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April 15, 2014

TO PARTIES OF RECORD IN RULEMAKING 12-11-005

This is the proposed decision of Administrative Law Judge MacDonald. Until and unless the Commission hears the item and votes to approve it, the proposed decision has no legal effect. This item may be heard, at the earliest, at the Commission's May 15, 2014 Business Meeting. To confirm when the item will be heard, please see the Business Meeting agenda, which is posted on the Commission's website 10 days before each Business Meeting.

Parties of record may file comments on the proposed decision as provided in Rule 14.3 of the Commission's Rules of Practice and Procedure.

/s/ MARYAM EBKE for
Timothy J. Sullivan, Chief (Acting)
Administrative Law Judge

KVC;jt2

Attachment

Decision PROPOSED DECISION OF ALJ MacDONALD (Mailed 4/15/2014)

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking Regarding Policies, Procedures and Rules for the California Solar Initiative, the Self-Generation Incentive Program and Other Distributed Generation Issues.

Rulemaking 12-11-005
(Filed November 8, 2012)

**DECISION REGARDING NET ENERGY METERING INTERCONNECTION
ELIGIBILITY FOR STORAGE DEVICES PAIRED WITH NET ENERGY
METERING GENERATION FACILITIES**

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**DECISION REGARDING NET ENERGY METERING INTERCONNECTION
ELIGIBILITY FOR STORAGE DEVICES PAIRED WITH NET ENERGY
METERING GENERATION FACILITIES****1. Summary**

On April 30, 2013, the California Energy Commission issued the seventh edition of the Renewables Portfolio Standard Eligibility Guidebook (Guidebook), which included a new section on energy storage technologies. Section III.G of the Guidebook established two categories of energy storage that may be considered an addition or enhancement to a renewable system eligible for net energy metering (NEM). This section of the Guidebook created some uncertainty with respect to whether storage devices paired with NEM-eligible generation facilities that meet the Guidebook requirements are exempt from interconnection application fees, supplemental review fees, costs for distribution upgrades, and standby charges as additions or enhancement to NEM-eligible systems.

Through this decision, the California Public Utilities Commission (Commission) clarifies existing policy that storage devices that are 1) paired with NEM-eligible generation facilities, and 2) meet the Guidebook requirements to be considered an "addition or enhancement" to NEM-eligible systems are exempt from interconnection application fees, supplemental review fees, costs for distribution upgrades, and standby charges when interconnecting under the current NEM tariffs.

In order to ensure the integrity of the NEM program, this decision places certain limitations on storage system sizing and implements metering requirements. In addition, the Commission shall require the electric utilities to gather data to determine the impact of interconnected storage on the distribution system.

Commission Rulemaking 11-09-011 addressing Rule 21 is taking a comprehensive examination of the safety of interconnected storage as it interacts with the grid, and it would be inefficient to duplicate that effort in this proceeding. Although the safety of storage devices on customer premises is addressed by numerous standards, rules and regulations, there is a lack of coordination at the state level. In order to facilitate a more cohesive set of standards and practices, we direct the Commission staff to work with state entities such as the Governor's Office of Planning and Research to develop a set of best practices for permitting as a resource for the local authorities. Finally, this decision extends the deadline to submit an incentive claim application for affected Self-Generation Incentive Program projects to 120 days after the revised NEM tariffs are approved.

2. Background

2.1. Net Energy Metering Program

The Net Energy Metering (NEM) program was created by Assembly Bill (AB) 656¹ and has been modified numerous times. The NEM program is an electricity tariff billing mechanism designed to facilitate the installation of renewable distributed generation by offering customers retail-rate billing credits for energy exported to the grid at times when generation exceeds onsite energy demand. In Decision (D.) 02-03-057, the California Public Utilities Commission (Commission) determined that Public Utilities Code (Pub. Util. Code) Section 2827 was intended to exempt NEM program participants, as customer-generators, from interconnection application fees, supplemental review fees, and

¹ Ch. 369, Statutes of 1995.

costs for distribution upgrades. Pub. Util. Code § 2827 also explicitly exempts NEM program participants from standby charges.

In 2011, Senate Bill (SB) 489² expanded the technologies eligible for the NEM tariff to include all Renewables Portfolio Standard (RPS)-eligible technologies.³ On April 30, 2013, the California Energy Commission (CEC) adopted the seventh edition of the RPS Eligibility Guidebook (Guidebook). This latest edition of the Guidebook includes a new section on energy storage technologies, Section III.G, that clarifies the conditions under which a storage device may be considered an addition or enhancement to a renewable electrical generation facility per California Public Resources Code (Cal. Pub. Resources Code) § 25741(a)(1).⁴

Section III.G establishes two categories of energy storage that “may be considered an addition or enhancement to a renewable electrical generation facility”: “integrated” and “directly connected.” Integrated energy storage is described as “[m]ethods of storing energy from a renewable energy resource that are integrated into the renewable electrical generating facility as part of the generation process...” For battery-based storage, the Guidebook further elaborates that “the storage device must only be capable of storing energy from the renewable generator” to be considered “integrated.”⁵ For a storage device to

² Ch. 593, Statutes of 2011.

³ At that time, Pub. Util. Code § 2827 (b)(5), which has been renumbered to Pub. Util. Code § 2827 (b)(11) since modification of the statute in 2013.

⁴ The RPS Eligibility Guidebook (7th Edition, April 2013) is available at <http://www.energy.ca.gov/renewables/documents/#rps>.

⁵ Guidebook at 64.

be deemed “directly connected,” it must be both directly connected to the renewable generator via an internal power line (i.e. power may not be transmitted from the renewable facility to the energy storage via an external distribution line) and the storage device must be operated as part of the RPS eligible facility.⁶

2.2. Current NEM Interconnection Eligibility for Storage Devices Paired with NEM Generation Facilities

Currently, the electric utilities require that storage devices paired with NEM-eligible facilities interconnect under the Multiple Tariff Facilities provision of their NEM tariffs. Under this provision, storage devices are treated by the utilities as distinct non-NEM-eligible generators, and are therefore not exempted from a variety of charges that do not apply to NEM eligible generating facilities. These charges include the \$800 interconnection application fee, supplemental review fees for facilities that do not qualify for fast track interconnection, standby charges, and the costs of any distribution system upgrades triggered by the addition of the generating facility to the local circuit. Electric Tariff Rule 21 (Rule 21) governs the interconnection process and requirements of these paired storage and generation systems.

3. Procedural Background

On October 17, 2013, Commissioner Michael Peevey issued an Assigned Commissioner Ruling (ACR) addressing the eligibility of storage devices paired with NEM-eligible generation facilities that meet Guidebook requirements as additions or enhancements to NEM-eligible systems to be exempt from

⁶ Guidebook at 65.

interconnection application fees, supplemental review fees, costs for distribution upgrades, and standby charges. The ACR proposed implementing system sizing limitations and metering requirements in order to ensure that NEM credits can only be generated by eligible renewable electric generation.

On November 1, 2013, California Solar Energy Industries Association (CALSEIA), SolarCity Corporation (SolarCity), California Center for Sustainable Energy (CCSE), San Diego Gas and Electric Company (SDG&E), Pacific Gas and Electric Company (PG&E), Interstate Renewable Energy Council, Inc. (IREC), Southern California Edison Company (SCE), Office of Ratepayer Advocates (ORA), California Energy Storage Alliance (CESA), Solar Energy Industries Association (SEIA), The Utility Reform Network (TURN), Elke Brazel, Sunverge Energy, Inc. (Sunverge), OutBack Power Technologies (OutBack), and Charles Hewitt filed comments.

On November 8, 2013, Outback, SDG&E, CALSEIA, SolarCity, CESA, SCE, PG&E, ORA, IREC, Sunverge, and Charles Hewitt filed reply comments. On January 6, 2014, Commissioner Michael Peevey issued a subsequent ACR to solicit additional input into safety considerations for the interconnection of energy storage systems. On January 8, 2014 SCE, ORA, SDG&E, Charles Hewitt, Elke Brazel, CESA, IREC and SolarCity filed comments in response to the January 6, 2014 ACR.

4. NEM Eligibility

The October 17, 2013 ACR explained that storage devices paired with NEM-eligible generation facilities that meet the Guidebook requirements are exempt from interconnection application fees, supplemental review fees, costs for distribution upgrades, and standby charges as additions or enhancements to NEM-eligible systems under the current NEM tariff. These exemptions would

apply to any storage device connected behind the same billing meter as the NEM generating system because this configuration meets the conditions of the "directly connected energy storage" category as described in the Guidebook.

However, in order to preserve the integrity of NEM, or in other words, in order to ensure that NEM credits can only be generated by eligible renewable electric generation, the ACR proposed that qualifying systems meet certain configuration and metering requirements. To achieve this goal, the ACR suggested that the metering requirements in the NEM Multiple Tariff (NEM-MT) serve as the standard to ensure that only NEM-eligible generation receives NEM credit. Under the NEM-MT provision, the customer-generator must 1) install a non-export relay on the non-NEM generator(s); 2) install Net Generation Output Metering (NGOM) for the NEM-eligible generation, meter the load, and meter total energy flows at the point of common coupling; or 3) install interval NGOM directly to the NEM-eligible generator(s). The ACR recognized however, that there might be some instances where these metering requirements should not necessarily apply and sought party comment.⁷

⁷ The ACR requested that interested parties comment on the following questions:

1. For single inverter systems, or other system configurations that do not allow NGOM, should the Commission consider estimated NEM generation as a means to limit NEM export credits during peak periods?
2. Should the Commission consider a threshold storage capacity below which NGOM is not required for the NEM generator? If so, what is an appropriate threshold and should the threshold be based on absolute capacity or in relation to customer load and the NEM generator capacity?
3. Should NGOM be required for customers who are not on time-varying rates?

The ACR proposed that exemption from stand-by charges, interconnection application and review fees for NEM-paired storage would be tested on a provisional basis for systems connecting by December 31, 2015, during which time the utilities should record data related to this exemption and provide this to the Commission.

4.1. Comments

CCSE, IREC, Outback, CESA, SolarCity, SEIA, Charles Hewitt, ORA and Sunverge support the Commission's proposal to exempt NEM-paired storage. Sunverge argues that storage integrated with renewables behind a customer meter is considered to provide the highest operational value when connecting renewables to the grid because of the ability to manage loads and to smooth power quality issues related to intermittent renewables. IREC supports the Commission's goal of maintaining NEM credit for energy generated by eligible renewable electric generation to ensure the integrity of the NEM tariff protocols.⁸ CESA, SolarCity and SEIA strongly support the proposal in the ACR because it is a quick resolution to what these parties allege to be the utilities current illegal practice of charging interconnection fees for storage paired with a NEM generator. All three argue that such exemptions are legally required under Cal. Pub. Resources Code § 25741(a) and D.02-03-057. CALSEIA also supports the proposal to exempt interconnected storage, but alternatively argues that such storage should not be charged any interconnection fees because of the mere fact that customer-generators have simply integrated what is essentially a home uninterrupted-power-source into their solar photovoltaic (PV) systems.

⁸ IREC's proposed metering requirements and system sizing limits will be discussed in detail below.

TURN generally supports the promotion of combined storage technologies but voiced concerns that the ACR goes too far in favor of the NEM customer-generator and storage provider. TURN suggests the Commission impose a limit on revenue losses to be evaluated annually. TURN also recommends that the exemption end automatically on December 31, 2015, unless reauthorized by the Commission. SCE supports the proposal for a temporary exemption of interconnection-related costs for certain NEM-paired storage under certain circumstances but asks that the Commission not to allow the exemption to potentially continue indefinitely.

Although PG&E does not oppose providing subsidies for Rule 21 interconnection fees, studies, standby and upgrade costs for residential customers with a renewable generating facility paired with storage meeting Self-Generation Incentive Program (SGIP) requirements for the proposed trial period, it strongly opposes providing subsidies to all storage installations combined with NEM generation. PG&E contends that the "addition or enhancement" language should not be interpreted as an expansion of the definition of "renewable generator" and argues that the Commission should not reference the RPS Guidebook modifications as a basis to grant storage an additional subsidy.

SDG&E opposes granting exemptions to interconnected storage because it shifts the burden to non-participants. SDG&E argues that the Commission should first pose the question of whether or not energy storage is a NEM-eligible technology. SDG&E further contends that existing transparent subsidies, paired with the Commission's recently adopted storage mandate, adequately incent deployment of distributed storage technologies.

4.2. Discussion

Pub. Util. Code § 2827(b)(11) provides that a “Renewable Electrical Generating Facility” is NEM eligible for interconnection but defers the actual definition of a Renewable Electrical Generating Facility to the Cal. Pub. Resources Code § 25741.⁹ Under the Guidebook, a storage device may be considered an addition or enhancement to a renewable generation facility so long as it can be classified as integrated or directly connected energy storage.¹⁰ We therefore find that the Guidebook allows storage devices, which meet the Guidebook definition of “integrated” or “directly connected energy storage,” to be treated as an enhancement or addition to NEM eligible facilities.

We clarify here that storage itself is not a “Generator” as defined under the Rule 21 interconnection tariff and should not be seen as such for interconnection tariff purposes. The definition of a “generating facility,” for interconnection purposes, includes a generator plus an addition or enhancement. Therefore, a generating facility, as a single entity, which includes a storage device, can interconnect using the NEM tariff.

Interconnection of integrated or directly connected energy storage behind the meter has encountered barriers because the investor-owned utilities (IOUs) concluded such systems were not NEM eligible and imposed additional

⁹ The relevant section reads: “Renewable electrical generation facility” means a facility that meets all of the following criteria: (1) The facility uses biomass, solar thermal, photovoltaic, wind, geothermal, fuel cells using renewable fuels, small hydroelectric generation of 30 megawatts or less, digester gas, municipal solid waste conversion, landfill gas, ocean wave, ocean thermal, or tidal current, and any additions or enhancements to the facility using that technology.

¹⁰ We note that the Guidebook’s use of the word “may” does not require such treatment but it permits such treatment.

requirements in order for the paired renewable generator to be NEM-eligible. We disagree with IOUs' conclusions and would have preferred that the IOUs had taken a more proactive and collaborative approach to avoid creating barriers. Because Cal. Pub. Resources Code § 25741 allows storage devices paired with NEM-eligible generation facilities and meeting the Guidebook requirements to be considered an "addition or enhancement" to NEM-eligible systems under Section III.G of the Guidebook, we hold that they are exempt from standby charges, interconnection application and review fees and costs for distribution system upgrades when interconnecting under the current NEM tariffs.

In order to preserve the integrity of NEM, we shall require systems to meet certain requirements. Systems must meet certain sizing requirements set forth below in detail in Section 5. In addition, systems shall be required to adhere to the metering requirements in Section 6.

5. Storage System Sizing Units

5.1. Proposed Sizing Limits

The ruling proposed that qualified NEM-paired storage systems be subject to the same system sizing requirements that are currently in place with the SGIP. More specifically, under Section 4.4.3 of the SGIP Handbook, regarding system sizing for energy storage, it states that:

Advanced Energy Storage (AES) projects coupled with generation technologies must be sized no larger than the rated capacity of the PV or SGIP eligible technology it is operating in concert with. When coupled with a PV system, the rated capacity of the AES system can be no larger than the CEC-AC [alternating current] rating of the PV system, which is the rated AC output of the PV system including inverters.

5.2. Comments and Reply Comments

CCSE opposes storage system sizing limits because inverter capacity is typically the limiting factor. As a result, CCSE believes that there is little to no remaining inverter capacity available to discharge a significant amount of storage energy that may have come from the grid during off-peak hours.

CALSEIA, SEIA and Sunverge Energy strongly oppose a size capacity limitation based on paired renewable capacity contending such limitation would discourage the storage market. CALSEIA contends that sizing limits cannot be reasonably created to meet the unique needs of individual customers. SEIA suggests that at minimum, systems of 5 kilowatt (kW) and smaller should not be subject to system size limits. SolarCity also disagrees with limiting size capacity and asserts such a limitation is unnecessary for systems of 5 kW or smaller because the SGIP Handbook already provides for an exemption from system sizing requirements. Instead, SolarCity suggests instituting an exemption for battery systems of 10 kW and smaller. SolarCity explains that because there are limited battery sizes available below 10 kW, an exemption makes sense.

CESA opposed the proposal arguing that the available battery size options are too limited to impose such a requirement. They further contend that such a requirement is contrary to both good engineering design practice and the desired benefits of using energy storage. CESA proposes instead that the sizing requirement instead be a ratio of not more than 12:1 in terms of maximum discharge power to maximum renewable generator power.

Although IREC supports the principle behind imposing size capacity limitations, IREC proposed an alternative approach that it argues takes into

account the need to preserve NEM integrity and storage sizing limits.¹¹ IREC asks the Commission to limit the size of storage systems relative to NEM-generators based on the amount of energy stored in the battery relative to the daily peak output NEM-generator. They provide an example of a 4 kW PV system that has a maximum daily output of 50 kWh and suggest that the sizing requirement be based on this kWh quantity plus expected losses, for a maximum size of 58 kWh. IREC contends this approach would be easier to implement and more equitable.

PG&E and SDG&E support sizing limitations. PG&E suggests that the Commission modify the size capacity limits proposed and instead limit storage system size based on the lesser of the NEM-eligible generator capacity or the on-site customer maximum demand. SDG&E also suggested the Commission modify the size capacity limits proposed. SDG&E proposed that the storage system be sized to the AC nameplate of the NEM-generator's inverter and from an energy perspective that the storage device should be no larger than the energy production of the NEM-generator on a single day. Outback suggested a sizing capacity limit of not more than 12:1 in terms of maximum discharge power to maximum renewable generator power. Outback contends this ratio would be sufficient to allow the generator to produce enough energy in a single day to match typical energy needs and round trip efficiency losses while also meeting the instantaneous power needs of the local loads being leveled or reduced.¹²

¹¹ IREC makes this proposal as an alternative to both requiring NGOM and imposing size capacity limitations.

¹² In reply comments, SolarCity agreed with Outback's proposal.

ORA suggested that the sizing limit be consistent with current SGIP requirements.

5.3. Discussion

The goal of this requirement is to set sizing requirements that ensure that the NEM-paired storage system is sized in such a way that it primarily functions to augment the value of the NEM-generator. With that in mind, IREC and SDG&E's proposals most clearly balance the practical needs of the system with this overarching goal. Also, SolarCity's argument that, given the nascent state of this industry, systems below 10 kW should not be subject to a system-sizing requirement is reasonable. As such, we adopt a system-sizing requirement where all NEM-paired storage systems with storage devices sized at 10 kW or smaller shall have no requirement to be sized to the customer demand or the NEM generator. For NEM-paired storage systems with storage devices larger than 10 kW, a) the discharge capacity of the storage system shall not exceed the NEM generator's maximum capacity, and b) the maximum energy discharged by the storage device shall not exceed 12.5 hours of storage per kW.¹³

6. NEM Integrity and Metering Requirements

6.1. Background

The ACR proposed that qualified NEM-paired storage systems should be configured and metered in order to ensure that NEM credit can only be generated by eligible renewable electric generation. To achieve this goal, the ACR suggested utilizing the metering requirements in the NEM-MT, the tariff applicable to customers that install NEM-eligible and non-NEM eligible technologies behind the same utility revenue meter, as the standard requirement

¹³ In opening comments, IREC suggested as an example of their proposal, a sizing limitation of 50 kwh for a 4 kW system.

to ensure that only NEM-eligible generation receives NEM credit. However, the ACR also posed three metering related questions:

1. Should the Commission consider estimated NEM generation as a means to limit NEM export credits during peak periods for single inverter systems, or other system configurations that do not allow NGOM?
2. Storage devices sized below a certain limit could pose a de minimis risk of harming NEM integrity. Should the Commission consider a threshold storage capacity below which NGOM is not required for the NEM generator? If so, what is an appropriate threshold and should the threshold be based on absolute capacity or in relation to customer load and the NEM generator capacity?
3. Because storage devices increase total consumption, customers on non-time-varying rates have no financial incentive to export energy for NEM credit, should NGOM be required for customers who are not on time-varying rates?

6.2. Comments

Party comments generally support the Commission's goal of preserving NEM program integrity, but do not agree on how such integrity should be preserved. ORA commented that the ACR metering requirements and exceptions appear reasonable, but requests that the Commission consider alternative proposals, such as the use of smart meters that are lower cost than NGOM meters. SolarCity supports the ACR's proposal but suggested the Commission allow the use of a more cost-effective smart meter for net generation output metering and impose a cost cap of \$400 for all fees associated with the smart meter. While IREC also supported the Commission's effort to preserve NEM integrity, IREC suggested a hybrid approach that addresses both the Commission's need to preserve NEM integrity and sets appropriate storage

system sizing limits through one requirement based on the size of the associated storage system, predicated on the storage system's net energy storage rather than on system capacity. Specifically:

- NGOM should be installed on all NEM-eligible generators that add storage capacity to their facilities where it is feasible to do so.
- For facilities that do install NGOM, system output qualifying under the NEM tariff should be limited to the output of the generating facilities without reference to the capacity of the associated storage facilities.

CESA and CALSEIA oppose the ACR's proposal. Both argue that such metering requirements are unnecessary and costly. We address each issue in detail below.

6.2.1. Metering Requirements

The ACR proposed that qualified NEM-paired storage systems should be configured and metered in order to ensure that NEM credit can only be generated by the eligible renewable electric generation.

6.2.2. Comments

CALSEIA and CESA oppose costly metering requirements. CESA argues there is currently no economic incentive to game the system. CESA contends that the Commission should allow estimation methodologies in lieu of metering solutions, not only for single inverter systems but ultimately for all NEM-eligible generators paired with energy storage that are below a specific size threshold.

PG&E, SDG&E, SCE, Sunverge, and Charles Hewitt oppose allowing an estimation methodology. TURN raised concerns that there is insufficient data available to determine whether or not estimated generation data should be used as a means to limit NEM export credits. TURN suggests that the Commission could potentially use existing data collected by Energy and Environmental Economics, Inc. SolarCity commented that an estimation methodology could be

pursued in lieu of metering, and suggested two different methodological approaches that present different trade-offs.

Sunverge proposes the Commission adopt the following approach:

For NEM eligible storage systems integrated with renewables on the [direct current] DC side of a single inverter, a simple approach to discounting possible non-renewable energy from NEM credits is to measure the total (grid) energy drawn into the system with the total energy dispatched by the system on an annual basis to determine a de-rate factor that would then be applied during the annual NEM true-up period to site NGOM NEM credits. The point of storage measurement is at or near the point where the inverter interconnects with the grid such that all AC energy into and out of the inverter can be measured directly. More specifically, the mathematical calculation is:

$$\frac{(\text{Annual Energy Dispatched to Grid} - \text{Annual Energy From Grid})}{\text{Annual Energy Dispatched to Grid}} = \% \text{ De-rate Factor}$$
$$\text{Adjusted Annual NEM Credits} = (\text{Annual NGOM Export Credits} * \% \text{ De-rate Factor})$$

The data acquisition system (DAS) should be capable of reporting kWh energy imported and exported by the inverter to an internet accessible data repository where utilities and customers alike can access and download the data in an appropriate format from which the de-rate factor can be calculated. For storage systems paired with renewables behind a single inverter with capacity that is 10 kW (AC) or less regardless of the quantity of inverters installed behind the billing meter, non-utility (5%) grade system integrated metering is both cost effective and appropriate for such small-scale applications. If greater accuracy is desired for renewable storage systems connected to a single inverter greater than 10 kW, a separate utility NGOM can be used per inverter to determine the de-rate factor. Multiple de-rate factors can be multiplied together to determine a single factor per billing meter.

Additionally, storage systems continuously consume some power to maintain system services similar to stand-alone renewable generators and should accordingly not be penalized for what could be considered de minimis consumption. Therefore, we propose that where the annual de-rate factor is determined to be 95% or higher, the customer should receive 100% of annual NEM credits. Setting an upper threshold will also keep utility administrative costs lower by reducing the amount of paperwork for systems strictly using renewable energy.

Both SDG&E and IREC contend that reliance on an estimate of NEM generation will be subject to many potential inaccuracies. IREC proposes instead that the Commission adopt a threshold, such that customers whose systems cannot accommodate NGOM would be exempt from any additional monitoring requirements so long as the storage system has a net kWh output no greater than the net output during summer months of the PV system that qualifies under the NEM tariff, adjusted for expected system losses. Although SCE believes that NEM paired storage devices that include separate inverters should continue to adhere to the requirements stipulated in the Multiple Tariff section of SCE's NEM rate schedules, SCE stated that it will continue working with inverter manufacturers to develop a solution that will allow these systems to operate in a manner that preserves the integrity of NEM. Although SCE stated it would be willing to utilize a calculated methodology that is consistent with the Guidebook because it errs on the side of underestimating the renewable portion of the stored and exported electricity whenever possible, SCE contends that the development of such a methodology, however, should take place as part of a more robust review of storage in the existing rulemakings.

6.2.3. Discussion

We are committed to preserving the integrity of NEM, and to that end, NEM-paired storage systems that qualify for NEM benefits must be configured and metered in order to ensure that NEM credit can only be generated by eligible renewable electric generation. With this in mind, we find that there are two categories of systems, those above 10 kW discharge and those at 10 kW and below discharge capability, with distinct metering requirements.

We find Sunverge's proposal balances the Commission's priority of ensuring NEM integrity with a cost-effective solution for a NEM-eligible generating facility (GF)¹⁴ with storage devices sized at 10 kW (AC) or less. For these systems, we will utilize the GF's DAS to measure the total energy drawn into the GF against the total energy dispatched by the GF on an annual basis to determine a de-rate factor. The resulting de-rate factor will then be applied during the annual NEM true-up period. The point of measurement for the de-rate factor is at or near the point where the GF interconnects with the grid such that all AC energy into and out of the GF can be directly measured. The mathematical calculation is:

$$\frac{(\text{Annual Energy Exported from the GF} - \text{Annual Energy Imported into the GF})}{\text{Annual Energy Exported from the GF}} = \% \text{ De-rate Factor}$$

$$\text{Adjusted Annual NEM Credits} = (\text{Annual Export Credits} * \% \text{ De-rate Factor})$$

¹⁴ As noted on page 10 of this decision, a GF, for interconnection purposes, includes a generator plus an addition or enhancement.

A non-utility grade meter associated with the DAS for systems described above is both cost-effective and appropriate for such small-scale applications.

Because storage systems continually consume some power to maintain system services, these systems should not be penalized for de minimis consumption. Therefore, customers shall receive 100% of annual NEM credits where the annual de-rate factor is 95% or higher.

NEM-paired storage systems larger than 10 kW shall be required to adhere to metering requirements similar to those in the NEM-MT.¹⁵ We find that such metering requirements will effectively ensure that only NEM-eligible generation receives NEM credit.

NEM paired storage systems larger than 10 kW (AC) will be required to 1) install a non-export relay on the non-NEM generator(s); 2) install an interval meter for the NEM-eligible generation, meter the load, and meter total energy flows at the point of common coupling; or 3) install interval meter directly to the NEM-eligible generator(s). We also find that SolarCity's proposal to impose a cost cap is reasonable and will impose a \$500 limit for fees associated with the metering requirement.

NEM-eligible GFs with storage devices sized at 10 kW (AC) or less may, at the system owner's option, adhere to the metering requirements prescribed for NEM-paired storage systems larger than 10 kW when it is technically feasible to do so.

¹⁵ Under the NEM-MT provision, the customer-generator facility must 1) install a non-export relay on the non-NEM generator(s); 2) install NGOM for the NEM-eligible generation, meter the load, and meter total energy flows at the point of common coupling; or 3) install interval NGOM directly to the NEM-eligible generator(s).

The NEM Tariff shall be modified to incorporate the sizing and metering requirements described in this decision for NEM-paired storage systems, both small and large. This modified tariff shall apply to all NEM-paired storage systems, even those currently interconnected.

7. Reporting

7.1. Proposed Reporting Requirements

The ACR proposed that the IOUs would be required to record data related to the foregone revenues resulting from this exemption and provide this information to the Commission. The utilities would be required to record data on revenue lost as a result of the treatment of NEM-paired storage disaggregated into, at a minimum, the following three categories:

- 1) Interconnection Application Fees,
- 2) Supplemental Review Fees, and
- 3) Distribution system upgrades triggered by the presence of storage devices.

In addition, the report should also include information on storage devices interconnecting through March 31, 2015. The utilities should serve the report on the service list of this proceeding or its successor no later than June 30, 2015.

7.2. Comments

SDG&E argues that the cost reporting and tracking are not adequate to track the cost shift created by giving energy storage devices the same benefits as NEM customers.

SolarCity believes that the Commission should only require the utilities track their actual costs of interconnection and nothing else. CALSEIA recommends modifying the reporting requirement to quantify grid benefits rather than grid costs. In addition, CALSEIA suggests that the Commission

implement an incentive program to encourage customer generators to install NEM eligible storage systems.

ORA supports the reporting requirement proposed by the ACR, but contends that technically the utilities will not lose revenues because they will recover costs from other ratepayers. ORA recommends that the Commission specify that interconnection costs for storage systems be included in the report required by Resolution E-4610 at Ordering Paragraph 4.

TURN supports requiring the reports but contends that they should be required to provide an estimate of avoided costs, segregated by type and customer class, by March 31, 2014 for 2013 lost revenues and by March 31, 2015 for 2014 lost revenues. TURN contends that the Commission should terminate the program by the following June 30 if the lost revenues in either year exceed a cap of \$10 million.

7.3. Discussion

Energy storage is in a nascent stage of development. Until the Commission and the IOUs gain more experience and data on interconnected storage, concerns regarding the impact of storage on the distribution system are speculative. In order to gain more information, we shall require the IOUs, beginning with the current cohort of pending storage interconnection requests, to record data on estimated avoided costs and the fee waivers resulting from the NEM-eligible interconnection of renewable-paired storage consistent with reporting requirements directed by Resolution E-4610. The reporting shall include information on NEM-paired storage devices interconnected from January 1, 2013 through March 31, 2015, and the utilities should serve their reports on the service list of this proceeding or any successor proceeding concerning NEM, no later than June 30, 2015. The Commission will utilize the

information to determine whether or not it will need to modify or reexamine NEM-eligible interconnection of renewable paired storage by December 31, 2015. The Commission may choose to include a review of NEM-eligible interconnection of renewable paired storage in the Commission's reevaluation of the NEM program as discussed below.

8. Net Energy Metering Transition Period

On October 7, 2013, Governor Brown signed into law AB 327 (Perea). Pursuant to AB 327, the Commission issued a decision on March 27, 2014, that establishes a transition period during which customers taking service under the NEM tariff or contract prior to July 1, 2017, or the date that a large electrical corporation reaches its statutorily required NEM program limit, whichever comes first, can remain on the previously applicable NEM tariff. Eligible NEM-paired storage systems interconnected under NEM shall be subject to the same transition period.

AB 327 also contemplates that the Commission develop a successor to the existing NEM tariffs by December 31, 2015, which will take effect July 1, 2017. We anticipate that the Commission may reevaluate the benefits of interconnected storage when interconnecting as an addition or enhancement to a NEM-eligible generator as it considers a successor to existing NEM tariffs.

9. Safety Considerations

Although the October 17, 2013 ACR sought party comment on the relevant safety considerations specific to energy storage, party comments were limited and often lacked sufficient detail. On January 6, 2014, assigned Commissioner Peevey issued an ACR to solicit additional input on the safety considerations related to energy storage. The ACR prefaced its request for additional input with the knowledge that storage devices eligible to be considered an "addition or

enhancement" to a renewable NEM-eligible system are required to meet the technical and safety standards for participation in SGIP and interconnection under Rule 21 in order to ensure safety during parallel operation with the utility distribution system.

In the Rule 21 Rulemaking (R.) 11-09-011, the Commission endeavors to balance the potential for advanced capabilities with the continuing paramount need to ensure safety for utility personnel and customers and reliability of the distribution network. The Commission remains very concerned with the safety and reliability impacts of storage devices on the utility distribution system as well as the safety impacts of such devices on customer premises. Therefore, the January 6, 2014 ACR sought additional information in two categories. The first category pertains to the interaction of the storage device with the electric grid, both during times when the local distribution grid is operating normally and when the grid is experiencing an outage. Second, the ACR sought additional information regarding the safety concerns on the customer premises pertaining to the interaction of the storage device within the home/business environment, including issues such as adequate fire and grounding protections, proper installation, clear labeling and accessible manual disconnects for emergency responders.

9.1. Comments

9.1.1. Interconnection Safety

PG&E, SCE and SDG&E generally agree that Rule 21 sufficiently addresses safety and reliability concerns with the interaction of customer-side energy storage with the utility grid. PG&E identified some areas for improvement including the additional study of inverters that have multi-mode capability and storage devices that plan to transition from parallel operation to non-parallel

operation. In addition, PG&E offered to work with the Commission to develop a process specifically to interconnect such projects in a timely and safe manner. SDG&E adds that the installation of energy storage devices on customer premises may affect the distribution system because these devices are capable of both charging and discharging energy. SDG&E cautions that the utility distribution system must be appropriately sized to minimize power quality impacts to customers, and ensure safe and reliable operation of the distribution system. SDG&E contends that customers and the IOUs must collaborate to successfully implement energy storage in a manner that is safe and reliable.

Several parties including ORA, Outback Power, SolarCity, and IREC believe that safety and reliability concerns related to customer side energy storage are addressed through Rule 21. Some argue this inquiry is duplicative given the Commission's efforts in the Rule 21 proceeding. IREC adds that in the Commission's Rule 21 and the Federal Energy Regulatory Commission proceeding, addressing Small Generator Interconnection Procedures, no significant issues have arisen to indicate that current rules aren't allowing adequate evaluation of safety.

9.1.2. Safety on Customer Premises

SCE accepts the UL1741 (IEEE-1547) certification to demonstrate compliance with Rule 21 and SCE's interconnection handbook requirements. SCE's interconnection agreements require customers to notify SCE prior to modifying their facilities. SCE seems to indicate these may be sufficient safeguards, but adds that the Commission should consider requiring that the design of qualifying device/generating facilities prevents them from being intentionally or unintentionally modified in a manner that would compromise safety or bypass UL system protections. SDG&E understands that the National

Electric Code and UL requirements address many of the safety issues for storage devices on customer premises. SDG&E adds that it treats energy storage no differently than other distributed generation resources and devices. For example, although SDGE believes concerns regarding the use of an electric vehicle battery for stationary storage are premature, SDG&E states such a storage device would have to meet acceptable certifications and follow the standards defined in Rule 21 to interconnect with the grid. Although PG&E did not specifically comment on whether existing rules and procedures adequately address safety impacts; PG&E stated several times that the utility relies on existing rules, standards and local permitting authorities for the safe operation of energy storage systems.

IREC points to steps taken by the state of Washington to prevent tampering and asks the Commission to engage stakeholders in a discussion of whether such steps would prove valuable in California.

With respect to customer-side safety and prevention of tampering with anti-islanding or other safety features, SolarCity contends there are already multiple layers of regulatory and safety review beyond simply using certified equipment. SolarCity cites Rule 21, UL certification, local permitting codes, and the California Electrical Code.

IREC suggests that the Commission engage the Office of the State Fire Marshall to work collaboratively with the Commission, utilities, storage companies and local fire departments to assure that new combinations of distributed generation and electricity storage will be subject to all reasonable safety precautions necessary to protect the public. Although SolarCity contends that existing rules and procedures provide a robust approach to address safety impacts of customer-sited energy storage, it believes there are opportunities for

state-level action to improve the consistency of permitting approaches across jurisdictions. SolarCity recommends the Commission work with the Governor's Office of Planning and Research to develop a set of best practices that seek to improve permitting and best practices for local authorities. SCE supports inter-agency collaboration and coordination on the safety issues identified by the Commission. SDG&E reiterates that collaboration among all parties is critical to a safe and reliable electric grid.

9.2. Discussion

With respect to the safety of interconnected storage as it interacts with the grid, we find the safety standards set forth under Rule 21 to be sufficiently comprehensive. Eligible storage devices must continue to meet the technical and safety standards required for interconnection under Rule 21 to ensure safety during parallel operation with the utility distribution system. This includes evaluation under the same technical interconnection standards currently applied to generating facilities not paired with storage. The Commission, in its Rule 21 R.11-09-011, is engaging in a comprehensive process to balance the potential for advanced capabilities with the continuing need to ensure safety for utility personnel and customers, and reliability of the distribution network.

The safety of storage devices on customer premises is addressed by numerous standards, rules, and regulations. National Electric Code and UL requirements address many of the safety issues for storage devices on customer premises. In addition, local permitting requirements and inspections provide additional oversight for the safe installation and operation of energy storage systems.

Several parties commented that while there are standards and rules addressing safety, there is a lack of coordination at the state level. We agree. In

order to facilitate a more cohesive set of standards and practices, we direct Commission staff¹⁶ to work with the state-wide entities such as the Governor's Office of Planning and Research and the Office of the State Fire Marshall to identify existing best practices and, if necessary, develop a set of best practices to improve permitting and inspection by local authorities. The resulting best practices shall be posted on the Commission's website.

10. Self-Generation Incentive Program (SGIP) Interconnection Deadlines

The latest revision of the guidebook created uncertainty regarding the proper interconnection treatment of NEM-paired storage. The ACR proposed that the IOUs extend expiration deadlines for affected SGIP projects to submit incentive claim applications until 14 days after the issuance of this decision.

The majority of comments filed with respect to an extension of SGIP interconnection deadlines supported a longer extension varying in length from 60 to 120 days. No opposition was raised to extending the application termination deadlines.

Based on comments filed, we extend the expiration date for affected SGIP projects to submit applications to claim the incentive to 120 days after the revised NEM tariffs are approved.

11. Comments on Proposed Decision

The proposed decision of the Administrative Law Judge in this matter was mailed to the parties in accordance with Section 311 of the Public Utilities Code and comments were allowed under Rule 14.3 of the Commission's Rules of

¹⁶ This team will be comprised of staff from the Safety Enforcement Division with input from Energy Division staff.

Practice and Procedure. Comments were filed on _____, and reply comments were filed on _____ by _____.

12. Assignment of Proceeding

Michael R. Peevey is the assigned Commissioner and Katherine MacDonald is the assigned ALJ in this proceeding.

Findings of Fact

1. The Commission created the California Solar Initiative to provide incentives and other support for solar PV systems in California. The Legislature codified and modified the program in SB 1.

2. AB 656 established the NEM program, an electricity tariff billing mechanism that provides customers with retail-rate billing credits for energy from renewable distributed generation exported to the grid when generation exceeds onsite energy demand.

3. SB 489 expanded the technologies eligible for the NEM tariff to include all RPS-eligible technologies.

4. On April 30, 2013, the California Energy Commission issued the seventh edition of the RPS Eligibility Commission Guidebook, which included a new section on energy storage technologies. Section III.G of the Guidebook established two categories of energy storage that may be considered an addition or enhancement to a renewable electrical generating facility.

5. Updates to the latest version of the Guidebook created uncertainty in the industry regarding the proper interconnection treatment of NEM-paired storage.

6. The Guidebook defines integrated energy storage at page 64. Integrated energy storage is defined to include methods of storing energy from a renewable energy resource that is integrated into the renewable electrical generating facility as part of the generating process. Further, the Guidebook states that integrated

battery-based storage must only be capable of storing energy coming from the renewable generator.

7. The Guidebook, at page 65, defines a storage device as "directly connected" when it is both directly connected to the renewable generator via an internal power line and operated as part of the RPS-eligible facility.

8. The electric utilities currently require storage devices paired with NEM-eligible facilities to interconnect under the NEM-MT and treat the storage devices as distinct generators not eligible for the benefits provided to NEM-eligible facilities.

9. The point of measurement for the de-rate factor is at or near the point where the GF interconnects with the grid or internal power line, such that all AC energy into and out of the GF can be directly measured.

10. Storage systems continually consume some power to maintain system services.

11. Under NEM-MT, the customer-generator facility must 1) install a non-export relay on the non-NEM generator(s), 2) install NGOM for the NEM-eligible generation, meter the load, and meter total energy flows at the point of common coupling, or 3) install interval NGOM directly to the NEM-eligible generator(s).

12. Gathering additional data on the impacts of interconnection of renewable-paired storage will allow the Commission to gain additional information on interconnected storage and the impact of such storage on the distribution system.

13. In R.11-09-011, the Commission endeavors to balance the potential for advanced capabilities with the continuing paramount need to ensure safety for utility personnel and customers and reliability of the distribution network.

14. The Commission is engaging in a comprehensive review of safety and reliability concerns related to customer side energy storage in its Rule 21 rulemaking proceeding.

15. Eligible storage devices must continue to meet existing technical and safety standards required for interconnection under Rule 21 to ensure safety during parallel operation with the utility distribution system.

16. The safety of storage devices on customer premises is addressed by a number of standards, rules, and regulations, including but not limited to National Electric Code, UL requirements, local permitting requirements and safety inspections.

17. There is a lack of coordination of standards and rules addressing safety at the state level.

Conclusions of Law

1. NEM-paired storage systems should be configured and metered in such a way as to ensure that NEM credit can only be earned by eligible renewable electric generation.

2. Pub. Util. Code § 2827(b)(11) provides that a renewable electrical generating facility is NEM eligible but defers the definition of a renewable electrical generating facility to the Cal. Pub. Resources Code.

3. Cal. Pub. Resources Code § 25741(a)(1) defines a renewable electrical generating facility as a facility that uses biomass, solar thermal, photovoltaic, wind, geothermal, fuel cells using renewable fuels, small hydroelectric generation of 30 megawatts or less, digester gas, municipal solid waste conversion, landfill gas, ocean wave, ocean thermal, or tidal current, and any additions or enhancements to the facility using that technology.

4. The seventh edition of the CEC RPS Guidebook, Section III.G clarifies the conditions under which a storage device may be considered an addition or enhancement to a renewable electrical generation facility pursuant to Cal. Pub. Resources Code § 25741(a)(1).

5. Storage itself is not a "generator" as defined under the Rule 21 interconnection tariff.

6. The definition of a GF, for interconnection purposes, includes a generator plus an addition or enhancement.

7. NEM-paired storage systems with storage devices sized at 10 kW or smaller should have no requirement to be sized to the customer demand or the NEM generator.

8. NEM-paired storage systems with storage devices sized larger than 10 kW should not have a discharge capacity that exceeds the NEM generator's maximum capacity and the maximum energy discharged by the storage device should not exceed 12.5 hours of storage per kW. Qualified NEM-paired storage systems should be configured and metered in order to ensure that NEM credit can only be earned by the eligible renewable electric generation.

9. It is reasonable to adopt simpler and more cost-effective sizing and metering requirements to ensure NEM integrity for systems sized at 10 kW or less.

10. NEM eligible GFs sized at 10 kW or less should be permitted to utilize the GF's DAS reporting data of kWh energy imported and exported to measure the total energy drawn into the GF against the total energy dispatched by the GF on an annual basis to determine a de-rate factor.

11. The de-rate factor should be applied during the annual NEM true-up period. When the de-rate factor is 95% or higher, customers should receive 100% of NEM credits.

12. Qualifying NEM-paired storage systems larger than 10 kW should be required to adhere to metering requirements similar to those in the NEM-MT tariff to ensure that only NEM eligible generation receives NEM credit. NEM-eligible storage devices sized at 10 kW or less should have the option to adhere to the metering requirements prescribed for NEM-paired storage systems larger than 10 kW when it is technically feasible to do so.

13. The NEM Tariff should be modified to incorporate the sizing and metering requirements described in this decision for NEM-paired storage systems, both for systems with greater than 10 kW discharge capacity and those sized at or below 10 kW discharge capacity. This modified tariff should apply to NEM-paired storage systems interconnected under the NEM Tariff.

14. Without additional data, concerns regarding the impact of storage on the distribution system are speculative.

15. Beginning with the current cohort of pending storage interconnection requests, the IOUs should record data on estimated avoided costs and the fee and upgrade cost waivers resulting from the NEM-eligible interconnection of renewable-paired storage consistent with reporting requirements directed by Resolution E-4610.

16. The report should include information on NEM-paired storage devices interconnected from January 1, 2013 through March 31, 2015, and the utilities should serve their reports on the service list of this proceeding or its successor no later than June 30, 2015.

17. The Commission staff should work with state-wide entities such as the Office of the State Fire Marshall and the Governor's Office of Planning and Research to develop a set of best practices that seek to improve permitting for local authorities and should work to improve the coordination of standards and rule addressing safety at the state level. The resulting best practices should be posted on the Commission's website.

18. The expiration date for affected SGIP projects to file applications to claim incentives should be extended to 120 days after the revised NEM tariffs are approved by the Commission.

O R D E R

IT IS ORDERED that:

1. Qualifying energy storage devices paired with Net Energy Metering (NEM)-eligible generation facilities that meet the Renewables Portfolio Standard Guidebook requirements shall be exempt from interconnection application, supplemental review, distribution upgrade, and standby charges as additions or enhancements to NEM-eligible systems under the current NEM tariff.

2. Net Energy Metering (NEM)-paired storage systems with storage devices sized at 10 kilowatts alternating current or smaller shall have no requirement to be sized to the customer demand or the NEM generator.

3. For Net Energy Metering (NEM)-paired storage systems with storage devices larger than 10 kilowatts alternating current, a) the discharge capacity of the storage system shall not exceed the NEM generator's maximum capacity, and b) the maximum energy discharged by the storage device shall not exceed 12.5 hours of storage per kilowatt.

4. Net Energy Metering-eligible generating facilities with storage devices sized at 10 kilowatts alternating current or less and that have a single inverter must utilize the storage device's data acquisition system to measure the total (grid) energy drawn into the storage device against the total energy dispatched by the storage device on an annual basis to determine a de-rate factor as follows:

$$\frac{(\text{Annual Energy Exported from the storage device} - \text{Annual Energy Imported into the storage device})}{\text{Annual Energy Exported from the storage device}} = \% \text{ De-rate Factor}$$
$$\text{Adjusted Annual NEM Credits} = (\text{Annual Export Credits} * \% \text{ De-rate Factor})$$

5. NEM-eligible storage devices sized at 10 kW alternating current or less may, at the system owner's option, adhere to the metering requirements prescribed for NEM-paired storage systems larger than 10 kW when it is technically feasible to do so.

6. Customers shall receive 100% of annual Net Energy Metering credits where the annual de-rate factor is 95% or higher.

7. Net Energy Metering (NEM) paired storage systems larger than 10 kilowatts alternating current shall be required to 1) install a non-export relay on the non-NEM generator(s); 2) install an interval meter for the NEM-eligible generation, meter the load, and meter total energy flows at the point of common coupling; or 3) install an interval meter directly to the NEM-eligible generator(s). Fees associated with the metering required shall be no more than \$500.

8. Within 30 days of the effective date of this decision, the investor owned utilities shall file Tier 2 Advice Letters to update the Net Energy Metering (NEM) tariffs to incorporate the sizing and metering requirements described in this decision for NEM-paired storage systems.

9. The investor owned utilities shall, beginning with currently pending storage interconnection requests, record data on the application fee waivers, supplemental review fee waivers, distribution cost upgrade waivers, and standby charges waivers resulting from the Net Energy Metering-eligible interconnection of renewable-paired storage consistent with reporting requirements directed by Resolution E-4610. The report shall also include the investor owned utilities estimated avoided costs.

10. The reporting requirements set forth in Ordering Paragraph 8 shall include information on Net Energy Metering-paired storage devices interconnected from January 1, 2013 through March 31, 2015, and the utilities must serve their reports on the service list of this proceeding or its successor no later than June 30, 2015.

11. Safety Enforcement Division staff with input from Energy Division Staff shall work with appropriate state-wide entities such as, but not limited to, the Office of the State Fire Marshall and the Governor's Office of Planning and Research, as appropriate, to develop a set of best practices that seek to improve permitting and best practices for local authorities. The resulting best practices shall be posted on the Commission's website.

12. The expiration date for affected Self-Generation Incentive Program projects to file applications to claim incentives shall be extended to 120 days after the revised Net Energy Metering tariffs, described in Ordering Paragraph 7, are approved by the California Public Utilities Commission.

13. Rulemaking 12-11-005 remains open

This order is effective today.

Dated _____, at San Francisco, California.