http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M186/K580/186580322.PDF

of the PV array may not be feasible for new communities where the homes are not yet occupied when the community is built. In both the ECR and GTSR programs, customers have the option to "unsubscribe" from the program whenever they like. This feature would likely not work if the homes are to be certified as "ZNE" at the time of construction.

GTSR is proving to be inviable

The ECR program has not yielded a single project. Last summer a solicitation was held. Only 15 bids were received and zero PPAs were executed. At a forum held this past Spring, developers noted that the poor economics of the program and the numerous mandatory requirements for participating (a legal opinion and expression of customer interest within 10 miles of the project) made development nearly impossible.[14]

Even the utilities' Green Tariff program, for which projects have been procured through a more traditional solicitation, have yielded limited customer uptake. As of June 2017, nearly a year and half into the program, less than 4% of the program's capacity has been used.[15] Southern California Edison's program has less capacity subscribed as of its last report (June 2017) than it did in February of this year, demonstrating limited customer appetite given the poor economics of the program.

The offsite option for ZNE buildings should be developed in concert with the PUC. The PUC should develop a manageable tariff, preferably an expansion of the Commission's virtual net metering tariff.

GTSR is Unavailable to Customers of the CCAs and Publicly-Owned Utilities

GTSR is available only to customers of the investor-owned utilities (IOUs), leaving a growing percentage of California ratepayers without access to the program. There are more than 40 publicly-owned utilities that serve nearly one-quarter of California's electricity.[16] There are eight community choice aggregators (CCAs) currently serving electricity to customers, and nearly more than a dozen more in various stages of development, including many planned 2018 launches. The CPUC estimates that by the mid-2020s, CCAs will serve nearly 15 million customers.[17] As a growing share of Californians are not receiving bundled service from the IOUs, an IOU-only program is increasingly insufficient to reach ZNE goals.

VI. CONCLUSION

[1414] http://www.lawofrenewableenergy.com/2017/04/articles/solar/report-on-community-solar-developer-forum-in-california/

[15] Calculated based on subscribed capacity as of the end of June 2017 based on monthly filings to the CPUC by the three IOUs.

[16] http://www.energy.ca.gov/pou_reporting/background/difference_pou_iou.html

[17] http://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/News_Room/News_and_Updates/Retail%20Choice%20White%20Paper%205%208%2017.pdf

SEIA and CALSEIA would like to thank Energy Commission staff on their continued effort to ensure the 2019 Title 24 moves California toward meeting the 2020 ZNE goal and allows builders the flexibility to utilize the best fit combination of energy efficiency and renewable energy measures under the performance pathway. Solar and storage have a critical role to play in the building standards compliance going forward and must therefore be valued accordingly with the compliance pathways. We look forward to continuing to provide input to staff as the final 2019 code is developed.

Sincerely,

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APPENDIX A: SEIA INFORMAL COMMENTS ON DNV-GL ZERO NET ENERGY INTEGRATION STUDY

The following informal comments were submitted by the Solar Energy Industries Association to CPUC Energy Division staff on August 10th, 2017.

Residential Zero Net Energy Building Integration Cost Analysis

July, 26, 2017 Study of ZNE Integration Costs Informal Comments

The Solar Energy Industries Association (SEIA) submits the following informal comments in response to the July 26 Staff Paper on study results entitled: "Residential Zero Net Energy Building Integration Cost Analysis."

Comments on the Study

SEIA appreciates Staff's methodical approach to the state's Zero Net Energy (ZNE) policy and desire to ensure that all costs and benefits of the policy are accounted for. Nevertheless, we are concerned that the frame of the study focuses exclusively on the costs of DER integration with no accounting for the corresponding benefits. To look only at the cost of integrating distributed resources while ignoring the savings to ratepayers from the avoided cost of large-scale electrical infrastructure is akin to a traveler focusing exclusively on the cost of riding the bus without accounting for the savings she would achieve by avoiding alternative means of transport, such as cab fare, car ownership, gasoline, etc. In addition, we have concerns that the assumed costs of energy storage and other complimentary DERs that can reduce PV integration costs are inflated to a significant degree and that likely cost declines are not accounted for. We outline those concerns in more detail below.

I. Staff incorrectly implies that DERs have ratepayer costs but no benefits

Energy Division introduces the study by pointing out that the improved cost-effectiveness of solar PV could soon justify a CEC requirement of solar on all new residential construction, but

that "PV integration costs, currently paid for by all ratepayers per CPUC Net Energy Metering (NEM) policy, are not accounted for in the CEC's test. This statement implies that the CEC and the CPUC should consider these ratepayer costs when considering a Title 24 code change that would require PV on all new residential construction. If so, the agencies should consider not only the ratepayer costs of integrating DERs, but also ratepayer benefits from avoided utility infrastructure that would be needed to serve residents of new construction in the absence of DERs.

While the CPUC has processes underway to evaluate the deferral benefits and other locational value of DERs generally, solar PV, storage and other DERs deployed on new construction offer potentially greater value than DERs deployed on the existing building stock, which is unlikely to be captured in the Locational Net Benefits Analysis and avoided cost calculator. This is because the construction of new residential housing can require utilities to build new distribution systems, transmission lines and potentially new power plants, depending on the scale of housing development and load growth over time. When DERs are required or included in new construction, much of this infrastructure could potentially be avoided, and the remainder can be designed in such a way that it accommodates DERs, which can potentially reduce costs.

Although staff is careful to acknowledge in the "Highlights of Study Findings" that the study only examines the costs of distributed PV integration and does not attempt to quantify the deferral value of PV installations, the paper makes no mention of any complimentary studies or future efforts to quantify that value. The result is an implication that the agencies will make a determination about the ZNE policy on the basis only of DER costs, without considering ratepayer benefits. The paper should make clear that the DNV-GL study should not be used to draw conclusions about net ratepayer benefits of the ZNE policy absent corresponding studies that quantify avoided infrastructure costs and other values of solar PV and storage on all new residential construction.

II. The study does not consider that under a ZNE policy, new distribution circuits might factor distributed PV and storage into their design

In section 2.2.1, the study describes the methodology for selecting representative feeders for the purpose of analyzing solar PV integration costs. That section also states that the "placement of new generation on a feeder has a major impact on the hosting capacity and integration costs." If the placement of new generation has a major impact on integration costs, then it stands to reason that the design of a feeder – which effects the placement of new generation – will also have an impact integration costs. Since many new homes will be part of new communities requiring new distribution feeders, it seems that there should be an opportunity for utilities to take into account the ZNE mandate and the existence of new generation in the design of distribution feeders, which in turn should reduce integration costs.

The possibility that utilities could design distribution feeders to reduce the integration costs of the ZNE mandate is not discussed or addressed in the study. Rather, the study appears to select representative feeders from those that already exist in each utility's service territory. The failure to recognize that distribution grids can be designed and planned around an expectation of distributed generation is a shortfall of the study and should be rectified.

III. The study errs in ascribing the cost of batteries entirely to the mitigation of distribution system impacts of PV

The study appears to assume that stand-alone solar PV is the default case for ZNE, storage added as mitigation measures once mitigation is required. In reality, however, energy storage devices are likely to be commonly deployed alongside solar PV systems by 2020 for other reasons, and with other benefits outside of PV integration into distribution grids.

For example, solar net metering customers are now required to take service on time-of-use rates, which have peak periods that are increasingly shifting towards the evening, and the value of exported energy has been reduced through non-bypassable charges. These changes will have the effect of causing more solar customers to shift load to the solar production hours and reduce exports to the grid – both through batteries and other forms of load control – which has the ancillary benefit of reducing the cost of integrating solar PV into the distribution system.

Because there will be benefits of storage accruing to participating customers (TOU management, backup power, etc.) and the electric grid (peak shaving, generation capacity, etc.), it is not accurate for the study describe the cost of battery storage as a "mitigation cost" for distribution system impacts without subtracting from those costs the other benefits storage would provide to customers and wholesale electricity markets and the transmission system.

In addition, the Energy Commission is currently considering whether to include battery storage as a measure in the next cycle of the Title 24 code update, since storage can significantly improve the time-differentiated value of energy consumption. If storage is included in the Title 24 code, then storage should be considered as the "default" case in the integration study, rather than a mitigation measure that is added if and when mitigation is required.

IV. The assumed costs of battery storage today and in the future are unreasonably high

In making assumptions about the cost of battery storage today and in the future, the DNV-GL study relies on Lazard's "Levelized Cost of Storage 2.0" report from December 2016.[18] That report, however, is already outdated, with assumed costs for battery storage that are much higher than what is already available on the market. For example, for residential lithium-ion batteries, the report assumes a current capital cost of $871/kWh to $1,557/kWh. By contrast, the publicly available price for a Tesla Powerwall 2 is $5,500 for a battery with 13.5 kWh of usable energy, or $407/kWh. Even assuming $2,500 for installation, the price of the Powerwall comes out to less than $600/kWh, or around 70% of the Lazard's assumed low-end capital cost of lithium-ion.

[18] https://www.lazard.com/media/438042/lazard-levelized-cost-of-storage-v20.pdf