**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE**

**STATE OF CALIFORNIA**

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| Order Instituting Rulemaking on the Commission's own motion to improve distribution level interconnection rules and regulations for certain classes of electric generators and electric storage resources. | Rulemaking 11-09-011<br>(Filed September 22, 2011) |

# JOINT MOTION SUPPORTING REVISIONS TO STREAMLINE RULE 21 FOR BEHIND-THE-METER, NON-EXPORTING STORAGE DEVICES


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**Dated:** November 18, 2015

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# JOINT MOTION SUPPORTING REVISIONS TO STREAMLINE RULE 21 FOR BEHIND-THE-METER, NON-EXPORTING STORAGE DEVICES

## I. INTRODUCTION

Pursuant to the California Public Utilities Commission's (Commission's or CPUC's) Rule of Practice and Procedure 11.1, Pacific Gas and Electric Company (PG&E) respectfully submits this motion (Motion) on behalf of itself, Southern California Edison Company (SCE), San Diego Gas & Electric Company (SDG&E), the Interstate Renewable Energy Council, Inc. (IREC), the Clean Coalition, Robert Bosch LLC (Bosch) and Stem, Inc. (Stem) (Joint Parties). This filing is in compliance with Administrative Law Judge (ALJ) Bushey's August 19, 2015 Ruling in Rulemaking (R.) 11-09-011 (Proceeding) that directed the parties to work together to file a motion setting forth proposed revisions to Electric Tariff Rule 21 to address interconnection of behind-the-meter (BTM), non-exporting energy storage, as modified by ALJ Bushey's subsequent October 30, 2015 Ruling providing an extension to file this Motion on November 18, 2015.

With this Motion, the Joint Parties request approval to:

- Insert clarifications regarding the treatment of load from energy storage charging to the Rule 21 tariff;
- Allocate costs for upgrades that are attributable to both the load and generation impacts of storage by prioritizing the load impacts before the generation impacts;
- Provide additional detail on energy storage charging load processes through a public Guide; and,

- Modify the Interconnection Application and Agreement to capture energy storage load information for the applicable energy storage agreements.

The Joint Parties further request approval of the process by which additional identified issues related to the interconnection of energy storage will be addressed.

## II. BACKGROUND

The proposed Rule 21 revisions as well as additional issues outlined within this motion are the result of ongoing efforts by the investor-owned utilities (IOUs or Utilities), industry stakeholders and the Commission to improve the interconnection process for non-exporting energy storage devices. On July 18, 2014, the Commission issued a Staff Report, *Issues, Priorities and Recommendations for Energy Storage Interconnection*,[1/] which identified several areas where interconnection policies could be streamlined and revised to address the safety and reliability issues presented by the interconnection of energy storage in an expeditious manner. In addition, the Commission hosted a stakeholder workshop on December 3, 2014, inviting the IOUs and industry stakeholders to share initial proposals on ways to modify Rule 21 to better accommodate the study of BTM non-exporting energy storage.[2/] Following the workshops on December 12, 2014, the IOUs provided a suggested path for next steps that was served on all parties to the proceeding. In response to direction from ALJ Bushey, the IOUs held weekly calls with stakeholders during the month of February 2015, and provided an initial Motion on April 1, 2015. On May 22, 2015, parties filed opening comments on the April 1, 2015 Motion regarding the streamlining for BTM non-exporting storage,[3/] and, on June 8, 2015, parties filed reply comments on this Motion.[4/]

On July 13, 2015, the Commission issued the *Ruling of the Assigned Commissioner and*

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1/ CPUC Staff Proposal, *Issues, Priorities and Recommendations for Energy Storage Interconnection,* July 18, 2014 http://www.cpuc.ca.gov/NR/rdonlyres/529F4161-620E-4DFA-98E2-F434462824F6/0/Rule21storageandinterconnectionFINAL724.pdf

2/ CPUC December 3, 2014 Rule 21 Workshop, presentations available at: http://www.cpuc.ca.gov/PUC/energy/rule21.htm.

3/ Clean Coalition, IREC, CESA, SolarCity, and Bosch.

4/ Joint IOUs, SolarCity, and Bosch.

*Administrative Law Judge Scheduling Status Conference and Ordering Parties to Meet and Confer*. The ruling directed parties to meet and confer on the topic of BTM non-exporting storage, and to present a status report at the scheduled August 6, 2015 Status Conference.[5/] During the August 6, 2015 Status Conference, Clean Coalition, on behalf of active parties, presented a recommendation to conduct Energy Division facilitated workshops to discuss these issues, and a deadline to submit motions on these topics in November 2015 to ALJ Bushey.

On August 19, 2015, ALJ Bushey issued the Administrative Law Judge's Ruling Setting *Dates for Filing Motions and Granting Motions for Party Status.* In this ruling, ALJ Bushey established the following procedural schedule for these BTM non-exporting storage interconnection requests: (1) Utilities, and other parties should they so desire, distribute to the service list a written proposal on storage load issues, including any changes to Rule 21 screens by August 31, 2015; (2) Utilities and SolarCity, and other parties should they so desire, distribute to the service list non-exporting storage proposals by September 14; (3) Utilities conduct informational webinar providing an overview of the process for reviewing storage projects pursuant to Rule 21 before September 30, 2015; (4) Energy Division to facilitate workshops on these issues during September/October 2015; (5) parties to file a joint motion requesting Commission action on storage interconnection issues, as well as any alternative motions, by November 4, 2015; and (6) Parties may file responses and replies (if authorized) to the motion, pursuant to Rule 11of the Commission's Rules of Practice and Procedure.

The Utilities and Bosch distributed their proposal on storage load issues as directed. SolarCity, Bosch, and the California Energy Storage Alliance (CESA) distributed their proposals on non-exporting storage as directed. The Utilities conducted an informal webinar on the process for reviewing storage projects as directed. On September 22 and October 1, 2015, the Energy Division hosted workshops on storage load interconnection issues. The October 1 workshop, and a workshop on October 21, 2015,

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5/ See July 13, 2015 Ruling of the Assigned Commissioner and Administrative Law Judge Scheduling Status Conference and Ordering Parties to Meet and Confer; *see also* August 19, 2015, Administrative Law Judge's Ruling Setting Dates for Filing Final Motions and Granting Motions for Party Status.

examined non-export as well as additional issues for storage interconnection.

As a result of all these efforts, the Joint Parties have a number of proposals for Commission consideration and approval.

## III. STORAGE LOAD PRINCIPLES

### A. Rule 21 Provides a Delineated Path to Facilitate the Streamlining of Energy Storage Interconnection

In Decision (D.) 12-09-018, the Commission adopted a settlement agreement that updated the CPUC-jurisdictional interconnection rules in many ways, including the addition of energy storage within Rule 21's definition of a Generating Facility.[6/] The study of energy storage under Rule 21 is supported under the principle that energy storage devices operating in parallel with the Distribution grid behave just like a generator when discharging energy, whether to on-site load or to the electrical grid.

As with any generator, energy storage devices present risks of overload conditions, reverse power flows, voltage regulation and fault current. If these matters are not reviewed, they can pose safety and reliability risks to other users of the distribution grid, the general public, and to utility personnel and equipment. For example, non-exporting devices can increase fault current, increasing the risk of failure for certain electrical apparatus used throughout the grid among other risks. Energy storage is reviewed under Rule 21 to ensure that each Generating Facility meets the criteria for safe and reliable operation in parallel with the grid.[7/] In addition, the Rule 21 interconnection process provides for increased visibility to both the utilities and their customers regarding the impacts of energy storage on the grid.

Energy storage is distinct from other traditional generators, however, in that it also has a charging function that may modestly or significantly alter the customer's onsite load or demand. Thus, through this Proceeding, parties have discussed whether the "load" side of the energy storage systems

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[6/] See D.12-09-018, p. 22. See also Finding of Fact No. 2: ("The Proposed Settlement responds to issues framed by this rulemaking, including…creating distribution-level interconnection procedures for storage technologies") and Finding of Fact No.3 ("The Proposed Settlement supports the broad goals of the Commission regarding transparency, predictability, and timeliness of the distribution level interconnection process by . . . confirming that storage facilities are eligible for interconnection evaluation under Rule 21.").

[7/] *See generally* Rule 21 Section G Engineering Review Details Screen I (Options 1-5).

should also be reviewed under Rule 21, or whether this review belongs exclusively within the purview of Rules 2, 3, 15 and 16. The IOUs have indicated that the charging functionality of an energy storage device is reviewed under the current Rule 21 Fast Track Study Process within Screens C and D.

As the IOUs discussed with parties, the Rule 21 interconnection application offers a streamlined collection of information necessary to conduct the analyses of both the discharging and charging load impacts of energy storage as compared to two separate and distinct processes.[8/]

### B. Existing Load Rules – Electric Rules 2, 3, 15 and 16 - Should Be Leveraged to Address Charging Impacts of Energy Storage

Charging is an inherent characteristic of energy storage, and the impacts of charging must be considered to ensure a safe and reliable distribution system consistent with Good Utility Practice.[9/] The Joint Parties recognize that existing rules and tariffs exist to study the addition of new load, and these rules can be leveraged to adequately analyze the impacts of storage charging to the grid without discriminating against incremental net load of energy storage when compared to other types of traditional load. The Joint Parties propose to leverage Rules 2 (Description of Service) and 3 (Application for Service) for load notification, and Rules 15 (Distribution Line Extensions) and 16 (Service Extensions) for cost allocation and cost responsibility for specifically load-related upgrades.

### C. Confirmation of Load Notification and Associated System Review

Throughout the recent workshops, stakeholders have voiced their desire to have delineated thresholds for triggering review of energy storage load impacts under the IOUs' current practices, in line

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[8/] Reasons supporting this recommendation include the avoidance of a redundant application or study process and related lost efficiencies if the use of a separate process was required for the review of the charging aspects of storage currently completed under Rule 21. The detail and rigor of the Rule 21 process effectively supports safe, reliable interconnection of storage Generating Facilities in a standardized manner.

[9/] Rule 21, Section C. defines Good Utility Practice as: Any of the practices, methods and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period, or any of the practices, methods and acts which, in the exercise of reasonable judgment in light of the facts known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. Good Utility Practice is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather to be acceptable practices, methods, or acts generally accepted in the region.

with the existing materiality threshold for Rule 3 under PG&E's and SCE's tariffs. As discussed during the workshops, Rule 3 does not provide a specific triggering threshold for load and related service reviews and instead requires notification for any "material" change.[10/] The IOUs explained that a load notification and related IOU review is generally required whenever customer modifications are made to the host facility electrical systems (e.g., an added circuit, service panel upgrade, or line side tap) or whenever a customer changes their facility operations and hence their load profile. From the IOUs' perspective, the only time it would be unnecessary to further review load impacts would be for a storage device connecting exclusively to existing receptacles.[11/] This review standard is consistent with the current treatment for all types of load once notice to the utility is provided.

The materiality of load impacts depends on site and system conditions, and a cursory review by the Utility is needed at a minimum to determine if the new power flows would trigger impacts to safe and reliable grid operations. The power flows due to charging load depend on the size and operational mode of a given energy storage facility.

Thus, the IOUs believe that it is still essential that the IOUs collect key information on energy storage size and operational mode to either confirm that no further load review is needed, or to direct the energy storage application to the correct level of load review. This collection and assessment of energy storage size and charging operational mode will allow for a review of charging impacts that the IOUs will use reasonable efforts to perform as part of the Rule 21 Fast Track Initial Review. Every energy storage device shall undergo this cursory review as part of the Rule 21 Fast Track Initial Review, though only a subset of energy storage devices will require a more detailed charging load review.

### D. Energy Storage Load Analyses Should Be Guided By Energy Storage Size and Operational Mode Thresholds

As discussed during the Commission workshops, the size and operational mode of the energy

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[10/] This is consistent with PG&E's and SCE's Rule 3. C. that requires customers to notify the utility of any material change. For SDG&E, under their Electric Rule 3.C, it is the customer's responsibility to notify the Utility if the customer makes any change in the connected load or operation.

[11/] The energy storage device's generating characteristics would still require review.

storage device will guide the level of load review needed. In particular, at the October 21, 2015 workshop, the Joint Parties identified four operational modes that have been condensed into three essential operational modes that characterize the level of impact to the grid, and thus the associated level of load review needed:

1) Non Grid Charging – the energy storage device will not charge from the grid, and will only charge from an on-site generator (Operational Mode 1).

2) Peak Shaving – the energy storage device charging from the grid will not increase the host facility's current peak load demand (Operational Mode 2).[12/]

3) Unrestricted Charging - the energy storage device charging is not subject to limitations and is requesting unrestricted charging capability (Operational Mode 3).

In Operational Mode 1, only a cursory charging review will be performed during the Rule 21 Fast Track Initial Review timeline to confirm the lack of charging capability from the distribution system, and a further load review is not necessary. In Operational Mode 2, load review may be necessary to determine any impacts to the primary conductor and substation transformer. The Utilities will use reasonable efforts to perform this study within the same timeframe as the Fast Track Initial Review, and at no additional cost to the applicant. In Operational Mode 3, a load review is required due to the need to assess impacts to both the distribution circuit (e.g., primary conductor and substation transformer) as well as the service facilities (e.g., service transformer and secondary conductors.) The timelines for these load reviews will have a minimum of two varieties: 15 business days, consistent with the Fast Track Initial Review timeframe for smaller devices or simpler cases, and 60 business days, consistent with the System Impact Study timeline, for larger devices or more complex system conditions. Each utility will include information in the Guide discussed in Section IV. C. defining the criteria for which timeline category applies to a given project, as well as how applicants will be notified throughout the process. In all cases, the IOUs will use reasonable efforts to complete these load review

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[12/] The IOUs interconnection applications and agreements will allow applicants to specify that they will operate in this manner and provide information about the means they will employ. .

activities within the specific timeframe provided in the Guide. This review will be done concurrently with any review of the discharging (generating) behavior of the energy storage system under the existing Rule 21 process.

### E. Cost Allocation Principles of Rules 15 And 16 Apply When Energy Storage Adds Permanent, Bona Fide Load to a Facility

The principles of Electric Rules 15 and 16 will apply when a storage device adds permanent, bona fide[13/] load to a facility that results in additional connected load to the overall site load. Electric Rule 15 and Rule 16 can be leveraged to appropriately assign cost responsibility for system upgrades that are triggered as a result of the charging load impacts of the storage device. These existing load rules, which have foundations based upon the addition of new end-use load and the resulting electric rate revenue, should be applied where appropriate to determine cost responsibility for upgrades.

As a general guideline, Rule 15, which covers Distribution Line Extensions, applies to distribution grid equipment that is used or has the ability to be used by multiple customers. Rule 16, which covers Service Extensions, applies to equipment that is used by only one customer.[14/] Rules 15 and 16 allow for the allocation of costs between the utility and the customer for new distribution line and service extensions, and for upgrades to existing service facilities that are triggered by the addition of permanent, bona fide load to the utility system. Therefore, Rules 15 and 16 should apply when energy storage is being added to a new site and the storage load is part of an entire new facility load, or when storage is adding permanent, bona fide load (also referred to as net positive incremental load) to an existing facility. When peak shaving (Operational Mode 2), most energy storage customers will be incentivized to reduce peak load, so the customer's peak demand (in kW) would decrease. In this operational mode, the customer may be adding additional volumetric energy (in kWh) to the site if charging from the grid, amounting to the roundtrip efficiency losses or auxiliary loads of the storage

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[13/] As provided for in Electric Tariff Rules 15, Section C.1.

[14/] For example, a transformer that serves multiple customers would be considered a Rule 15 distribution facility. A dedicated service transformer or service drop that serves only one customer is considered a Rule 16 service facility.

device. In this case, the only additional permanent, bona fide load added to the site would be the additional volumetric energy and would most likely result in reduced net revenue. If the customer requests unrestricted charging (Operational Mode 3), the IOUs study the energy storage device in the case where the storage adds its capacity on top of the customer peak as well as the system peak, and thus the new permanent, bona fide load may amount to an increase in peak demand (kW) along with an increase in volumetric energy (kWh) equivalent to roundtrip efficiency losses or other auxiliary loads of the storage device. These two factors may result in additional net revenue.

Under Rules 15 and 16, revenue-based allowances are applied to offset the costs of a new extension based on the estimated net revenues that the utility expects to recover through distribution rates from the host customer's incremental (or new) load.

Generally, for *new* line and/or service extensions, the new load would amount to the entire new facility load, including the storage device. Costs in excess of the allowance are the responsibility of the applicant.[15/] Regarding upgrades to existing facilities, if the upgraded facilities will serve the utility general population (i.e., usually defined as serving or having the ability to serve more than one customer), these facilities are considered "distribution facilities" and are upgraded at the expense of the utility as reinforcement or betterment to the existing distribution system. Allowances are not applicable since the individual applicant is not responsible for these upgrade costs. If the upgraded facility is a service facility and will only provide service to the applicant ("service facility upgrade"), allowances are applied based on the estimated incremental distribution revenues that will be collected by the utility from the permanent, bona-fide load to be served by the upgraded service facilities.

Therefore, upgrade costs associated with serving permanent, bona fide load may be the responsibility of the applicant, the utility, or may be shared between the two based on the anticipated

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[15/] An applicant has two options for the amounts owed that are in excess of the allowance: (1) Refundable Option and (2) Non-Refundable Discount Option. If the Refundable Option is selected, the applicant has the ability to receive refunds for certain additional amounts paid in excess of the allowance based on the amount of distribution revenues received from the load served via the new line and/or service extension after the allowances are cleared (i.e., "revenue justified" based on distribution revenues received from the load served by the new or upgraded facilities).

revenue that results from the addition of permanent, bona fide load and applicable allowances.

For non-residential customers, the allowance calculation is based on the following formula:

**Allowance = Net** Revenue[16]**/ Cost of Service (COS) Factor**[17]

The Net Revenue used in the calculation will be based on the utility's estimate of the incremental permanent bona-fide load to be added by the operating characteristics of the storage device, for which the utilities can reasonably expect to receive increased distribution revenues from the host customer. New permanent, bona fide load from a storage device could either be increased demand (kW) if the storage device intends to increase a host customer's peak demand due to the customer requesting the flexibility to charge the storage device at-will regardless of impact to peak (Operational Mode 3); or, from the additional energy (kWh) consumed by the storage device when charging, which will most likely only be the roundtrip efficiency losses associated with operating the storage device, as described in Section D. If a customer is not charging from the grid or is peak shaving (Operational Modes 1 and 2), it is less likely that the customer will require a system upgrade measure. In the rare case that a system upgrade is needed and the energy storage device is peak shaving on an existing facility, it is unlikely that the utility will see a net increase in revenues because the business case for peak shaving is bill reduction. In cases where the customer reduces the revenue, the customer would not be eligible for an allowance.

The Commission originally adopted this revenue-based allowance methodology in 1994 to

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16/ SCE's Rule 15 defines Net Revenue as follows: That portion of the total annual Distribution rate revenues that support SCE's Distribution Line and Service Extension costs for applicants requesting line and/or service extensions and excludes such items as Energy, California Independent System Operator (CAISO)-Controlled transmission, public purpose programs, revenue cycle services (RCS) costs, prorated baseline credit, and generation-related administrative and general (A&G) costs. For residential line extensions, the Net Revenue is calculated based on average residential distribution revenue per customer, calculated as the total residential distribution revenue divided by the total number of residential customer with the cost of the extension facilities that go into the utility's rate base, including capital and operations and maintenance (O&M).

17/ The Cost of Service factor accounts for items associated w components such as rate of return, depreciation, administrative and general (A&G) expense, franchise fees and uncollectible (FF&U), ad valorem tax, insurance, federal and state income tax, O&M expenses and replacement coverage. The COS factor is the ratio of such costs to the cost of the line extension. For example, a COS factor of 0.16 means that for every $100 of line extension cost, $16 in revenue is needed to recover the associated costs. Using this example, if the estimated net revenue is $160 and the COS factor is 0.16, the allowance would be $1,000 ($160/0.16).

modernize the way in which costs were allocated for distribution line extensions and provide a more equitable allocation of these costs and uniform treatment of applicants. D.94-12- 026 provides, in pertinent part, as follows:

> "Revenue-based allowances (supported by applicant revenues) for both the gas and electric line extensions provide an equitable arrangement between the applicant and the ratepayer, as well as between various classes of applicants. The revenue-based allowances which represent the utility investment are based on the expected supporting revenues from the loads to be served by the extension. This amount is then used as the allowance, and is credited to the applicant's total cost for the extension."[18/]

In 1997, the Commission adopted D.97-12-098, which extended this revenue-based allowance methodology to services (i.e., Rule 16). Specifically, Conclusion of Law 4 stated:

> "The cost of TSM [transformer, service and meter] provided by the utility to applicants should be included in the costs that will be covered by allowances only to the extent that they are revenue-justified."[19/]

That decision directed the Utilities to use only distribution-based revenues for calculating allowances, rather than revenues reflecting the full range of utility services in the "net revenue" portion of the allowance calculation.[20/]

Therefore, when determining the amount of the allowances, the IOUs estimate the amount of annual distribution revenues (using the distribution rates from the otherwise applicable tariff or schedule (OAT/OAS)) that will be received from the permanent, bona fide load served by the new facilities on a project-specific basis for non-residential load and then divide that estimated Net Revenue amount by the Commission-approved COS Factor. If no applicable distribution revenues are associated with the extension or upgrade, the numerator of the allowance formula would be $0.00, which results in an allowance of $0.00.

Today, for non-residential Rule 15 and/or 16 projects that include both load and generation, the

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[18/] D.94-12-026 at p. 2 (footnote 2). Emphasis added.

[19/] D.97-12-098 at p. 36 (Conclusion of Law 4). Emphasis added.

[20/] D.97-12-098 at p. 37 (Ordering Paragraph 1); see also Conclusion of Law 6 at p. 36.

Utilities utilize the revenue-based allowance methodology outlined above. The Rule 15 allowance for residential customers is based on the average distribution revenue per residential customer divided by the Cost of Service Factor. This results in a set allowance amount that is applied to any eligible residential extension and upgrade request under Rules 15 and/or 16, regardless of the specific customer's actual anticipated net revenue. This methodology will continue to apply to residential customers with storage.[21/]

One final concept related to allowances that is important to understand is a practice commonly referred to as "deficiency billing." Although implemented somewhat differently by the IOUs due to differences in tariff language, deficiency billing allows the Utility, in certain cases, to require that an applicant pay back any portion of the allowance that is not "revenue justified" by the resulting distribution revenues received by the Utility from the load served on the new or upgraded facilities within a specified period of time.[22/] This provision exists to protect the utility's general body of customers from subsidizing applicants who fail to take service or who fail to use the services contracted for, and aligns with the intent of the revenue-based allowance approach. Therefore, it is generally not in the best interest of applicants to receive an allowance for load that is not likely going to materialize or produce additional distribution revenues just to offset upfront installation costs. This is because the applicant may ultimately have to reimburse the Utility for the excess allowance granted. For these reasons, it is prudent for all parties that allowances are applied appropriately based on the realistic expectation of distribution revenues to be received from the permanent, bona fide load being served by the new or upgraded facilities.

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[21/] This treatment is pursuant to Ordering Paragraph 2 of D.07-07-019, For SCE, this set allowance amount is currently $3,038 per meter or residential dwelling unit, as provided in Rule 15, Section C.3. This amount is subject to Periodic Review, as outlined in Section I.2 of Rule 15. PG&E's approach is similar and its allowance amount is $1,918. For SDG&E, the allowance amount is $2,841 per meter or residential dwelling unit and is subject to Periodic Review, as outlined in Section I.2 of Rule 15.

[22/] *See* SCE Electric Rule 15, Section D.7.a; PG&E Electric Rule 15, Section D.7.a and Rule 16, Section E.2; and, SDG&E Electric Rule 15, Section D.7.a.

To summarize, a customer interconnecting an energy storage device may be eligible for an allowance under Electric Rules 15 and 16, as long as the allowance is based on net revenues that the Utility expects to collect resulting from new permanent, bona fide load from energy storage charging. Allowances will be calculated using the existing Electric Rules 15 and 16 methodologies, provided that allowances are based on net incremental revenues resulting from storage charging. Customers may be subject to deficiency billing if the Utility fails to recover any allowances provided through the distribution rate increases resulting from energy storage charging.

## IV. PROPOSALS FOR COMMISSION APPROVAL

### A. Clarifications Regarding Treatment of Storage Load are Proposed to be Added to the Rule 21 Tariff

Parties recognize that the economic drivers for energy storage are rapidly changing, and the field of energy storage is still evolving. Therefore, uses for storage and possibly Operational Modes may change in the future. In addition, the rules governing load analysis and review span several policies, all of which may change according to Commission initiative. For these reasons, the Joint Parties propose that the Rule 21 tariff be modified to include broad language to clarify that existing relevant load review tariffs will govern load analysis and review for energy storage. The purpose of this clarification is to streamline the review of BTM, non-exporting energy storage devices under Rule 21. This language is kept intentionally brief to accommodate any changes that may occur in the energy storage market or to load tariffs. More specific detail and clarifications will be included in the Guide described in Section IV.C.

**JOINT PARTIES' PROPOSAL:**

The Parties recommend that the following language be added to the Rule 21 tariff:

> "B.4. Interaction with other Tariffs for Storage Charging Load Treatment
> For retail Customers interconnecting energy storage devices pursuant to this Rule, the load aspects of the storage devices will be treated pursuant to Electric Rules 2, 3, 15 and 16 just like other load, using the incremental net load for non-residential customers, if any, of the storage devices."

### B. Cost Allocation for Upgrades Attributable to Both Load and Generation System Impacts Should Prioritize Load Impacts

During the workshops, the question was raised regarding how cost allocation under Rules 15, 16 and 21 should be applied in the circumstance of a system upgrade caused by both the load and generation aspects of a storage generating facility. As stated in Section III.E, Rule 15 and 16 cost treatment principles would be applied for the net incremental revenue contributed by added storage charging load; the Utilities would then apply the provisions of Rule 21 to anything in addition to what is necessary to serve the added load and that was triggered as a result of the generation. Clarification of this policy will be provided in the Guide described below in Section IV.C.

**JOINT PARTIES' PROPOSAL:**

If the IOUs determine that a given upgrade would be triggered independently by the load or generation (charging or discharging) aspects of an energy storage device, the Utilities would first apply the cost allocation principles of Rules 15 and 16 for the upgrades required to serve any permanent, bona fide addition of load with allowances based on the net incremental revenue contributed by added storage charging load; the Utilities would then apply the provisions of Rule 21 to anything in addition to what is necessary to serve the load and that was triggered as a result of the generation.

### C. Provide Additional Detail on Storage Charging Load Processes via a Public "Guide"

The IOUs propose the development of an interconnection process guide ("Guide") that will include the process and implementation of the energy storage load review and cost responsibility of load-related upgrades not already included in Rule 21 or Rules 2, 3, 15 and 16. This portion of the Guide is intended to provide stakeholder transparency regarding areas of storage load review and related processes. As to provide additional interconnection customer support, the IOUs may use their discretion to publish other general information to further assist interconnection customers. The Guide is intended to be more readily modifiable than the Rule 21 tariff as the energy storage technologies, markets, load study tariffs, and distribution conditions evolve over time. The following is proposed to efficiently and collaboratively modify the Guide:

- A stakeholder process that is consistent across all IOUs will be utilized for Guide

feedback. The process will include notice of Guide revisions to the service list for R.11-09-011 or any successor proceeding.

- Each IOU will maintain its respective Guide and be responsible for soliciting and incorporating feedback and for responding to stakeholder proposals for modifications or clarifications.

**JOINT PARTIES' PROPOSAL:**

The IOUs propose to develop an Interconnection Process Guide detailing the processes and implementations by which the load aspects of energy storage are reviewed, including specific size thresholds and cost responsibility of load-related upgrades not already included in Rule 21 or Rules 2, 3, 15 and 16. The guide will contain, at a minimum:

- A description of the review process including specific requirements for cursory load review,[23/]
- A description of the kind of information that will be provided by the Utility as a result of the load study, including proposed charging profiles to avoid identified potential system upgrade needs.

The IOUs also propose to develop a transparent stakeholder process such that modifications to the Guides may be made quickly and collaboratively.

The IOUs propose to make the Guide publically available and served on the R.11-09-011 service list or any successor proceeding within ninety (90) Business Days[24/] of the date of issuance of a Commission's Final Decision anticipated after the filing of this Motion.

### D. Modify Interconnection Application and Agreement to Capture Load Related Information

The robust discussion in the Proceeding around the charging characteristics of energy storage

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[23/] See Appendix D for an illustrative example of the type of diagram anticipated to be included in the PG&E specific guide.

[24/] Any day not including Saturday, Sunday or Federal or State holiday.

devices has yielded proposed refinements to several interconnection forms. First, to enable clear description by applicants of storage device behavior and to facilitate the resulting study processes, modifications were identified for the respective interconnection application forms. These modifications serve to update the format and details of storage device information requested in the IOU applications as of 2014.

Furthermore, since a customer's proposed charging behavior is material to the assumptions of the interconnection study, resulting requirements and thus the safety and reliability of the grid, the parties propose to memorialize in their Interconnection Agreements the relevant commitments of a storage device regarding its charging characteristics.[25/] These commitments correspond to the charging behavior proposed by the customer and would be optional based on the storage device's proposed operations. The IOUs would seek to memorialize only those commitments that materially impact the outcome of the interconnection study, so as not to be unnecessarily prescriptive in the contractual restrictions of how the storage devices are operated.

**JOINT PARTIES PROPOSAL:**

The Parties propose that the IOUs file advice letters within 30(BD of the issuance of a Final Decision. This Advice Letter would propose modifications to the IOUs' respective Interconnection Application and pro-forma Interconnection Agreement Forms used for facilities that include non-export energy storage.

The modifications to the Application forms will ensure storage charging behavior is adequately described in the Rule 21 Interconnection Request. An illustrative example of such proposed changes are provided in Appendix A, a redline draft of excerpts from PG&E Form 79-974, *Interconnection Application For Non-Export Or Certain Net Energy Metered Generating Facilities.*

The modifications to the pro-forma Interconnection Agreement forms will memorialize the relevant commitments of an interconnection customer and IOU to respectively operate and serve a

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[25/] See draft Interconnection Agreement language in Appendix B.

generating facility as proposed. The Agreement forms will also clarify the customer's responsibility to notify the IOU of changes in operations, and to provide data to the IOU upon request regarding the agreed upon constraints. An illustrative example of the proposed changes is provided in Appendix B, Illustrative Draft Agreement Language for Insertion to PG&E Form 79-973, *Generating Facility Interconnection Agreement For Non-Export Generating Facilities*. With regard to fees and costs, changes in the load characteristics will be treated in a manner consistent with Rules 2, 3, 15 and 16 using the incremental net load, if any, of the storage device.

## V. THE JOINT PARTIES PROPOSE ADDITIONAL STEPS FOLLOWING THE COMMISSION ISSUANCE OF THE DECISION ADDRESSING THIS MOTION

In addition to the items discussed in Section IV, the Joint Parties propose a process for moving forward on the following additional items that were discussed during the workshops but that require additional review and consideration by the stakeholders to properly balance increased efficiency and flexibility with the need to maintain safety and reliability. For these items, the Joint Parties request Commission approval of the *process* specified to move forward on these items.

### A. Expedited Interconnection Process for Certified Standard Storage Applications

During the recent workshops, clarification was made between processes for evaluating the impact of charging behavior of storage relative to that of its discharging behavior. For discharging behavior, the study of non-exporting storage could be no more complicated or costly than a comparably sized Net Energy Metering (NEM) generator due to the non-export nature of the storage resource. Presently, the IOUs have processes and tools in place that allow for the expedited interconnection of standard, well-understood configurations of rooftop solar under certain size thresholds and physical configurations. Also, over the last several years, small (kW scale) non-exporting storage systems have enjoyed a relatively quick Rule 21 interconnection process as the IOU interconnection teams gained familiarity with particular facility configurations.

The Joint Parties agree that it should be possible to establish standard physical configurations for non-exporting storage facilities that would allow an expedited interconnection process without compromising the safety or reliability of the distribution system.

Once a streamlined process is available, the interconnection application fee could be reduced, if justified. While interconnection fees must be considered in the context of the entire portfolio of generation technologies and customers, Joint Parties agree that system improvements that reduce processing costs should yield benefits to interconnection customers.

**JOINT PARTIES PROCESS PROPOSAL:**

The Joint Parties propose that IOU staff and interested industry members collaborate on defining criteria for an expedited interconnection process for non-export energy storage no later than 60 BD of issuance of a Final Decision on this Motion, presuming approval by the Commission of this proposal.

Each IOU will file an advice letter the latter of 120 BD of the filing of this Motion, or 30 BD of the issuance of a Final Decision, presuming acceptance of this Motion, proposing an expedited interconnection process for non-export energy storage that may also be functional for other technologies or configurations in the future.

The proposed process will include:

- For currently known technologies, physical specifications and standard configurations for eligibility, including converter-based storage facilities such as the Bosch DC Microgrid technology;
- For future technologies, process and any related costs to establish new physical specifications and standard configurations for eligibility;
- Information required in an Interconnection Request under this process and any changes needed to filed Application forms;
- Definition of final testing or commissioning activities required prior to interconnection, which may be specific to the configurations or technologies;
- Process flow diagram with mapping to Rule 21 requirements;
- Expected process timelines, as applicable;
- State of automation needed to support the process (if any);
- Date by which the proposed process will be available to customers, allowing time needed to develop process optimizations or automation, as needed;

- Proposed interconnection application fee for projects using the proposed process; and,
- Specification of process documentation that the IOU will make available.

### B. Streamlined Rule 21 Review Process for AC/DC Converter

In the Proceeding, Bosch proposed for discussion a type of generating facility that would safely utilize an AC to DC converter that could be demonstrated to be physically incapable of back feeding power to the distribution system or of contributing fault current. As a result of discussions over the course of the workshops sponsored by the Energy Division, Bosch and the IOUs agreed that certification of AC/DC converters meeting such technical standards would be refined to provide for streamlined interconnection approval under Rule 21. Correspondence with Underwriters' Laboratories (UL) proceeded to identify several options for potential standards, either UL 1741 and/or UL 62109, which could be utilized to certify converters to such characteristics under Rule 21. The additional requirements under discussion to be added into these UL standards are the allowable maximum backfeed current and duration during normal and fault conditions and testing for harmonics per IEEE 519. Bosch and the IOUs agree that these two standards once revised may be an appropriate standard to certify converters in Rule 21.

The IOUs agree to amend Rule 21 to address the certification of converters and that such a certification, once mutually agreed upon, could satisfy the need for a performance of an interconnection study. The IOUs intend to amend Rule 21 in a technology-neutral fashion, such that any technology that could be certified to such standards would qualify for such expedited interconnection approval. Configurations to which this certification is applicable will be included in the scope of the expedited interconnection process for non-exporting storage described in Section V.A. above. In the context of that effort, the corresponding administrative components outside of the study process are expected to be simplified, streamlined, or automated where possible. Thus, upon validation of such certification, a given interconnection request would be considered to pass the relevant interconnection study.

**JOINT PARTIES PROCESS PROPOSAL**:

The Joint Parties recommend that the Commission's decision provide as follows:

Within 60 Business Days of the delivery to the Joint IOUs of the results of a mutually agreed upon, between the IOUs and Bosch, test of Bosch's AC/DC converter by UL, including data on backfeed current and duration that occurs during normal and fault conditions and harmonics contribution of its converter meeting the requirement of IEEE 519 Harmonic Limit, the IOUs will file a Tier 2 advice letter(s) requesting Commission approval of amendments to their Rule 21 tariff and forms, as applicable, to address the use of AC/DC converters (or other defined term as agreed upon) and specify the certification of and Rule 21 process applicable to such technology that would allow Generating Facilities utilizing such equipment to immediately pass Rule 21 Fast Track Initial Review.

### C. Creation of an Option to Utilize Advanced Inverter Functionality for Inadvertent Export

In its comments filed May 22, 2015, SolarCity Corporation proposed a new protection option for Initial Review Screen I that would utilize a control system including advanced inverter functionality to implement a non-export control function similar to the Inadvertent Export option described in Rule 21, Section M. This concept was further discussed in workshops and other correspondence and is still under exploration by the Parties. The IOUs continue to be open to discussing the requirements that would define an acceptably safe and reliable means of using such an inverter-based control system in a non-exporting or inadvertent exporting storage device. The specific technical issues have gained clarity among the parties, including identifying the key parameters of duration, magnitude, and frequency of occurrences of incidental power export. Venues for certification against the emergent technical parameters were discussed, but a means to certify or otherwise validate device functionality has not yet been agreed upon. The Joint Parties are open to the continued pursuit of a mutually agreed upon process.

**JOINT PARTIES PROCESS PROPOSAL:**

The Joint Parties propose to continue discussion among interested parties and the IOUs with the intent to define the criteria and certification process that could constitute a mutually agreed upon basis for providing an "Advanced Inverter Functionality" option for Rule 21 Fast Track Initial Review or other tariff options as appropriate. This discussion must include both Planning and Protection engineering functions from the IOUs as well as storage project developers, inverter and/or system

manufacturers, and relevant certifying bodies. Within 30 BD of issuance of a Decision regarding this motion, the Joint Parties and interested stakeholders shall provide a status update to the service list for R.11-09-011 on additional progress that has been made toward developing consensus-based requirements to address the inadvertent export issue. This update will include detail on the timeline of further actions, including any expected filings. Within this 30 BD timeframe, the Joint Parties shall schedule a minimum of three stakeholder calls to engage in continued discussions. If agreement is reached, tariff changes could be proposed to the Commission via advice letter to modify the corresponding tariff sections and filed forms to accommodate the change.

## VI. OTHER FORUMS OFFER OPPORTUNITIES AS WELL

The focus of this Proceeding is improving the Rule 21 interconnection process while maintaining safety and reliability. Other rulemakings are looking at broader policy initiatives beyond interconnection.

Parties have raised a wide range of issues and proposals to improve the Rule 21 interconnection process. Various parties have provided input on the list in in Appendix C, *Unaddressed Issues in the Rule 21proceeding*.

The Joint Parties propose that the Commission provide an opportunity prior to the close of this Proceeding for Parties to comment on (1) the outstanding issues such as those identified herein, and (2) the need for a successor proceeding or other venue to address the ongoing evolution of matters relating to interconnection.

## VII. CONCLUSION

The Joint Parties appreciate the opportunity to submit this Motion and look forward to Commission approval of the proposals to improve the interconnection process under Rule 21 for BTM, non-exporting energy storage configurations.

Respectfully submitted,

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On behalf of PG&E, SCE, SDG&E, IREC, Clean Coalition, Bosch and Stem.

November 18, 2015

**Appendix A:**

Illustrative redline draft of excerpts from PG&E Form 79-974, *Interconnection Application For Non-Export Or Certain Net Energy Metered Generating Facilities.*

**F. Additional Information Required for Energy Storage Systems (if applicable):**

~~Describe the current primary intended use (s) of the storage device (please check all applicable boxes that apply. If operations significantly change, please contact PG&E):~~

~~☐ Peak Shaving ☐ Load Shifting (away from peak time periods)~~
~~☐ Export to Grid ☐ Back Up Power~~
~~Other:~~

**Electrical Load Function:**

Rated Charge Demand (Load): _____ kW
Estimated annual net energy usage of the energy storage device, including auxiliary loads: _____ kWh

Will the ~~distribution~~ Distribution ~~grid~~ System be used to charge the storage device: ☐ Yes ☐ No

If no: Provide technical description of control systems including:
Source of energy for charging: _____
Mechanism to prevent charging from the Distribution System: _____

If yes: Will charging the storage device increase the host facility's current peak load demand:
☐ Yes ☐ No

If yes: Provide the following loading information:
Amount added of peak demand in (kW): _____
How frequently is the above added peak demand expected to occur?
Daily / Monthly / Annually Additional Details: _____

If no: Provide technical description of control systems including:
Charging periods: _____
Mechanism to prevent charging from the Distribution System during host facility peak:
_____

~~If yes,: Will charging the storage systems from the grid increase the host facility's current peak load demand:~~
~~Yes ☐ No ☐~~

- ~~Yes: Provide the amount added of peak demand in (kW): _____~~
- ~~No: Provide technical description of control systems including:~~
  - ~~Charging periods: _____~~
  - ~~Source of energy for charging: _____~~
  - ~~Mechanism to prevent charging from the grid at peak:~~
    ~~_____~~
    ~~=~~

~~Generating Facility: *Including all generation sources such as PV, storage, and other technologies, provide the following information:*~~

~~Will the generating facilities export power to the grid: ☐ Yes ☐ No~~

~~If yes, specify Generating Facility's maximum coincident export to the grid: _____ kW~~

~~If all generation sources are not simultaneously exporting to the grid, provide technical high-level description of the control system(s) for this function:~~

**Appendix B:**

Illustrative draft agreement language for insertion to PG&E Form 79-973, *Generating Facility Interconnection Agreement For Non-Export Generating Facilities*.

## 5. GENERATING FACILITY, CERTIFICATION, AND OPERATING REQUIREMENTS

[…]

5.3 Distribution Provider shall provide requirements that must be met by the Producer prior to initiating parallel operation with PG&E's Distribution System, including but not limited to the following.

*[If the storage device is proposed to not charge from the grid at any time]*

5.3.1 The Producer's storage device(s) will not demand power from the Distribution Provider's Distribution System at any time.

*[If charging the storage device from the grid will not increase the host facility's current peak load demand]*

5.3.2 The Producer's storage device(s) will not exceed the host facility's normal peak demand. Specifically, the host facility's normal peak demand is the highest amount of power required from the Distribution System by the Producer's facilities without the influence of the energy storage device.

*[If charging the storage systems from the grid increases the host facility's current peak load demand where no mitigation is identified during a study Results Meeting]*

5.3.3 Consistent with current load service Rules, the Distribution Provider is not required to reserve capacity for load. The customer is responsible to contact the utility for any modification to its apparatus or change in operations that may result in increased load demand per Electric Rule 3.C.

*[If charging the storage device from the grid increases the host facility's peak load demand and where a constraint-based mitigation is identified and selected by customer during a study Results Meeting]*

5.3.4 To avoid a mitigation item identified in the [*Study Name*] Report, the Interconnection Customer has chosen the following Generating Facility operating constraints:

> For the annual period between [*Date Range, Month and Day*] between the hours of [*time period*], the storage device can charge no more than [*X kW*] from the Distribution System. This operating constraint voids the need to [*specific mitigation scope avoided*].

No other charging limitation is required except the conditions above. The Customer will be responsible for the costs of the corresponding upgrades if at any time the Customer elects to forego an operating constraint.

If an Operation Requirement is specified above, Distribution Provider reserves the right to ask for data at 15 minutes intervals at any time to verify that the Operation Requirement is being met. Distribution Provider will ask for this data in a written request no more frequently than once per calendar quarter. The Interconnection Customer must provide such data within 30 Calendar Days of a written request.

If the Generating Facility fails to meet the Operating Requirements at any time, it will be disconnected immediately and not reconnected until an approved supervising control is in place as determined by the Distribution Provider.

**Appendix C:** *Unaddressed Issues in the Rule 21proceeding*

| Sponsor | Unaddressed Issue | Venue/Action | Detail |
|---|---|---|---|
| IREC/CESA | Exporting Storage Technical Study Process | | |
| IREC/SolarCity | Jurisdictional Issues for exporting resources | | |
| Community Environmental Council | “Click and Claim” Functionality | | |
| Stem, Inc./CESA | The Disconnect Switch requirement should be relaxed or removed entirely, and standardized across utilities. | | |
| Stem, Inc./CESA/CODA Energy | The IOUs should create and maintain an Interconnection Guidebook (akin to CAISO Business Practice Manual) | | |
| Stem, Inc./CODA Energy | The IOUs should implement business process enhancements (e.g. greater transparency in interconnection requirements, consistent “deemed complete” application requirements across IOUs, electronic signatures, etc.) | | |
| Stem, Inc./CESA | Permission to Operate (PTO) Inspection should remove anti-islanding test for certified inverters and establish consistent practices across IOUs (e.g. in-person test requirements) | | |
| Clean Coalition | Incorporate DRP Interconnection Capacity data | | |
| Clean Coalition | SCE Income Tax Component of Charges | | |
| Clean Coalition | Third Party Construction of Upgrades | | |
| Clean Coalition | Periodic Review of Rule 21Quarterly Data | | |
| Clean Coalition | Interconnection Data Collection and Access | | |
| Clean Coalition | Replacement and Recovery Charges (Cost of Ownership) | | |
| CESA | Define “Station Power” for energy storage devices | | |
| CESA | Transition between Rule 21 and WDAT interconnections (i.e. wholesale vs. retail metering accommodation) | | |
| SolarCity/CODA Energy | NGOM meter installations for customers with NEM paired storage being classified as "complex metering solution" | | |

| | | | |
|---|---|---|---|
| SolarCity | NGOM meter deployment process and billing | | |
| CESA | Mobile inverter standards for interconnection | | |
| CALSEIA | Construction Timelines | | |
| CALSEIA | Anti-Islanding Screen | | |
| CALSEIA | Smart Inverters | | |
| CALSEIA/CODA Energy | Dispute Resolution | | |

**Appendix D:** below is a sample diagram to illustrate the content planned for the Guide. This example is a current draft of process steps specific to PG&E.