CESA
CALIFORNIA ENERGY STORAGE ALLIANCE

June 22, 2020

CPUC Energy Division Tariff Unit
505 Van Ness Avenue
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Re: Protest of the California Energy Storage Alliance to Advice Letter 5640, *et* al. of the Joint SGIP Program Administrators

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Dear Sir or Madam:

Pursuant to the provisions of General Order 96-B, the California Energy Storage Alliance ("CESA") hereby submits this Protest to the above-referenced Advice Letter 5640 of Southern California Gas Company ("SoCalGas"), Advice Letter 4255-G/5839-E of Pacific Gas and Electric Company ("PG&E"), Advice Letter 4223-E of Southern California Edison Company ("SCE"), and Advice Letter 112-E of Center for Sustainable Energy ("CSE"), *Large Thermal Energy Storage (L-TES) Incentive Calculation Methodology Proposal for the Self-Generation Incentive Program and Proposed Updates to the Self-Generation Incentive Program (SGIP) Handbook* ("Advice Letter"), submitted jointly by the program administrators ("PAs") on June 2, 2020.

I. <u>INTRODUCTION & BACKGROUND</u>.

The submission of the PAs' Advice Letter continues a long history on issues related to large thermal energy storage ("LTES") in the Self-Generation Incentive Program ("SGIP"). Trane US, Inc. ("Trane") submitted a SGIP Program Modification Request ("PMR") on December 8, 2017 to modify the rating criteria for energy storage projects to apply to LTES projects. In the PMR, Trane proposed to use a methodology developed by University of California ("UC") Davis' Western Cooling Efficiency Center ("WCEC") to calculate the 1-in-10-year peak kilowatt (kW) power consumption of a building's chillers for the sizing of the LTES system, as well as the attendant energy (kWh) impacts. This methodology was outlined in a project report entitled "Valuation of Thermal Energy Storage Systems for Utility Grid Operators." No action was taken on this PMR by the PAs.

Subsequently, the Commission issued Decision ("D.") 19-08-001 on August 9, 2019 that established greenhouse gas ("GHG") emission reduction requirements for energy storage projects claiming SGIP incentives. Importantly, in order to ensure the most accurate signal and measure of GHG emissions, the Commission reasoned that the adoption of the five-minute real-time signal as the GHG compliance signal as being reasonable and sending "the correct market message to support the SGIP's long-term market transformation."[1] Regarding thermal energy storage ("TES") systems in light of these changes, the Commission determined that "modifications to our adopted GHG and existing SGIP rules may be necessary to ensure the appropriate application of the GHG requirements to TES systems" and directed the PAs and Energy Division ("ED") staff to convene a TES subgroup by September 13, 2019.[2] Crucially, the Commission directed that LTES *"should assess TES system performance using a dynamic approach and actual data."*[3] The subgroup met on September 13, 2019 and clarified the scope to include system, measurement, verification, performance evaluation and other program requirements for TES.[4] When submitting their implementation advice letter pursuant to D.19-08-001, the PAs proposed no specific modifications as being needed to accommodate LTES participation, with no discussion on this conclusion[5] despite extensive workshop discussions to the contrary.

Fortunately, Energy Division ("ED") found merit in the protest and response submitted by CESA, Trane, and DN Tanks and recommended that the PAs submit a specific LTES incentive calculation methodology within 30 days of the effective date of the advice letter (*i.e.*, late March 2020). Notably, staff explained that "the question of LTES participation should be resolved as soon as possible."[6] Finally, after more than six months of delay to implement an incentive calculation methodology, the PAs submitted the above-referenced Advice Letter that essentially rejected the UC Davis dynamic calculation methodology for several reasons that CESA will address in our protest below. Instead, the PAs proposed a methodology developed out of the SGIP Technical Working Group ("TWG") based on the California Energy Commission ("CEC") Non-Residential Alternative Calculation Method Reference Manual to calculate the kW and kWh offsets for LTES technologies under 1-in-10-year peak weather conditions. This methodology uses chiller curves approved by the CEC and used in the California Building Energy Compliance (CBEC) software for Title 24 compliance. The PAs supported this deemed-value approach because they argued that it is consistent, simple, and does not allow for over-estimation of the SGIP incentive.

After more than 2.5 years of no progress on developing dynamic incentive calculation and evaluation methodologies, LTES technologies have essentially landed back in the same place. Even as the Commission determined that storage technologies in SGIP should strive to respond to dynamic GHG signals and meet real-time GHG compliance requirements, LTES technologies will be subject to deemed-value calculation methodologies that do not recognize or award the additional GHG benefits that can be provided from LTES and thus inhibit their participation in the program.

In this Protest, CESA recommends that the Commission reject this Advice Letter as failing to adopt a methodology for LTES that adheres to the GHG requirements and goals set for energy storage pursuant to D.19-08-001. In addition, CESA finds the PAs' assessment of the UC Davis

[1] D.19-08-001 at 16.
[2] *Ibid* at 71.
[3] *Ibid*
[4] *Ibid* at 89 and Conclusion of Law ("COL") 47.
[5] Advice 4118-E, et al., *Revisions and Updates to the Self-Generation Incentive Program Handbook Incorporating Program Changes Related to Greenhouse Gas Emissions Reduction Requirements pursuant to Decision 19-08-001*, submitted on November 27, 2019 at 10.
[6] Attachment 1 of Non-Standard Disposition Letter of Advice 4118-E, et al. on February 24, 2020 at 6.

dynamic methodology as being incorrect and inadequate, and we rebut the arguments made that such a methodology should be dismissed for being complex, resulting in an excessive incentive, creating an unreasonable administrative burden, and using proprietary simulation models. Specifically, CESA makes the following points in this Protest:

- The methodology based on the CEC Non-Residential Alternative Calculation Method Reference Manual is not compliant with D.19-08-001 in supporting LTES participation in SGIP.
- No explanation is offered on the purported overpayment of incentives under the UC Davis methodology, and SGIP Handbook rules are in place to cap costs.
- The use of proprietary simulation models is not a limiting factor for using dynamic methodologies.
- Arguments that the UC Davis methodology is too complex or represents an unreasonable administrative burden are unsubstantiated and can be streamlined through the use of .pdf outputs of ASHRAE-compliant models.
- Having different methodologies for LTES and small thermal energy storage ("STES") is reasonable given the different costs and burden of monitoring.

In the new SGIP Order Instituting Rulemaking ("OIR"), the Commission explained that the rulemaking "may consider the need for revisions to SGIP requirements to address the dynamic operation of some TES systems."[7] CESA agrees. Unless a dynamic methodology is adopted as soon as possible, LTES will continue to face barriers to participate in the program. Notably, a disproportionate number of facilities with chilled water plants are municipalities, schools, hospitals, local government agencies, and other critical facilities, who are seeking to adopt LTES to support GHG emission reductions, grid services, and customer bill savings and represent the very customer groups that SGIP has prioritized through decisions made in D.19-09-027 and D.20-01-021. As such, time is of the essence to enable LTES participation in the program.

II. <u>DISCUSSION</u>.

In the below sections, CESA discusses the shortcomings of the proposed methodology based on the CEC Non-Residential Alternative Calculation Method Reference Manual for the purposes of SGIP and addresses the "issues" highlighted by the PAs in the Advice Letter. CESA urges Energy Division to reject the proposed deemed methodology and instead adopt the UC Davis methodology.

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[7] *Order Instituting Rulemaking Regarding Policies, Procedures and Rules for the Self-Generation Incentive Program and Related Issues*, R.20-05-012, issued on May 28, 2020 at 13-14.

A. The methodology based on the CEC Non-Residential Alternative Calculation Method Reference Manual is not compliant with D.19-08-001 in supporting LTES participation in SGIP.

The PAs propose the use of the CEC-approved methodology to calculate the kW and kWh offsets for LTES technologies as being consistent across projects and between LTES and STES, adaptable to different LTES system types, administratively manageable, and as avoiding overestimation of SGIP incentives. However, CESA finds major issues with the use of this methodology for LTES technologies that are inherently dynamic in nature (*e.g.*, weather sensitive, different based on equipment's chiller curves) and for not complying with D.19-08-001 in encouraging more dynamic, accurate, and real-time GHG performance from energy storage technologies at specific locations and for specific project and equipment.

In developing the Title 24 methodology referenced by the PAs, the CEC was tasked with regulating energy use of building structures across the entire state and thus strived to develop Title 24 codes that would similarly be broadly applicable to the state, spanning 16 Climate Zones, over 160,000 square miles of territory, and equipment with useful lives measured in decades. Title 24 is the quintessential "big-picture" program. This big-picture philosophy is animated through program and methodological design. One example of this is the use of "average" curves to estimate chiller performance.

However, it is unreasonable to estimate chiller performance at a specific discrete site based on some average value, which may be appropriate for a state-wide building code but is not compliant with the project-specific and dynamic performance evaluation methodology expected of energy storage systems in SGIP. There are innumerous potential variations in chiller selection that can made at the time of design, including hundreds of impeller choices, from size to vane curves. There are hundreds of choices available in evaporator tube bundles, from internal rifle type, to external surface area, to material, to wall thickness, to number of tubes and tube surface area, to condenser tube bundles, and so on. Each of these choices produces a change in performance across a range of performance characteristics. As a rule of thumb, almost every large chiller is effectively a unique integrated set of equipment that has a unique performance curve.

Engineers understand the implications of each of these impacts and give great thought to their choice in a process called "chiller selection." Chillers are selected differently because applications are different. The desired chiller performance characteristics that are needed for an office in Pacifica are far different than those needed for an office in Palm Springs. Similarly, the characteristics needed for a chiller serving an office in Pacifica are far different from a chiller serving a cold storage warehouse in Pacifica. Chillers are thus selected with the different internal components and performance curves needed for a specific application. Cumulatively, the energy impacts of the chiller selection process can result in substantial differences in individual chiller performance, especially when looked at across a range of operating conditions.

For Title 24 regulations, this individual variation is less of a concern because of the "big-picture" nature of this regulation, where the performance of an average chiller is appropriate, and since the codes are intended to set entire-building standards rather than one for the chiller as a single component. The impact of being off by some degree on an individual chiller when setting regulations and codes for the entire State of California does not rise to the level where departure from using an average chiller performance baseline would matter enough to depart from current practice. However, while a relative indifference to specific site conditions is appropriate for Title 24, it is a wholly unsuitable approach to an SGIP evaluation methodology for several reasons, both from the standpoints of accuracy and compliance with decisions in this proceeding.

First, the use of "deemed" average performance curves as proposed by the PAs is problematic from an accuracy perspective. When trying to track the actual impact of an LTES system at a specific site, a discrete curve is needed that is tuned to that building. By contrast, and contrary to the performance and verification regime applied for other commercial energy storage projects, the PAs propose to use average values as the baseline of performance that does not reflect the unique characteristics and capabilities of individual LTES projects and locations. Attempting to measure the real-time performance of a specific, highly variable chiller using "deemed-value" curves is an inaccurate way to use public funds, particularly when a much more accurate method is available. This impact is even more pronounced when trying to accurately track the GHG impacts of any individual LTES installation.

Second, with the issuance of D.19-08-001, the Commission directed the use of near-real-time 5-minute GHG signals as the measure for compliance.[8] As opposed to the fleet approach for verification for residential projects, new commercial projects are subject to project-specific evaluation and verification for GHG performance[9] – the payment and enforcement regime that LTES would likely fall under. However, the proposed deemed-value approach fails to meet these basic requirements. Because of the variability in both chiller design and performance noted above, performance of the chiller, and therefore the grid impact of an L-TES system incentivized under SGIP, is not just variable across a range of conditions, it is also dynamic from chiller to chiller. By using deemed curves that do not accurately represent the performance of the specific individual chillers applying to the program, the deemed approach advocated by the PAs cannot track the response of the chillers across varying conditions. By contrast, the UC Davis methodology complies with this direction from the decision by recognizing the specific and unique characteristics of LTES by project and location.

In addition, D.19-08-001 states that the SGIP program "should assess TES system performance using a dynamic approach and actual data, to the extent possible."[10] The methodology proposed by the PAs do not comply with this aspect of the decision

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[8] D.19-08-001 at 16-17.
[9] *Ibid* at 37.
[10] *Ibid* at 71.

because it uses deemed-performance curves developed for a statewide project to establish a baseline, unnecessarily introducing a deemed-value variable into the analysis, especially when better alternatives exist and the merits or shortcomings of alternatives are not adequately discussed, if at all. Conversely, the UC Davis methodology assesses system performance using actual data from the specific site for both the baseline and measured performance. Only one of these appears to meet the clear direction given in D.19-08-001.

Lastly, the use of deemed baseline information has consumer impacts as well. Most likely, for chillers that are inherently dynamic, the deemed values will most certainly be inaccurate and not represent the actual characteristics and performance of the specific project and location, unless actual site data is used. When deemed or otherwise inaccurate baselines are used, potential customer bill savings are likely undercounted, leading to the value proposition to customers in installing LTES equipment to be limited or be sub-optimal. Conversely, ratepayer funds could also be wasted if a less accurate methodology overcompensates an installation. Given the inherently dynamic and variable performance characteristics of chillers and therefore the grid impacts of LTES systems, Energy Division should insist upon an evaluation methodology that conforms to previous decision guidance. The methodology proposed by the PAs do not meet this clearly stated requirement, while the UC Davis methodology clearly achieves all of the above guidance.

B. No explanation is offered on the purported overpayment of incentives under the UC Davis methodology, and SGIP Handbook rules are in place to cap costs.

The Advice Letter argued that that the use of existing equipment specifications rather than replacement equipment specifications to calculate the initial incentive could result in a higher incentive,[11] suggesting that the UC Davis methodology would cause an overpayment of SGIP incentives to LTES projects. CESA views this as suggesting that LTES would be overpaid under the UC Davis methodology but the Advice Letter critically does not address whether the higher incentives are actually merited given the real-time and incremental GHG reductions and other benefits that can be delivered by LTES. Any value statement that incentives are "too much" is inappropriate and should be substantiated, instead of making this general argument to favor a deemed methodology. Furthermore, CESA is unclear on the basis for opposing the use of existing equipment specifications if the measure of storage capability is premised on the addition and changes of existing equipment to convert chillers into LTES facilities.

Additionally, the SGIP Handbook outlines rules that prevent projects from receiving total incentives that exceed the total eligible project costs.[12] These rules will

[11] Joint Advice Letter at 2.
[12] 2020 SGIP Handbook v5 at Section 3.2.2.

remain in place with the adoption of the UC Davis methodology, protecting against any overpayment of incentives of LTES facilities. Rather, the PAs should be outlining and substantiating the types of eligible project costs if they have any concerns about incentives being too high under the UC Davis methodology.

C. The use of proprietary simulation models is not a limiting factor for using dynamic methodologies.

The Advice Letter points to the use of proprietary simulation models as being a limitation of the UC Davis methodology.[13] CESA believes that this is a non-issue given the Commission's rich history of using proprietary software for other Commission and utility programs. For example, the Commission uses or supports a number of models that are not open-source but are used to inform policy and/or program design, such as Astrape Consulting's SERVM model to conduct production cost simulations and loss-of-load expectation for the Resource Adequacy ("RA") Program. The utilities are also able to use their own proprietary models to manage their distributed energy resource ("DER") programs, evaluate bids and responses to solicitations, and/or conduct modeling for planning purposes. There are countless more examples, and the use of proprietary models is not novel for ratepayer-funded programs or processes. Given this history, it is not unprecedented for SGIP to use a proprietary model for the purposes of LTES incentive calculation, especially if it better supports the Commission's goals around more accurate and dynamic GHG emissions reduction and broader market transformation beyond battery storage technologies.

Furthermore, it is standard practice for consulting engineers to use proprietary models (*e.g.*, Trace 700, Carrier HAP, eQuest, IES VE) to design and engineer chiller projects. So long as the energy simulation model is compliant with ANSI/ASHRAE Standard 140 and is calibrated to the energy consumption by the chiller plant only,[14] these proprietary tools are appropriate for use in SGIP incentive calculation. While compliance with industry standards should be more than sufficient, independent third-party review of any software tools could also be conducted to enhance understanding and provide greater assurances of the model's functionalities, so long as such a process is does not unduly delay the process for adopting a dynamic LTES methodology.

Finally, just as the Commission has used the outputs of vetted and/or standard models for various programs, planning processes, and policy decisions, a similar approach could be used to support incentive calculation methodologies for LTES systems

[13] Joint Advice Letter at 2.
[14] Similarly, the Department of Energy ("DOE") lists a number of pre-approved software that could be used for qualifications for 179D Commercial Building Tax Credits. A similar process could be used to identify the appropriate software that could be used, and this also just points to an example where proprietary software can be used for public-benefit programs and incentives. Reference: https://www.energy.gov/eere/buildings/qualified-software-calculating-commercial-building-tax-deductions

based on proprietary models. Model outputs from these models can be exported as files and printed as .pdf documents that can support PA assessment of project-specific performance-based incentives ("PBI") and real-time GHG performance. As such, the proprietary model outputs are still accessible, and any concerns of gaming or bad actors can be addressed through occasional audits and/or punishments (*e.g.*, suspensions) as outlined in the SGIP Handbook.

D. Arguments that the UC Davis methodology is too complex or represents an unreasonable administrative burden are unsubstantiated and can be streamlined through the use of .pdf outputs of ASHRAE-compliant models.

The Advice Letter claims, without substantiation, that the UC Davis methodology is complex and represents an unreasonable administrative burden without any explanation. CESA disagrees. Consulting engineers who are designing these chilled water systems are already conducting much of this modeling already, while utility program administrators have been using the aforementioned models as well to make *ex ante* calculations and assess *ex post* performance in their energy efficiency and load-modifying programs. As discussed above, spreadsheet or .pdf outputs can be produced from the ASHRAE-compliant models on a project-specific basis, thus streamlining incentive calculations and performance evaluation for PBI payments. In essence, rather than using a spreadsheet using deemed-value calculations, the PAs would be required to use a spreadsheet using dynamic-value calculations based on data from runs in the ASHRAE-compliant models. CESA does not view this as an unreasonable administrative burden.

Moreover, arguments that dynamic methodologies are complex are without merit, especially given the findings, conclusions, and orders of D.19-08-001 to assess energy storage performance and incentive payments on a real-time basis – all in an effort to more accurately assess and incentivize GHG performance from energy storage resources. Comparatively, CESA does not believe that the use of a dynamic methodology, as proposed, represents any more complexity than what is currently expected for energy storage resources at large. LTES can similarly achieve the level of sophistication in addition to accurate and granular GHG performance but would be presented with barriers with the adoption of the PAs' proposed deemed-value methodology. By its nature, HVAC systems with TES capabilities are inherently dynamic. With our proposed approach above, a more reasonable balance of complexity and manageable administrative burden can be achieved. To encourage all forms of energy storage technologies in SGIP, CESA urges the Commission to reject the PAs' proposed deemed-value methodology and to reconsider/adopt the UC Davis dynamic calculation methodology.

E. Having different methodologies for LTES and STES is reasonable given the different costs and burden of monitoring.

The Joint PA Advice Letter make the case for the deemed methodology as being similar to the methodology for STES systems. CESA does not believe that this reason should be used to force-fit LTES into a deemed methodology, just because it is currently being applied to STES systems. Given the higher cost of monitoring and evaluating performance on dynamic basis for STES systems, CESA believes it is reasonable to maintain the deemed-value regime for STES while still utilizing dynamic methodologies for LTES systems.

The Commission has similarly created parallel but distinct performance evaluation and GHG requirements for different "types" of battery storage projects. Due to the large number of residential battery storage projects, the Commission established upfront deemed compliant options to meet the GHG requirements; whereas the Commission subjected commercial battery storage projects to dynamic and measured approaches given the fewer number but higher MW impacts of these larger projects. To this end, in setting the GHG requirements, the Commission recognized the need to minimize administrative burden for small residential systems.[15] In the same way, the Commission has precedent for allowing for differentiated performance and verification regimes for LTES versus STES.

[15] D.19-08-001 at 40-41. See also Staff Proposal Attachment of *Assigned Commissioner's Ruling Issuing Energy Division's Self-Generation Incentive Program Greenhouse Gas Signal Staff Proposal for Comments and Revising Comment Schedule* issued on September 6, 2018 at 15.

III. CONCLUSION.

CESA appreciates the opportunity to submit this Protest in response to the Joint Advice Letter and looks forward to collaborating with the Commission and PAs to better enable program participation from LTES projects pursuant to D.19-08-001.

Respectfully submitted,

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Executive Director
California Energy Storage Alliance

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Attachment:

Letter from UC Davis Western Cooling Efficiency Center

Dear Sir or Madam,

I am writing to you regarding the provisions of General Order 96-B and to voice my support for the Self-Generation Incentive Program Modification Request submitted by Trane on December 8, 2017 to modify the rating criteria for energy storage projects to apply to large thermal energy storage (TES). The methodology developed by Trane is consistent with the results of my research in TES systems and has many advantages over the methodology proposed in Large Thermal Energy Storage Incentive Calculation Methodology Proposal for the Self-Generation Incentive Program and Proposed Updates to the Self-Generation Incentive Program Handbook ("Advice Letter"), submitted on June 2, 2020.

Since the grid impact of deploying a TES system to offset a cooling load is the difference between the electric demand that would have been required by the primary cooling system to meet the offset load and the electricity demand associated with operating the TES system it is critical to be able to accurately and consistently predict what that offset load was. The methodology supported by my research uses real time monitoring of system performance to develop a detailed performance map of the chiller and TES system performance that accounts for the building cooling load and ambient conditions. This methodology would use high resolution (5 minute) real time monitoring to develop and constantly refine performance curves of the system. Upon commissioning a system, the model would be seeded with simulated data using typical meteorological year weather files as well as ASHRAE 10-year maximum conditions for the location in which the system is installed. System performance at specific conditions can be estimated by curve fitting or interpolating between the thousands of simulated data points. **It is critical to stress that this simulated data is only to seed the system and is intended to be supplemented and replaced by actual recorded performance data as it becomes available through regular system operation.**

Using the chiller curves approved by the CEC and used in the California Building Energy Compliance (CBEC) software that is used for Title 24 compliance as recommended in the "Advice Letter" submitted on June 2, 2020 raises several concerns. While this methodology can reliably predict the annual performance of an average chiller, it cannot accurately predict the performance of an actual chiller, at a specific site, at a high enough resolution to predict the electric grid impact. Furthermore, since actual chiller performance is not difficult to monitor, model and predict today, this methodology would open the door to selection bias, incentivizing installers and operators to install TES only at sites where they can easily determine that the average annual performance predictions will result in overcompensation and avoid installation sites that will result in under-compensation despite the fact that TES systems may have the same potential for benefit to the grid.

I sincerely hope that you reconsider implementing a methodology that relies on on-site system monitoring to develop accurate and dynamic system models that are specific to a specific system and location for evaluating and verifying the grid impact of TES systems. Please reach out to me with any questions.

Sincerely,

Nelson Dichter
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