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Tesla Comments - Oct 4/5 Workshop Pre-rulemaking 2019 Draft Express Terms

Additional submitted attachment is included below.

October 20, 2017

Commissioner Andrew McAllister and Energy Commission Staff
California Energy Commission
Dockets Office
Re: Docket No. 17-BSTD-01
1516 Ninth Street
Sacramento, CA 95814

RE: October 4-5, 2017 Staff Workshop on Pre-rulemaking Draft Express Terms for the 2019 Building Energy Efficiency Standards

Dear Commissioner McAllister and Energy Commission Staff:

I am writing on behalf of Tesla to share our comments in response to the 2019 building standards workshop focused on the pre-rulemaking draft express terms that took place on October 4-5, 2017.

Tesla previously submitted several sets of comments, which explain our proposal for how to best incorporate a credit mechanism for solar photovoltaics (PV) plus storage within the Energy Design Rating (EDR) score and outline the capabilities of behind-the-meter storage systems.[1] Upon reviewing the pre-rulemaking draft express terms for the 2019 standards as presented by California Energy Commission (CEC) staff, Tesla focuses these comments on providing feedback on Joint Appendices (JA) 11 and 12 covering the technical requirements for solar PV and storage. Additionally, we recommend some minor modifications to the EDR language to more accurately capture the value of storage in the 2019 code.

Energy Design Rating

Section 150.1 in subchapter 8 pertains to the performance and prescriptive compliance approaches for low rise residential buildings. The current modification suggested by CEC staff states the following for the performance standards:

- 1**. Newly Constructed Buildings**. The Energy Budget for newly constructed buildings is expressed in terms of the Energy Design Rating, which is based on TDV energy. The Energy Design Rating has two components, the Energy Efficiency Design Rating, and the Solar Electric Generation and Demand Flexibility Design Rating. The Solar Electric Generation and Demand Flexibility Design Rating shall be subtracted from the Energy Efficiency Design Rating to determine the Total Energy Design Rating. The Proposed Building shall separately comply with the Energy Efficiency Design Rating and the Total Energy Design Rating.

While this language attributes value to demand flexibility measures such as battery storage, it does not capture the key value for storage in the 2019 code. As Tesla and several other stakeholders such the California Building Industries Association (CBIA), the Solar Energy Industries Association (SEIA), and the California Solar Energy Industries Association (CALSEIA) have advocated for, batteries must be allowed to offset prescriptive energy efficiency and PV

[1] Tesla comments submitted on May 5, 2017 and September 6, 2017 available at: http://docketpublic.energy.ca.gov/PublicDocuments/17-BSTD-01/TN217464_20170505T163804_Francesca_Wahl_Comments_Tesla_Comments__2019_ZNE_Residential_St.pdf; http://docketpublic.energy.ca.gov/PublicDocuments/17-BSTD-01/TN221070_20170906T165047_Francesca_Wahl_Comments_Tesla_Comments__Aug_22_2017_Staff_Works.pdf

measures through the performance compliance approach.[2] Tesla recommends re-phrasing the EDR description to state the following:

- 1**. Newly Constructed Buildings**. The Energy Budget for newly constructed buildings is expressed in terms of the Energy Design Rating, which is based on TDV energy. The Energy Design Rating has ~~two~~ three components, the Energy Efficiency Design Rating, ~~and~~ the Solar Electric Generation Design Rating, ~~the~~ and the Demand Flexibility Design Rating. The Total Energy Design Rating shall be comprised of a combination of t~~T~~he Solar Electric Generation, ~~and~~ the Demand Flexibility Design Rating ~~shall be subtracted from~~ and the Energy Efficiency Design Rating ~~to determine the Total Energy Design Rating.~~ The Demand Flexibility Design Rating shall be allowed to offset a portion of the Energy Efficiency Design Rating as defined by the Alternate Compliance Manual. The Proposed Building shall separately comply with the Energy Efficiency Design Rating (accounting for any offsets through the Demand Flexibility Design Rating) and the Total Energy Design Rating.

The language as written above better captures the value of storage and helps enable flexibility for home builders who are utilizing the performance pathway while still maintaining a tight building envelope.

To better reflect the modified language above, we also recommend altering the definition of Total Energy Design Rating and Demand Flexibility Measure in Section 100.1 under Subchapter 1 and adding a definition for an energy storage and/or battery storage system as discussed further below.[3]

Joint Appendix JA11- Qualification Requirement for Storage System

The attachment below incorporates Tesla's suggested modifications to JA11.[4] Additions are provided in red text and modifications are struck through. The attachment also incorporates CEC staff modifications as discussed during the October 5, 2017 workshop.

Minimum Performance Requirements

For the minimum performance requirements, during the workshop staff indicated that the energy capacity retention has been updated to 70 percent after 4,000 cycles. We recommend moving away from the cycling concept and instead focusing any performance requirements on warranty language as provided below.

Flexible Control Strategies

We provide several modifications to the operational control strategies language per the attachment. First, we recommend removing the 24 hour override language as this could significantly impact the customer experience. Second, we would like to see some consideration of standalone storage systems within the control requirements for cases when on-site solar is not feasible but a battery storage system may still be valuable. Finally, we would like to add a flexible control strategy.

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[2] http://docketpublic.energy.ca.gov/PublicDocuments/17-BSTD-01/TN217466_20170505T170153_Evelyn_Butler_Comments_Comments_regarding_2019_Building_Energy.pdf; http://docketpublic.energy.ca.gov/PublicDocuments/17-BSTD-01/TN217469_20170508T093603_California_Building_Industry_Association_CBIA_Comments_2019_ZNE.pdf

[3] http://docketpublic.energy.ca.gov/PublicDocuments/17-BSTD-01/TN221248_20170920T143529_Draft_2019_Standards_Chapter_1100.pdf

[4] This is based on the version of JA11 that was posted on the CEC website on September 20, 2017 and also incorporate the modifications staff provided during the October 4-5, 2017 workshop in their presentation. Available at: http://docketpublic.energy.ca.gov/PublicDocuments/17-BSTD-01/TN221256_20170920T145757_Draft_2019_Standards_Joint_Appendix_11.pdf; http://docketpublic.energy.ca.gov/PublicDocuments/17-BSTD-01/TN221448-2_20171009T140719_10517_Joint_Appendicies_Presentation.pdf

Desired customer operational strategies for the battery may vary due to the specific conditions of the home, PV size, appliances, behavior, and number and type of batteries installed. As a result, any operational strategies should encourage, but not require, behavior to maximize battery EDR value. These approaches should allow for flexibility on behalf of customers to operate the battery to meet their objectives which may be comfort, solar self-consumption, Time of Use (TOU) energy arbitrage, etc. While there may be more than one recommended strategy, builders should also be able to model bespoke approaches and receive EDR value for the batteries they install commensurate with the value those strategies provide. Most customers are expected to operate the battery to maximize self-consumption and utility bill savings. As such, utilities should be encouraged to design rates that would encourage battery operations to align with EDR value.

Storage System Definition

In addition to these modifications, we also recommend incorporating a definition for energy storage system or battery storage system specifically within Section 100.1 in Subchapter 1, which can be cross-referenced in JA11.[5] This definition can be developed using existing state and national electrical codes. One potential reference is the proposed 2020 National Energy Code (NEC), which is currently in the process of being updated. SEIA provided feedback on the definition of an energy storage system (ESS) within the 2020 NEC update process, portions of which could be applied here.[6]

Joint Appendix JA12 – Qualification Requirement for Photovoltaic System

Tesla is suggesting several refinements to JA12 as well as seeking some clarification.[7] These refinements are based on Tesla's technical experience as a solar power provider and consistent with industry standards.

System Orientation

While not provided in the draft text for JA12 that was uploaded to the 2019 pre-rulemaking portal, during the staff presentation on October 5, 2017, staff referenced that system strings must be within 110 to 270 degrees from true north. This range is somewhat limiting in that it removes due east facing roof planes. Staff has indicated that much of this language is being developed to be consistent with the New Solar Homes Partnership (NSHP) guidebook. The NSHP guidebook[8] references 90 to 280 degrees to be eligible for receiving incentives. 90 azimuth should therefore be included. We recognize limiting the system orientation may be an attempt to ensure homes are not net generators; however, when paired with an energy storage system, this should no longer be a concern.

Shading Verification

The shading verification section references a solar assessment tool, which has not previously been associated with the code. It is unclear from the description of the solar assessment tool whether this can be a remote digital tool, such as computer modeling, satellite or done imagery, developed by a solar developer working with a builder in the planning stage or whether this has to be done as a physical assessment. Tesla would recommend allowing digital tools that can include a proprietary tool as already created by a solar developer so long as it provides the same end results. To that extent, we suggest rephrasing this section to emphasize that any tool that is used shall be capable of asserting the

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[5] http://docketpublic.energy.ca.gov/PublicDocuments/17-BSTD-01/TN221248_20170920T143529_Draft_2019_Standards_Chapter_1100.pdf

[6] http://www.nfpa.org/assets/files/AboutTheCodes/70/70_A2019_NEC_P04_FD_PISubmittals.pdf

[7] This is based on the version of JA12 that was posted on the CEC website on September 20, 2017 and also incorporates the modifications staff provided during the October 4-5, 2017 workshop in their presentation. Available at: http://docketpublic.energy.ca.gov/PublicDocuments/17-BSTD-01/TN221257_20170920T150119_Draft_2019_Standards_Joint_Appendix_12.pdf; http://docketpublic.energy.ca.gov/PublicDocuments/17-BSTD-01/TN221448-2_20171009T140719_10517_Joint_Appendicies_Presentation.pdf

[8] http://docketpublic.energy.ca.gov/PublicDocuments/16-NSHP-01/TN221473_20171012T134427_Final_NSHP_Guidebook_Eleventh_Edition.pdf; p.26.

measurements as outlined within JA12 but also have the ability to derive at the desired verification level in the most efficient manner possible.

System Monitoring Requirements

Tesla appreciates staff's desire to ensure eventual homeowners have the ability to monitor real time system production and performance. Instead of requiring both an in unit display and remote monitoring capability, this section should be rephrased to state that a solar PV system installed in a new home shall provide either one of these two options. Tesla provides both a mobile app and an online web based portal that can be accessed from virtually anywhere in order to meet our customers' needs and provide constant system transparency. Additionally, we recommend focusing any detailed monitoring access available to dwelling occupants at the system level. Providing the instantaneous output of each panel or string is unnecessary for the dwelling occupant and currently not standard practice within the residential solar industry. While panel or string level monitoring has benefits for very large PV systems, a residential PV system is small enough that system level monitoring is sufficiently granular to identify issues. Adding more granular monitoring requirements beyond the system will not only add additional costs but also provide little benefit to the dwelling occupant in regards to lifetime operations and maintenance.

* * *.

Tesla appreciates the opportunity to submit comments on the proposed draft express terms for the 2019 standards. The technical requirements proposed for battery storage and solar PV play a critical role in ensuring the 2019 code is as effective as possible in moving California toward the zero net energy (ZNE) goal for new homes. With the modifications suggested in our comments above, we are confident the 2019 code will be able to capture the full value that solar PV paired with storage can provide to meet grid harmonization needs.

We look forward to continuing to work in partnership with the CEC to achieve the state's clean energy and greenhouse gas emissions goals.

Sincerely,

Francesca Wahl
Sr. Associate, Business Development and Policy
Tesla

Appendix JA11 – Qualification Requirements for Battery Storage System

JA11.1 *Purpose and Scope*

Joint Appendix JA11 provides the qualification requirements for battery storage system to meet the requirements for energy storage compliance credit(s) available in the performance standards set forth in Title 24, Part 6, Sections 150.1(b), 140.1(a)2 and 140.1(b)3. The primary function of the energy storage system is ~~daily~~ cycling for the purpose of load shifting and/or solar self-consumption. It can be used as a standalone system, or in combination with an on-site photovoltaic system.

JA11.2 *Qualification Requirements*

To qualify as an energy storage system for use for compliance with applicable performance compliance credits, the energy storage system shall be certified to the Energy Commission according to the following requirements:

JA11.2.1 Safety Requirements

The battery storage system shall be tested in accordance with the requirements given in UL1973~~, and xxx.~~ UL 9540, UL 1741 and UL 1741 SA.

JA11.2.2 Minimum Performance Requirements

The battery storage system should meet or exceed the following performance specification:

~~(a) Usable capacity of at least 6 kWh.~~

~~(b) Continuous charging and discharging rate of at least 4 kW.~~

(c) Round-trip efficiency of at least 85 percent.

(d) ~~Energy capacity retention of 80 (70)percent after 7,500 (4,000) cycles.~~ Energy capacity retention of 70 percent under a 10 year warranty.

JA11.2.3 Control Requirements

JA11.2.3.1 *General*

The battery storage system shall be capable of different modes of operation including solar photovoltaic self-consumption, backup power, and load shifting which are operationalized through control schemes.

The requirements in this section are applicable to all control strategies.

(a) The battery storage system shall be controllable remotely ~~have the capability of being remotely programmed~~ to change the charge and discharge behavior. The charge and discharge behavior shall have the ability to change in response to real or expected load changes.~~periods. Also, the battery storage system shall allow the occupant to program the charge and discharge periods. At the minimum, the system shall be capable to program a summer schedule and a winter schedule.~~

(b) During discharge, the battery storage system shall be capable of being programed to first meet the electrical load of the dwelling. If during the discharge period the electrical load of the dwelling is less than the maximum discharge rate, the battery storage system ~~may~~ shall have the capability to discharge energy into the grid.

~~(c) Should the occupant initate initiate an override to backup mode, such selection will expire in no more than a 24-hour period and the operation mode shall return to default.~~

JA11.2.3.2 *Basic Control*

To qualify for the Basic Control, the battery storage system shall be ~~shipped~~ installed in the default operation mode to allow charging only from an on-site photovoltaic system when the photovoltaic system production is

greater than the on-site electrical load. The battery storage system ~~shall~~ may discharge when the photovoltaic system production is less than the on-site electrical load.

JA11.2.3.3 *Advanced Control*

To qualify for the Advanced Control, the battery storage system shall allow charging ~~only~~ during off-peak hours, and begin discharging ~~only~~ during the peak hours. The operation schedule shall be ~~preprogramed from factory,~~ updated remotely~~,~~ or programmed during the installation/commissioning of the system.

JA11.2.3.4 *Demand Response Control*

To qualify for the Demand Response Control, the battery storage system shall be controlled by the local utility or third-party aggregator as part of a demand response program.

JA11.2.3.5 *Flexible Control*

To qualify for Flexible Control, the battery storage system shall be operated in a manner that increases self-consumption, responds to utility rates, responds to demand response signals, and/or other strategies that align with EDR value.