**BEFORE THE PUBLIC UTILITIES COMMISSION**

**OF THE STATE OF CALIFORNIA**

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| Order Instituting Rulemaking to Develop a Successor to Existing Net Energy Metering Tariffs Pursuant to Public Utilities Code Section 2827.1, and to Address Other Issues Related to Net Energy Metering. | R.14-07-002<br>Filed July 10, 2014 |

# COMMENTS OF THE CALIFORNIA ENERGY STORAGE ALLIANCE IN RESPONSE TO ADMINISTRATIVE LAW JUDGE'S RULING SEEKING COMMENTS ON THE DRAFT VERSION OF THE PUBLIC TOOL

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**CALIFORNIA ENERGY STORAGE ALLIANCE**

April 28, 2015

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# COMMENTS OF THE CALIFORNIA ENERGY STORAGE ALLIANCE IN RESPONSE TO ADMINISTRATIVE LAW JUDGE'S RULING SEEKING COMMENTS ON THE DRAFT VERSION OF THE PUBLIC TOOL

The California Energy Storage Alliance ("CESA")[1] hereby submits these comments pursuant to the Rules of Practice and Procedure of the California Public Utilities Commission ("Commission"), and the *Administrative Law Judge's Ruling Seeking Comments on Draft Public Tool*, issued by Administrative Law Judge Anne E. Simon on April 15, 2015 ("ALJ's Ruling").

[1] 1 Energy Systems Inc., Abengoa, Advanced Microgrid Solutions, AES Energy Storage, Aquion Energy, ARES North America, Brookfield, Chargepoint, Clean Energy Systems, CODA Energy, Consolidated Edison Development, Inc., Cumulus Energy Storage, Customized Energy Solutions, Demand Energy, Duke Energy, Dynapower Company, LLC, Eagle Crest Energy Company, East Penn Manufacturing Company, Ecoult, ELSYS Inc., Energy Storage Systems, Inc., Enersys, EnerVault Corporation, Enphase ENERGY, EV Grid, Flextronics, GE Energy Storage, Green Charge Networks, Greensmith Energy, Gridtential Energy, Inc., Hitachi Chemical Co., Ice Energy, IMERGY Power Systems, Innovation Core SEI, Inc. (A Sumitomo Electric Company), Invenergy LLC, K&L Gates, LG Chem Power, Inc., LightSail Energy, Lockheed Martin Advanced Energy Storage LLC, LS Power Development, LLC, Manatt, Phelps & Phillips, LLP, Mitsubishi Corporation (Americas), Mobile Solar, NEC Energy Solutions, Inc., NextEra Energy Resources, NRG Solar LLC, OutBack Power Technologies, Panasonic, Parker Hannifin Corporation, Powertree Services Inc., Primus Power Corporation, Princeton Power Systems, Recurrent Energy, Renewable Energy Systems Americas Inc., Rosendin Electric, S&C Electric Company, Saft America Inc., Sharp Electronics Corporation, Skylar Capital Management, SolarCity, Sony Corporation of America, Sovereign Energy, STEM, SunEdison, SunPower, Toshiba International Corporation, Trimark Associates, Inc., Tri-Technic, Wellhead Electric. See, http://storagealliance.org.

## I. INTRODUCTION.

CESA herby responds to the questions posed in the ALJ's Ruling. CESA reserves the right to expand on and clarify its responses in the course of this proceeding as appropriate.

## II. CESA'S RESPONSES TO QUESTIONS POSED FOR COMMENT.

**Question 1: Please identify any input descriptions, or documentation materials, within the draft version of the Public Tool that should be expanded or modified. If yes, please provide tab and row references to the description and/or materials, as well as a detailed description of each proposed expansion or modification.**

***CESA's Response:*** While E3 was very helpful in answering questions, especially at the workshop, more documentation regarding the three different energy storage deployment methods would have been helpful. Documentation should be imbedded in the Advanced distributed energy resources ("DER") input tab and should include, but not be limited to: discharge and charging profiles, round-trip efficiency, and how the energy storage is sized in each case.

**Question 2: Please identify any computational errors in the draft version of the Public Tool or the Revenue Requirement that should be corrected. For each error identified, provide model and row references to identify each error, provide a proposed change that will correct the error, and provide specific reasons for the proposed change.**

***CESA's Response:*** Over the course of modeling scenarios and sending questions to E3, several issues were identified. E3 is aware of the issues and sent formula corrections to CESA, but CESA does not propose any specific corrections at this time.

**Question 3: Please identify any logical inconsistencies in the draft version of the Public Tool or the Revenue Requirement that should be resolved. For each inconsistency identified, provide model and row references to identify each inconsistency, explain why it is an inconsistency, provide a proposed change that will remove the inconsistency, and provide specific reasons for the proposed change.**

***CESA's Response:*** As issued the draft Public Tool does not appear to reasonably model the adoption of PV solar paired with energy storage. Even if a user makes energy storage effectively free the model results show little to no adoption. In reality, if energy storage was nearly free it would be a monumental game changer for the electric power system and CESA would anticipate a very significant increase in adoption. Due to the limited time available for comment, CESA did not have adequate time to provide even a moderate level of assessment, let alone diagnose issues at the cell/formula level. However, CESA would like to highlight three very important overarching concerns:

1. **Underestimating the Level of Storage Adoption will Result in the Public Took Understating the Avoided Costs of Solar Deployed Under Net Energy Metering.**

The deployment of energy storage paired with PV solar generation can dramatically increase the value of the PV solar resource to the extent the energy storage system is used to dispatch solar energy from lower value periods to higher value periods. This fundamental use case does not appear to be captured by the Public Tool, even in circumstances where the assumed energy storage system economics and tariffs would militate toward energy storage being used in this manner.

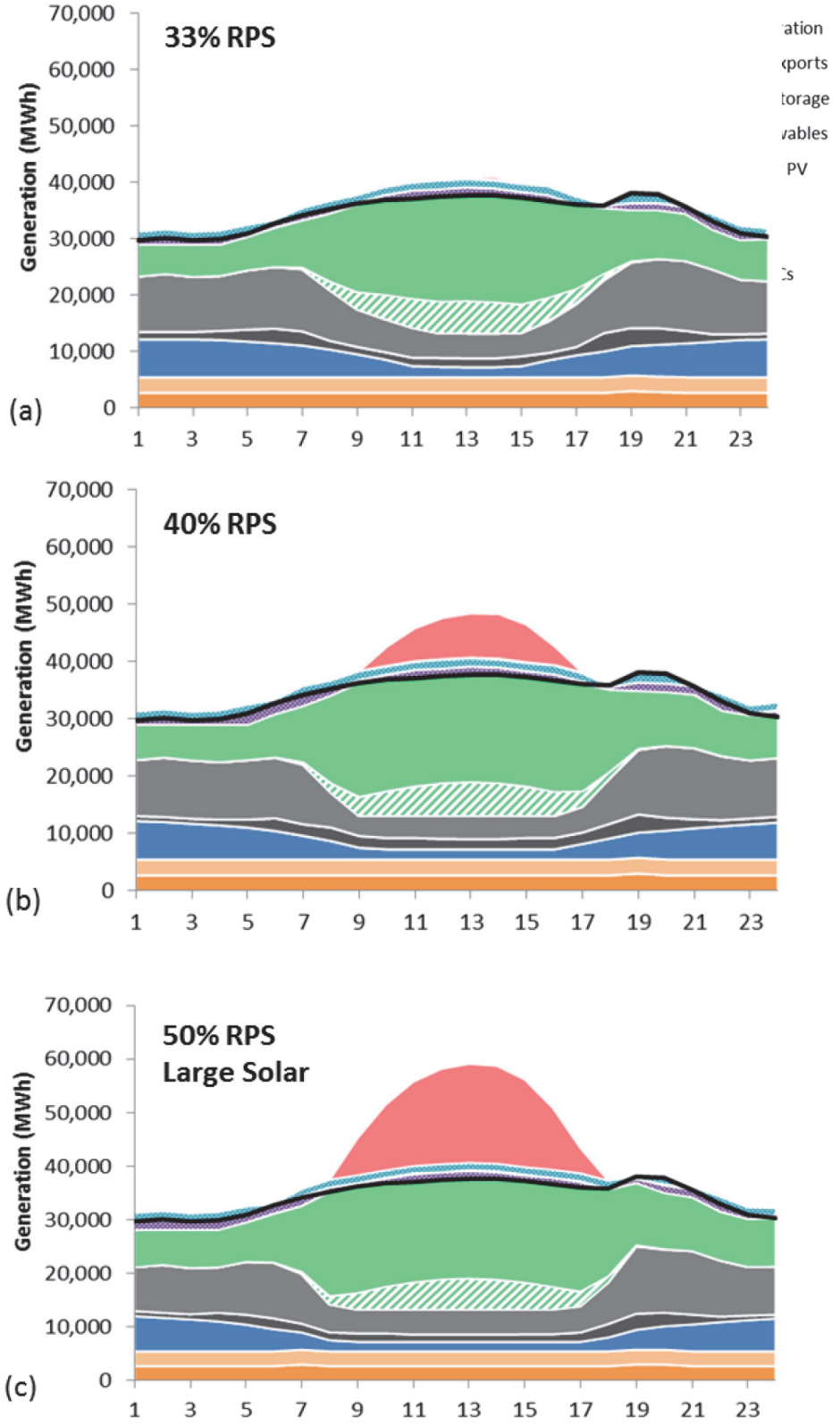
2. **The Public Tool is Based on the Currently Flawed Market Structure for Energy Storage and Projects that Flawed Structure Into the Future.**

The model assumes a very low monetary value for capacity until 2030. This may have made sense based on historical experience in California when the system was characterized by limited renewable penetration, stable load profiles, and fewer state policies objectives. However, this historic setting is just that, in the past. Numerous regulatory proceedings at the Commission, the California Energy Commission, and the California Independent System Operator ("CAISO") have been initiated to address these issues for energy storage. The current market failure in

properly identifying and compensating energy storage is thus perpetuated in the Public Tool. For instance, the Public Tool completely disregards the value of flexible capacity that energy storage systems can provide. Considering that the CAISO is seeing ramping and over generation issues on the system now, and is projecting those issues to increase over time, it is important that the Public Tool captures the capabilities of energy storage to address these issues in the avoided cost calculations. Instead, the Public Tool only accounts for summer peaking capacity based upon a 2030 Resource Balance Year. This excludes a wide variety of considerations that are being brought up in the Long Term Procurement Planning ("LTPP") proceeding.

The charts and tables below are suggestive of how energy storage can increase the value of renewable resources generally, and PV solar resources specifically, by reducing the projected level of curtailment that E3 predicts is likely to occur under a variety of renewable generation scenarios. Curtailment of renewable energy represents lost value to the degree this energy, which is being produced by a renewable energy system regardless, could be put to productive use. Although CESA does not necessarily agree with the magnitude of E3's curtailment projections, to the degree that curtailment is a concern, energy storage can clearly play a helpful role by acting a sink for energy that would otherwise be wasted. As the level of projected renewable curtailment increases, the opportunity to utilize energy storage to capture additional value likewise increases.

**E[3] REFLEX Model: Generation mix for an April day in 2030 with the 33% RPS, 40% RPS, and 50% RPS (assumes renewables are predominately solar)**

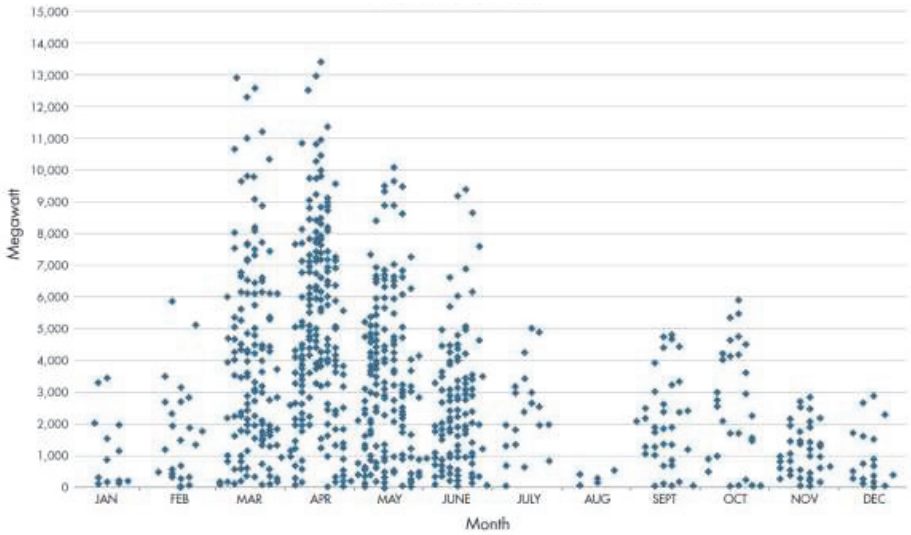


| Overgeneration Statistics | 33% RPS | 40% RPS | 50% RPS Large Solar |
|---|---|---|---|
| Total Overgeneration | | | |
| *GWh/yr.* | 190 | 2,000 | 12,000 |
| *% of available RPS energy* | 0.2% | 1.8% | 8.9% |
| Overgeneration frequency | | | |
| *Hours/yr.* | 140 | 750 | 2,000 |
| *Percent of hours* | 1.6% | 8.6% | 23% |
| Extreme Overgeneration Events | | | |
| *99th Percentile (MW)* | 610 | 5,600 | 15,000 |
| *Maximum Observed (MW)* | 6,300 | 14,000 | 25,000 |

Source: *Investigating a Higher Renewables Portfolio Standard in California*. E3. 2014. https://www.ethree.com/documents/E3_Final_RPS_Report_2014_01_06_ExecutiveSummary.pdf.

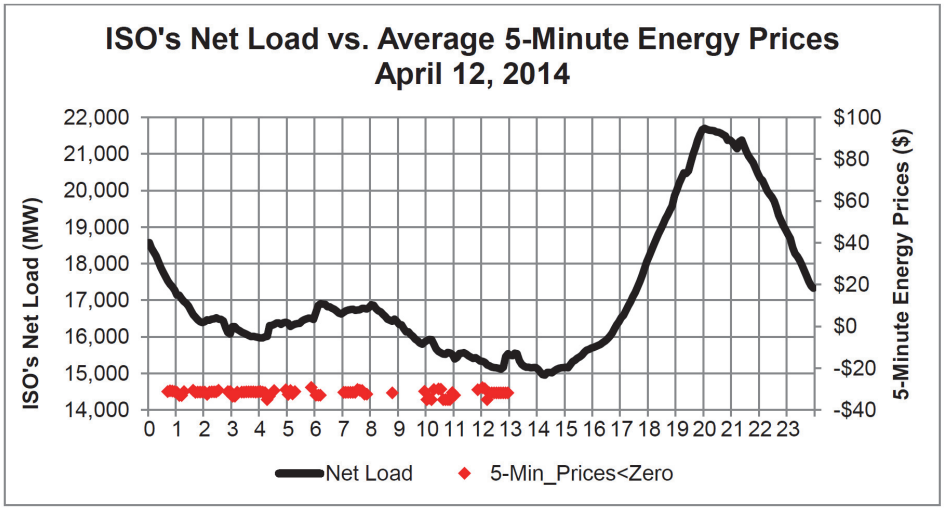
CAISO testimony introduced in the LTPP earlier this year underscored the issue and noted that the estimated renewable curtailment magnitude and frequency would be significant with a 40% RPS scenario.

**Estimated Renewable Curtailment Frequency and Magnitude in 2024 at 40% RPS**




Source: Prepared statement of Mark Rothleder on behalf of the CAISO (February 20, 2015). http://www.ferc.gov/CalendarFiles/20150220110211-Rothleder,%20CAISO.pdf.

The effect of low net load is already manifesting itself in the form of zero or negative energy prices. On April 14, 2014, CAISO reported that 43% of its 5-minute energy prices were zero or negative during low net load times of the day.




Prepared statement of Mark Rothleder on behalf of the CAISO (February 20, 2015). http://www.ferc.gov/CalendarFiles/20150220110211-Rothleder,%20CAISO.pdf.

### 3. The Public Tool's Handling of Energy Storage Undervalues the Asset Class.

The undervaluing that occurs is, in part, due to the above issue but also the scope of the Public Tool and the default inputs by E3. In conversations with E3 representatives there was acknowledgment that the Public Tool undervalues some of energy storage's benefits. Part of this issue stems from using time blocks vs. an hourly view of energy storage. In addition, system wide impacts are not considered. CESA recently commissioned a production cost model run in PLEXOS using the CAISO's input assumptions for its 2014 LTPP scenario of 40% RPS by 2024. CESA ran two sensitivities on this scenario – one without energy storage and one with a small amount (412.5 MW) of 2-hour discharge energy storage. Assuming a very conservative round-trip efficiency of 60%, the addition of 412.5 MW of 2-hour discharge energy storage to the grid provided a net savings of 203,677 tons of CO2, along with a reduction of 2,927 Unit Starts across the system (a 6.4% reduction in total annual fossil fuel unit starts). The 412.5 MW of 2-hour discharge energy storage also reduced renewable curtailment by 8.1%, equating to shifting 299,002 MWH of renewable energy that would have otherwise been wasted.

**Question 4: Please identify any assumptions on advanced user inputs tabs (e.g., Advanced Rate Inputs, Advanced DER Inputs, RR Inputs) that should be added to the "Key Driver Inputs" tab. Please provide a detailed description of each input that should be added, as well as supporting analysis demonstrating that the proposed input would have a significant impact on the outputs of the Public Tool.**

***CESA's Response**:* CESA has no comment in response to this question at this time.

**Question 5: Please identify any changes or clarifications that should be made to the categorization of Societal Inputs on the "Key Driver Inputs" tab. For example, should a separate category be created for user-defined locational values that are anticipated to be produced in the Distribution Resources Plans addressed in Rulemaking 14-08-013? Please provide a detailed description of each input that should be added, as well as the specific reasons for each proposed change.**

***CESA's Response:*** As stated above, the missing benefit streams of energy storage should be represented in the Public Tool If the Public Tool is not appropriately modified, it might be best by a "catchall" input solely for energy storage. Perhaps this could be done by a slight modification or duplication of the societal value adder input found in tab "basic rate inputs" cell E30. The option should include a $/kW adder as well as a $/kWh adder. CESA also agrees that some input should exist for locational values. Energy storage can defer distribution upgrades while maintaining a small physical footprint. This makes locational consideration very important to energy storage's value proposition.

**Question 6: Please identify any erroneous or outdated data inputs used in the draft version of the Public Tool. For each such input, please provide a substitute value and a detailed rationale for the proposed change. Provide publicly available supporting material for the proposed change. If no publicly available material supporting the proposed change is provided, please identify any non-public information or material that has been used and explain why the relevant information is not publicly available.**

***CESA's Response:*** For a certain portion of data inputs, particularly values that are unknown, constantly changing, or highly variable, the Commission should not overly rely on

default model assumptions. Natural gas prices and future price escalation projections are key examples. These costs have historically been highly variable, and should be risk adjusted going forward. For these highly variable and forward looking values, CESA believes that Commission analysis should not rely on default E3 assumptions in the Key Drivers and Advanced DER Input tabs. Instead, the Commission should weigh and consider values offered by other parties in the scenarios that are built. If nothing else, a range of sensitivities can be established by using a mix of input ranges from various parties.

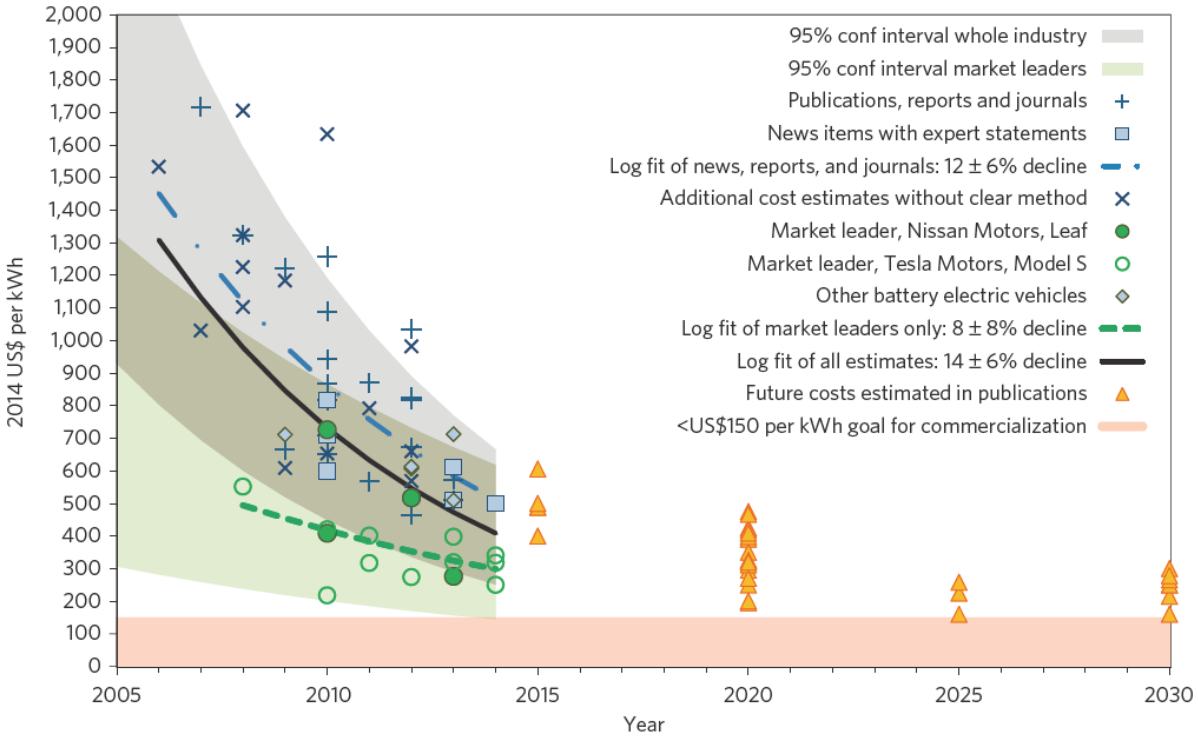
For energy storage pricing specifically, the battery costs, in the Public Tool are much higher than recently published publicly available estimates. A recent Brattle Group report cited vendor quotes for installed costs of energy storage systems of $350/kWh by 2020.[2] Navigant has stated that the Tesla could be producing cells as low as $110/kWh upon completion of the "GigaFactory."[3] The journal Nature recently published an article with over 80 different reported cost curves for battery prices, including forward-looking projections.[4] Figure 1 highlights the constant, downward trend:

[2] *The Value of Distributed Electricity Storage in Texas*. The Brattle Group. November 2014. http://www.brattle.com/system/news/pdfs/000/000/749/original/The_Value_of_Distributed_Electricity_Storage_in_Texas.pdf.

[3] Jaffe, Sam (2014), *Energy Storage Supply Chain Opportunities*, Navigant Research. September, 2014.

[4] Nykvist, Bjorn; Nilsson, Mans. *Rapidly Falling Costs of Battery Packs for Electric Vehicles*. Nature Climate Change 5, 329–332 (2015) doi:10.1038/nclimate2564.

**Figure 1. Battery Price Projections (Nature; March, 2015)**




Findings from the reports cited above stand in stark contrast to the cost estimates included in the Public Tool. By 2020, E3 assumes that the installed cost of storage will be approximately $930/kWh. This is *over 2.5x* the installed cost included in the Brattle Group's study, and is higher than the costs to many vendors today. While projections are inherently imprecise, the Public Tool reflects prices that simply do not track to where costs will be under the NEM Successor Tariff.

**Question 7. Please identify any other changes or modifications to the draft version of the Public Tool that are necessary (not merely desirable) to improve the functionality of the Public Tool for its intended use in this proceeding. Provide a detailed description and specific reasons for each proposed change. Provide publicly available supporting material for the proposed change. If no publicly available material supporting the proposed change is provided, please identify any nonpublic information or material that has been used and explain why the relevant information is not publicly available.**

***CESA's Response:*** In addition to the concerns expressed above regarding the draft Public Tool's failure to reasonably model uptake of energy storage, even in circumstances where the

economics would clearly support widespread adoption, CESA also believes that in order to avoid a gross misrepresentation of the adoption of energy storage, the Public Tool should calculate the value of energy storage based upon system benefits to the future California grid. These values should be based upon a current understanding of California's flexibility needs and should be derived from production cost modeling under the renewables scenario proposed by the Governor (40% renewables by 2024; 50% renewables by 2030).

## III. CONCLUSION.

CESA appreciates this opportunity to comment on the ALJ's Ruling, and looks forward to continuing to work with the Commission and stakeholders in this proceeding.

Respectfully submitted,

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DOUGLASS & LIDDELL

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**CALIFORNIA ENERGY STORAGE ALLIANCE**

April 28, 2015