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**Agenda ID #16915
Ratesetting****TO PARTIES OF RECORD IN RULEMAKING 14-07-002:**

This is the proposed decision of Administrative Law Judge Valerie U. Kao. 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 November 8, 2018 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.

The Commission may hold a Ratesetting Deliberative Meeting to consider this item in closed session in advance of the Business Meeting at which the item will be heard. In such event, notice of the Ratesetting Deliberative Meeting will appear in the Daily Calendar, which is posted on the Commission's website. If a Ratesetting Deliberative Meeting is scheduled, *ex parte* communications are prohibited pursuant to Rule 8.3(c)(4)(B).

/s/ ANNE E. SIMON

Anne E. Simon

Chief Administrative Law Judge

AES:avs

Attachment

Decision **PROPOSED DECISION OF ALJ KAO** (Mailed 10/5/2018)

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to
Develop a Successor to Existing Net
Energy Metering Tariffs Pursuant to
Public Utilities Code Section 2827.1, and
to Address Other Issues Related to Net
Energy Metering.

Rulemaking 14-07-002

**DECISION GRANTING PETITION FOR MODIFICATION OF
DECISION 14-05-033 REGARDING DIRECT CURRENT-COUPLED
SOLAR PLUS STORAGE SYSTEM**

Table of Contents

Title	Page
DECISION GRANTING PETITION FOR MODIFICATION OF DECISION 14-05-033 REGARDING DIRECT CURRENT-COUPLED SOLAR PLUS STORAGE SYSTEMS	2
Summary	2
1. Background	2
1.1. Decision 14-05-033.....	2
1.2. Petition for Modification.....	3
1.2.1. Use Cases That Comport With D.14-05-033 and Options for Compliance	5
1.2.2. Other Requests Included in Petition.....	6
1.3. Responses to Petition.....	7
1.4. Reply to Responses	10
1.5. Ruling Requiring Further Information on Software Option	11
2. Issues Before the Commission	12
3. Discussion	12
3.1. Compliance Pathway for “No Grid Charging” and “No Storage Export” Use Cases	12
3.2. Determining System Size of DC-Coupled Solar Plus Storage Systems.....	17
3.3. Other Issues Deferred or Otherwise Not Resolved	18
4. Conclusion	18
5. Comments on Proposed Decision	19
6. Assignment of Proceeding.....	19
Findings of Fact	19
Conclusions of Law	21
ORDER	21

**DECISION GRANTING PETITION FOR MODIFICATION
OF DECISION 14-05-033 REGARDING DIRECT
CURRENT-COUPLED SOLAR PLUS STORAGE SYSTEMS**

Summary

This decision partially grants a petition for modification of Decision (D.) 14-05-033, to allow large net energy metering-eligible facilities paired with energy storage using direct current configurations. In D.14-05-033 the Commission declined to consider a possible pathway for such configurations, acknowledging such configurations may not be able to accommodate the metering equipment required by D.14-05-033. This decision approves a firmware-based option for complying with D.14-05-033, and denies an ex-post data verification option. The decision also approves a software-based option, contingent upon Commission determination that the electric investor owned utilities' communication infrastructures are capable of communication with Electric Rule 21 Phase II and Phase III communication-compliant inverters. The decision also adopts a means for measuring storage system size in direct current configurations, in order to determine whether size restrictions and metering requirements apply, as specified in Decision 14-05-033. The investor owned utilities shall submit advice letters to effectuate this modification.

This proceeding remains open.

1. Background

1.1. Decision 14-05-033

In Decision (D.) 14-05-033 the Commission clarified existing policy that net energy metering (NEM)-eligible generating facilities (GFs) may be paired with qualified energy storage (NEM-PS) devices and receive service on a NEM tariff. For large GFs, defined as GFs with NEM-PS devices that exceed 10 kilowatts (kW) (alternating current (AC)) maximum discharge capacity, D.14-05-033

established certain metering requirements for the purpose of ensuring that NEM bill credits accrue to NEM-eligible (*i.e.*, renewable, on-site) generation as opposed to grid energy.¹ Decision 14-05-033 acknowledged that “certain single inverter large GFs with NEM-paired storage devices may not be able to accommodate the metering requirements” established in the decision, but declined to consider alternative metering requirements for such systems.

1.2. Petition for Modification

On September 1, 2017, the California Solar & Storage Association (CALSSA) filed and served a petition for modification of D.14-05-033 (Petition) in order to facilitate interconnection of direct current (DC)-coupled solar plus storage systems,² which utilize a single inverter instead of one each (*i.e.*, a total of two inverters) for both the NEM-eligible GF and the NEM-PS device. To illustrate the difference between a typical AC-coupled solar plus storage system and a typical DC-coupled solar plus storage system, we include the following

¹ Public Utilities Code Section 2827(b)(4): “‘Eligible customer-generator’ means a residential customer, small commercial customer as defined in subdivision (h) of Section 331, or commercial, industrial, or agricultural customer of an electric utility, who uses a renewable electrical generation facility, or a combination of those facilities, with a total capacity of not more than one megawatt, that is located on the customer’s owned, leased, or rented premises, and is interconnected and operates in parallel with the electrical grid, and is intended primarily to offset part or all of the customer’s own electrical requirements.”

² Rulemaking (R.) 14-07-002 *Order Instituting Rulemaking to Develop a Successor to Existing Net Energy Metering Tariffs Pursuant to Public Utilities Code Section 2827.1, and to Address Other Issues Related to Net Energy Metering*, filed July 10, 2014 (R.14-07-002), *Petition of the California Solar Energy Industries Association for Modification of D.14-05-033 to Allow DC-Coupled Solar Plus Storage Systems*, filed September 1, 2017 (Petition). On February 8, 2018, the California Solar & Storage Association filed a notice of name change from California Solar Energy Industries Association to California Solar & Storage Association, or CALSSA.

excerpt from the Rule 21 Interconnection (Rulemaking 17-07-007) Working Group One Final Report:³

AC-coupling and DC-coupling are the two different methods of combining a solar and energy storage system. An AC-coupled system has an inverter for the storage and a separate inverter for the solar. It is therefore possible to directly meter the AC output of the solar as seen in Figure 1 on the left. DC-coupled systems combine the solar and storage on the DC side of the single inverter. This means any meter on the AC side records both solar and storage as seen in Figure 1 on the right.

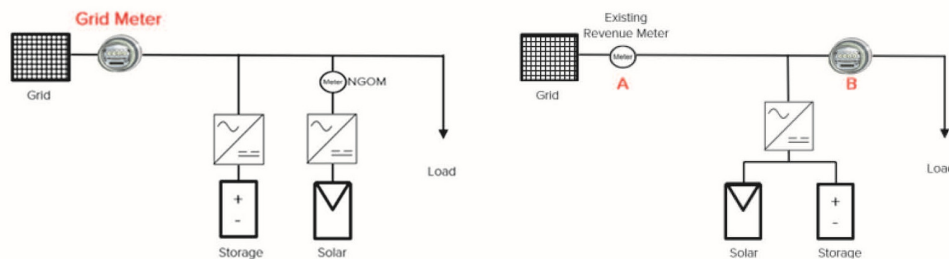


Figure 1 – AC-coupled systems left with a NGOM directly metering the AC output of the solar and DC-coupled system right, where no AC point exists to directly monitor the solar

For the sake of consistency, this decision equates “single inverter large GFs with NEM-PS devices” with “DC-coupled solar plus storage systems” and refers primarily to the latter terminology throughout the remainder of this decision. Similarly and more generally, this decision also equates “GFs with NEM-PS devices” with “solar plus storage systems.”

³ Rulemaking 17-07-007 Order Instituting Rulemaking to Consider Streamlining Interconnection of Distributed Energy Resources and Improvements to Rule 21, filed July 13, 2017 (R.17-07-007), Working Group One Final Report, retrieved from <http://www.cpuc.ca.gov/General.aspx?id=6442455170#WG1> on June 19, 2018, at 32 (Issue 2 Appendices, Appendix A).

1.2.1. Use Cases That Comport With D.14-05-033 and Options for Compliance

The Petition describes two use cases – “no grid charging” (*i.e.*, no grid charging to the storage device) and “no storage export” (*i.e.*, no storage exports to the grid) -- for which CALSSA requests Commission authorization to permit interconnection of DC-coupled solar plus storage systems, as well as to expand compliance options for AC-coupled solar plus storage systems, beyond the three options specified in D.14-05-033. On the latter point, the Petition asserts the current typical means of complying with D.14-05-033, which is to install a net generation output meter (NGOM), can increase project costs by \$25,000 and can also increase project timelines by three to six months.

For each use case, the Petition discusses several possible configurations and possible compliance pathways. For the “no grid charging” use case, the Petition discusses a voltage-controlled configuration of DC-coupled solar plus storage, a virtual net energy metering (VNEM) configuration, a NEM Aggregation (NEM-A) configuration, other unspecified configurations, and AC-coupled solar plus storage systems. The Petition essentially posits that these configurations would ensure the paired storage device is charged exclusively from the NEM-eligible generator and not from the grid. For the “no storage export” use case, the Petition discusses using an inverter or charge controller “with functionality that prevents the storage device from discharging at times when the customer site is exporting power to the grid or install an external relay that provides the same function.”⁴ The Petition asserts that this approach would prevent storage exports to the grid. For both use cases, the Petition notes there

⁴ Petition, at 12.

may be inadvertent but minor instances of either grid import (in the “no grid charging” use case) or storage export (in the “no storage export” use case), which the Petition argues should not disqualify the customer-generator from continuing to receive service on a NEM tariff.

The Petition also discusses several options for validating or ensuring ongoing compliance with the intent of D.14-05-033’s metering requirements, *i.e.*, to ensure that NEM bill credits accrue only to NEM-eligible generation. These options include (1) a firmware solution, (2) a software-based solution, and (3) an *ex-post* data solution.

1.2.2. Other Requests Included in Petition

The Petition contains several requests beyond the primary request, as described above. First, the Petition requests the Commission to “leave the door open” for a use case in which NEM-PS systems can also participate in demand response programs, but does not propose a specific metering or billing solution for distinguishing renewable (NEM-eligible) exports from non-renewable (*i.e.*, for demand response) exports for such a use case.⁵ The Petition also requests the Commission to clarify that storage system size for DC-coupled solar plus storage systems should be determined from the continuous output rating of the storage device, rather than the nameplate (AC) rating of the inverter to which the utilities currently refer, for purposes of determining whether a NEM-PS arrangement meets the definition of a ‘small’ or ‘large’ system (*i.e.*, whether the paired storage device exceeds 10 kW (AC) maximum discharge capacity). Lastly, the Petition requests the Commission to explicitly permit the use of third party-owned

⁵ The Petition also acknowledges such a solution may need to be developed in the Commission’s demand response proceeding, R.13-09-011.

metering in lieu of a utility-owned NGOM, in cases where eligible customer-generators opt to install an interval meter directly to the NEM-eligible generator.

1.3. Responses to Petition

On October 2, 2017, California Energy Storage Association (CESA); Energy Freedom Coalition of America (EFCA); and Pacific Gas and Electric Company, Southern California Edison Company and San Diego Gas & Electric Company (together, the electric investor owned utilities (IOUs)) each filed and served a response to the Petition.

CESA and EFCA generally support the Petition, with minor suggested modifications. CESA seeks clarification that future use cases not currently known will be considered for NEM-PS eligibility; they suggest CALSSA's two use cases ("no grid charging" and "no storage export") are simply two options out of many that a single-inverter system could adopt. EFCA suggests three amendments to CALSSA's original proposal: 1) expanded consideration of software controls to verify that a storage system does not charge from the grid or export to the grid; 2) explicit Commission direction to the utilities to allow third-party owned metering to be used to comply with existing metering requirements in the NEM-PS tariff; and 3) modification of the 10 kW threshold calculation methodology to consider the lesser of the rated capacity of the inverter and the continuous output rating of the storage system, rather than only the continuous output rating.

The electric IOUs generally agree with the intent of the Petition, and that the time is appropriate to consider inclusion of large DC-coupled solar plus storage systems as a permissible configuration for interconnection and service on a NEM tariff. The electric IOUs support both the “no grid charging” and “no storage export” use cases discussed by CALSSA so long as each use case can be verified.

For the “no grid charging” use case, the electric IOUs support the firmware proposal but suggest more exploration of the software-based solution is needed; the electric IOUs consider *ex-post* data validation as a problematic alternative to the existing metering requirements, as it relies solely on a customer attestation and storage charge/discharge data after the fact, which would likely introduce new data validity issues and increase administrative costs; the electric IOUs therefore do not support the data validation option. For the voltage-controlled configuration that utilizes a firmware solution, the electric IOUs recommend the Commission require third party certification, such as through Underwriters Laboratory (UL), in order to expedite interconnection review and processing. In these voltage-controlled configurations, the electric IOUs argue that any energy required to power the storage system should be monitored to ensure that it is truly *de minimis* and therefore in compliance with the Renewables Portfolio Standard Guidebook requirements. The electric IOUs argue the solutions CALSSA offers for VNEM and NEM-A tariffs are outside the scope of what D.14-05-033 considers and because at the time of their response the Commission

was considering modifications to VNEM elsewhere in the R.14-07-002 proceeding.⁶

For the “no storage export” use case, the electric IOUs argue the Commission should continue to require the use of a non-export relay as currently required by D.14-05-033. However, the electric IOUs also state that certified firmware solutions that provide “equal reliability and security” would be acceptable.⁷ As with the “no grid charging” use case, the electric IOUs argue against using an *ex-post* data approach to validate the lack of export. The electric IOUs argue that the ‘inadvertent export’ allowance under Rule 21 is inapplicable to the “no storage export” use case, where the objective is to ensure that NEM bill credits accrue only to NEM-eligible generation, and ask the Commission to reject any proposal in which inadvertent export is allowed to receive NEM credit under this use case.

The electric IOUs oppose CALSSA’s proposal to change the way in which storage device capacity is measured. The electric IOUs favor the current basis for measuring storage device capacity, *i.e.*, the nameplate capacity of the inverter used by the storage device, over the continuous discharge capacity of the battery that appears on the battery’s specification sheet. They argue the inverter

⁶ R.14-07-002 *Administrative Law Judge’s Ruling Seeking Comment on Use of Energy Storage by Customers on Virtual Net Metering Tariffs*, issued August 14, 2017. The Commission subsequently adopted D.17-12-005, *Decision to Facilitate Virtual Net Energy Metering Generation Paired With a Storage System*, issued December 21, 2017.

⁷ R.14-07-002 *Response of Pacific Gas and Electric Company (U 39 E), Southern California Edison Company (U338E) and San Diego Gas & Electric Company (U 902 M) to the Petition of the California Solar Energy Industries Association for Modification of Decision (D.) 14-05-033 to Allow DC-Coupled Solar Plus Storage Systems*, filed October 2, 2017 (Electric IOUs’ response), at 6.

capacity is simple to understand and not subject to dispute and is therefore a better standard to use.

The electric IOUs also do not support third party metering at this time. They argue it is costly and “extremely complicated” to incorporate data from third party-owned meters in utility billing systems while maintaining established standards for meter and billing accuracy.⁸

1.4. Reply to Responses

On October 20, 2017, CALSSA filed and served a reply to the responses to the Petition (Reply). CALSSA’s Reply asserts there is alignment between the parties on the question of whether the issue needs to be addressed. Therefore, CALSSA represents, the Commission need only “work out some details” to allow single-inverter storage systems to participate in NEM-PS.⁹

On the NEM-A question, CALSSA argues there is no fundamental difference between a NEM-A system and a NEM system, since both systems look to pair with storage units behind a single inverter. CALSSA therefore argues against the position of the electric IOUs that NEM-A solutions are out of scope, and continues to argue that NEM-A should be addressed as part of its Petition. CALSSA acknowledges the Commission is/was addressing VNEM and paired storage in a different track of R.14-07-002.

On the issue of determining storage device capacity, CALSSA dismisses the electric IOUs’ arguments and agrees to EFCA’s proposed modification that

⁸ Electric IOUs’ response, at 9.

⁹ R.14-07-002 *California Solar Energy Industries Association Reply to Responses to Petition for Modification of D.14-05-033*, filed October 20, 2017, at 2.

the capacity of the storage system be measured by the lesser of the inverter capacity and the storage device's continuous discharge rating.

1.5. Ruling Requiring Further Information on Software Option

On July 19, 2018, the assigned ALJ issued a ruling requiring CALSSA to provide supplemental information regarding the software option for the "no grid charging" use case, and inviting other parties to address the same issue.¹⁰ On July 30, 2018, CALSSA, EFCA, PG&E, SCE, and SDG&E filed and served responses to the July 19, 2018 ruling. All parties acknowledge that updating software settings is easier than updating firmware settings; CALSSA and EFCA assert this feature of software settings may allow distributed energy resources such as solar plus storage systems to provide more services in response to future Commission and/or California Independent System Operator (CAISO) initiatives. CALSSA and EFCA identify an additional advantage of a software-based approach, which is that it allows for a single make and model of inverters whereas a firmware-based approach likely necessitates the manufacture and stockpiling of different versions of storage systems to accommodate different requirements depending on the relevant regulatory framework. This greater flexibility, however, is the primary reason the electric IOUs express reservations about the software-based option. That is, the electric IOUs assert that software settings are subject to modification, including in ways that violate Commission policies or requirements. The electric IOUs express concern that, for the "no grid charging" use case, modifications to the software settings may result in system

¹⁰ R.14-07-002 *Administrative Law Judge's Ruling Requiring Supplemental Information Regarding Petition of California Solar and Storage Association to Modify Decision 14-05-033*, filed July 19, 2018.

reliability concerns such as overloads to the service transformers and other equipment. The electric IOUs identify a current inability to monitor solar plus storage systems in real time; real-time monitoring would enable ongoing verification that systems operate according to regulatory requirements.

2. Issues Before the Commission

The issues before us are whether and how to provide alternative compliance pathways for large NEM-eligible facilities with NEM-PS devices to interconnect and take service on a NEM tariff, which would permit interconnection of large DC-coupled solar plus storage systems; and whether to specify a different means for determining the size of paired storage devices, which would affect whether such systems are classified as ‘small’ or ‘large’ with respect to the metering requirements that D.14-05-033 imposes for large solar plus storage systems.

3. Discussion

3.1. Compliance Pathway for “No Grid Charging” and “No Storage Export” Use Cases

To summarize, we approve three options for the relevant use cases. We approve the firmware-based option for ensuring NEM credit accrues only to NEM-eligible generation in large solar plus storage systems. We also approve a firmware-based option in the “no storage export” case, but with the important specification as recommended by the electric IOUs that any such firmware-based option provide equal reliability and security as a non-export relay. We also approve the software-based option for the “no storage export” use case, but contingent on Commission determination that the electric IOUs’ communication infrastructures are capable of communication with Electric Rule 21 Phase II and Phase III communication-compliant inverters. We will not approve the *ex-post*

data validation option at this time. We agree with the electric IOUs that this option does not currently provide a sufficient degree of reliability.

All parties generally agree that single-inverter systems should be allowed to interconnect under the NEM-PS tariff if they utilize a firmware-based voltage control system, whereby only the NEM-eligible facility (and never energy from the grid) is allowed to charge the storage device. We agree this is a reasonable modification to the current rules.

Of relevance to this discussion, the Commission in D.17-12-005 directed the electric IOUs to modify their VNEM tariffs in order to facilitate installation of paired storage devices. Specifically, D.17-12-005 directs that both the NEM-eligible facility and the storage device be located behind the same output meter (such that generation from the NEM-eligible facility would not be metered separately from generation from the storage device), which would be required to include a physical non-import relay or a functionally equivalent non-import configuration to prevent grid power from flowing to the storage device. This is essentially the same situation as CALSSA's proposed "no grid charging" use case for large DC-coupled solar plus storage systems under NEM, in that both situations prohibit grid charging to the storage device. The electric IOUs submitted compliance advice letters to implement D.17-12-005;¹¹ those advice letters, approved as of May 25, 2018, describe the electric IOUs' collaborative efforts with solar and storage industry stakeholders to identify ways to reliably and consistently ensure that NEM-paired storage devices charge only from the NEM-eligible generator and not from the grid. Although all three electric IOUs

¹¹ Advice Letters 5245-E-A (Pacific Gas and Electric Company), 3761-E-A (Southern California Edison Company), and 3199-E (San Diego Gas & Electric Company).

stated their preference for a third party-certified configuration, they acknowledged no Nationally Recognized Testing Lab (NRTL) currently provides third party certification for a non-import configuration and instead proposed an interim testing procedure that will remain effective until issuance of a formal UL certification that can replace it. This is a reasonable forward-looking approach for which the electric IOUs and solar and storage industry stakeholders deserve recognition. In light of the broad agreement over both the concept and implementation details of the “no grid charging” use case, we approve the firmware-based option for ensuring NEM credit accrues only to NEM-eligible generation in large solar plus storage systems. We also approve a firmware-based option in the “no storage export” case, but with the important specification as recommended by the electric IOUs that any such firmware-based option provide equal reliability and security as a non-export relay.

There is also general agreement on the advantages of the software-based option put forward by CALSSA, though the electric IOUs identify some concerns or details over which “further scrutiny and exploration would be required,” including who/what entity would have access to the password and whether alteration of the software would nullify third party certification. The electric IOUs’ responses to the July 19, 2018 ruling make clear that a key challenge is the risk that software settings may be modified in a way that violates Commission policy, for which a framework for controlling access via passwords and third-party testing/certification would need to be established. Even under such a framework, the electric IOUs do not support the software-based option because, they assert, the software settings may still be subject to modification after they are initially programmed and deployed. SCE, however, concedes that it will have the ability to monitor and verify in real time that storage devices

operate according to Commission requirements, once “the communication requirements under Smart Inverter Phase II and Phase III are enabled and implemented with” its communication systems.¹² SCE’s response refers to communication protocols (Phase II) and advanced functions (Phase III) for which the Commission has adopted implementation timelines in connection with R.11-09-011, the predecessor to the current Rule 21 rulemaking (R.17-07-007).¹³ We agree that real-time monitoring and communication capability is an important and necessary prerequisite to approving the software-based option, as it enables ongoing verification that systems operate according to regulatory requirements. Further work may also be needed for manufacturers and/or developers to control access to software settings, and for development of third party certification capability, and we encourage the electric IOUs and industry stakeholders to work collaboratively towards practical solutions as they did in implementing D.17-12-005. It may still be useful to develop these elements as further safeguards, but we do not see a need to require them if the electric IOUs have real-time monitoring and communication capability, which is what we make our approval of the software-based option contingent on in this decision.

¹² R.14-07-002 Response of Southern California Edison Company (U338E) to Ruling Regarding Software Option for Allowing DC-Coupled Solar Plus Storage Systems, filed July 30, 2018, at 4.

¹³ The Commission, in collaboration with the California Energy Commission (CEC), formed the Smart Inverter Working Group in 2013 and invited parties to R.11-09-011 to join and participate. The Smart Inverter Working Group has made recommendations for development of smart inverter requirements, from which the electric IOUs proposed revisions to their Rule 21 tariffs via advice letters. Pursuant to Resolutions E-4832 and E-4898, approving (with modifications) proposed revisions to the electric IOUs’ Rule 21 tariffs, all inverters to be used for interconnection under Rule 21 must, by specified dates, include capabilities pursuant to Phase II communication protocols and Phase III advanced functions.

The record on each electric IOU's readiness to communicate in real time with Phase II and Phase III communication-compliant inverters is deficient in this proceeding such that it would not be reasonable to adopt a specific date by which the electric IOUs must modify their NEM tariffs and interconnection agreement forms to allow a software-based option. However, we anticipate further direction to the electric IOUs, in the Rule 21 rulemaking, to ready their communication infrastructures for real-time communication with Phase II and Phase III communication-compliant inverters.¹⁴ No later than 30 days after the Commission determines the electric IOUs' communication infrastructures are capable of real-time communication with Phase II and Phase III communication-compliant inverters, we will require the electric IOUs to submit a Tier 2 advice letter modifying their NEM tariffs and interconnection agreement forms to implement the software-based option for ensuring that NEM bill credits accrue only to NEM-eligible generation.

We will not approve the *ex-post* data validation option at this time. We agree with the electric IOUs that this option does not currently provide a sufficient degree of reliability and security for the purpose of ensuring that NEM bill credits accrue only to NEM-eligible generation.

With respect to CALSSA's recommendation that the proposed firmware-based voltage control solution apply to NEM-A, we note that NEM-A is a special condition under the general NEM tariff; therefore, any changes to storage

¹⁴ R.17-07-007 *Scoping Memo of Assigned Commissioner and Administrative Law Judge*, issued October 2, 2017, at 6, Issue 27 (Smart Inverter Issues and Coordination with Rulemaking 14-10-003 (Working Group Five/Smart Inverter Working Group): "What should be the operational requirements of smart inverters? What rules and procedures should the Commission adopt for adjusting smart inverter functions via communication controls?"

requirements under the NEM tariff that are adopted in this decision would necessarily apply to NEM-A because it is part of the NEM tariff.

3.2. Determining System Size of DC-Coupled Solar Plus Storage Systems

We approve CALSSA's proposal, as modified by EFCA, for specifying the way in which storage system size should be measured in DC-coupled systems. We find merit in CALSSA's proposal, as modified by EFCA's response, to measure storage device capacity as the lesser of the continuous output rating and the capacity of the inverter shared with the NEM-eligible facility.

Customer-generators have the option to install a NEM-eligible facility with a greater capacity than the paired storage device; in such arrangements, and where both the NEM-eligible facility and the paired storage device share one inverter, the inverter's rated capacity exceeds the storage device's capacity. Therefore it is reasonable in such arrangements to measure paired storage device capacity as the lesser of the storage device's continuous output rating and the shared inverter's nameplate capacity.

We make one further modification, in response to the electric IOUs' expressed concern regarding the uncertainty of the continuous output rating, as this is a specification that the battery manufacturer establishes that may or may not be met in reality. The Self-Generation Incentive Program (SGIP) specifies a means for determining maximum continuous output of an energy storage device:

- Maximum continuous output may be determined by the calculated maximum continuous discharge power of the energy storage system or by the continuous rated power output of the inverter, depending on which is less.¹⁵

This method is used to determine SGIP incentive eligibility and is therefore subject to review by the SGIP administrators. For purposes of determining system size, we find it reasonable to employ this existing method, which is subject to review in a Commission-authorized program.

3.3. Other Issues Deferred or Otherwise Not Resolved

We decline to address or resolve the remaining issues raised by or in response to the Petition.

First, with respect to potential future participation in demand response programs, given that CALSSA offers no specific metering or billing solution for such a use case, it would be premature to consider this request at this time.¹⁶

Second, the Petition's final request, to allow data pulled from third party-owned metering in lieu of an NGOM, does not require a modification to existing policy as third party-owned metering is not currently prohibited. The electric IOUs raise valid concerns with the use of third party-owned meters, which we encourage solar and storage industry stakeholders to work with the electric IOUs to address.

4. Conclusion

It is reasonable to grant CALSSA's request to provide alternative options for compliance with D.14-05-033's requirements for large NEM-eligible facilities

¹⁵ See, e.g., Pacific Gas and Electric Company's 2017 V6 SGIP Handbook, Section 5.1 and footnote 44.

¹⁶ For the same reason, we do not address CESA's request for confirmation that future use cases not currently known will be considered for NEM-PS eligibility.

with paired storage devices, pursuant to the firmware-based and software options addressed in CALSSA's Petition. Further work is needed, and within scope of the Commission's Rule 21 rulemaking, on readying the electric IOUs' communication infrastructures for real-time communication with Phase II-compliant inverters. Therefore, we will require the electric IOUs to enable the software-based option after the Commission determines their communication infrastructures are capable of real-time communication with Phase II and Phase III communication-compliant inverters.

It is also reasonable to adopt an existing means for determining the size of NEM-paired storage devices in DC-coupled solar plus storage systems.

5. Comments on Proposed Decision

The Commission mailed the proposed decision to the parties in accordance with Pub. Util. Code § 311, and allowed comments in accordance with Rule 14.3 of the Commission's Rules of Practice and Procedure. On _____, _____ filed comments. On _____, _____ filed reply comments.

6. Assignment of Proceeding

Martha Guzman Aceves is the assigned Commissioner and Mary F. McKenzie and Valerie U. Kao are the assigned ALJs in this proceeding.

Findings of Fact

1. Decision 14-05-033 defines large NEM-eligible GFs as those with NEM-paired storage devices that exceed 10 kW (AC) maximum discharge capacity.
2. Decision 14-05-033 imposes a size limitation and metering requirements on large GFs for the purpose of ensuring that NEM bill credits accrue only to NEM-eligible generation.

3. Decision 14-05-033 declines to consider alternative compliance options for large single inverter NEM-eligible facilities paired with energy storage.

4. CALSSA's petition for modification of D.14-05-033 proposes several alternative compliance options for large NEM-eligible facilities paired with energy storage, or large solar plus storage systems.

5. D.17-12-005 directs that both the NEM-eligible facility and the storage device be located behind the same output meter, which would be required to include a physical non-import relay or a functionally equivalent non-import configuration to prevent grid power from flowing to the storage device. This is a comparable situation to CALSSA's proposed "no grid charging" use case for large DC-coupled solar plus storage systems under NEM. The Commission approved the electric IOUs' advice letters implementing D.17-12-005 on May 25, 2018.

6. The Commission adopted specific dates by which inverters used for interconnection under Rule 21 must comply with specific communication protocols (Phase II) and include specific advanced function communication requirements (Phase III).

7. Customer-generators have the option to install a NEM-eligible facility with a greater capacity than the paired storage device; in such arrangements, and where both the NEM-eligible facility and the paired storage device share one inverter, the inverter's rated capacity exceeds the storage device's capacity.

8. The SGIP Handbook specifies a means for calculating maximum continuous output of an energy storage device, which is used to determine SGIP incentive eligibility and is therefore subject to review by the SGIP administrators. That method is: Maximum continuous output may be determined by the calculated maximum continuous discharge power of the energy storage system

or by the continuous rated power output of the inverter depending on which is less.

9. The electric utilities' readiness to accept data from third party-owned meters varies.

Conclusions of Law

1. It is reasonable to grant CALSSA's request to provide alternative options for compliance with D.14-05-033's requirements for large NEM-eligible facilities with paired storage devices, pursuant to the firmware-based and software options addressed in CALSSA's Petition.

2. It is reasonable to require the electric IOUs to implement the software-based option after the Commission determines their communication infrastructures are capable of real-time communication with Phase II and Phase III communication-compliant inverters.

3. It is reasonable to deny the *ex-post* data validation option, for compliance with D.14-05-033's requirements for large NEM-eligible facilities with paired storage devices, addressed in CALSSA's Petition.

4. It is reasonable to adopt the existing method, for determining SGIP incentive eligibility, for determining the size of NEM-paired storage devices in DC-coupled solar plus storage systems.

5. D.14-05-033 should be modified as set forth in Appendix A of this decision.

O R D E R

IT IS ORDERED that:

1. The Petition for Modification is granted in the following respects:
 - a. We approve the firmware-based option for ensuring net energy metering (NEM) credit accrues only to NEM-eligible generation in large solar plus storage systems. We also approve a firmware-based option in the

“no storage export” case, but with the important specification as recommended by the electric IOUs that any such firmware-based option provide equal reliability and security as a non-export relay.

- b. We also approve the software-based option, but contingent on Commission determination that the electric investor owned utilities’ communication infrastructures are capable of communication with Electric Rule 21 Phase II and Phase III communication-compliant inverters.
 - c. We approve the proposal, as modified in Section 3.2, for specifying the way in which storage system size should be determined in direct current-coupled solar plus storage systems.
2. The Petition for Modification is denied in all other respects.
 3. Decision 14-05-033 is modified as set forth in Appendix A of this decision.
 4. Within 45 days after the issue date of this decision, Pacific Gas and Electric Company, Southern California Edison Company and San Diego Gas & Electric Company must each submit a Tier 2 advice letter modifying their respective net energy metering tariffs and interconnection agreement forms, as applicable, to implement the firmware-based option for complying with Decision 14-05-033’s requirements for large generating facilities paired with energy storage devices. These advice letters must also specify that direct current-coupled solar plus storage systems’ size will be determined as the lesser of the storage device’s maximum continuous output rating, determined pursuant to the Self-Generation Incentive Program Handbook, and the shared inverter’s nameplate capacity.
 5. Within 30 days after the Commission determines the communication infrastructures of Pacific Gas and Electric Company, Southern California Edison Company and San Diego Gas & Electric Company (together, the electric investor owned utilities) are capable of real-time communication with Electric Rule 21 Phase II and Phase III communication-compliant inverters, each of the electric

investor owned utilities must submit a Tier 2 advice letter modifying their respective net energy metering tariffs and interconnection agreement forms, as applicable, to implement the software-based option for complying with Decision 14-05-033's requirements for large generating facilities paired with energy storage devices.

6. Rulemaking 14-07-002 remains open.

This order is effective today.

Dated _____, at Fresno, California.

Appendix A
Changes to Decision 14-05-033

Section 6.2.3 Discussion of Metering Requirements

Starting on Page 21, amend as follows (additions in italics and underlined, deletions in strikeout):

~~Although w~~We recognize that certain single inverter large GFs with NEM-~~paired storage devices~~NEM-eligible GFs paired with storage devices by direct current, or DC-coupled solar plus storage systems, may not be able to accommodate the metering requirements as described above., ~~we choose not to provide an alternative metering solution for such configurations at this time. Therefore, all large NEM-paired storage GFs shall conform to the metering requirements described above.~~ For these systems, we will authorize a firmware-based option for ensuring NEM credit accrues only to NEM-eligible generation in large solar plus storage systems; firmware-based options that restrict storage from exporting to the grid must provide equal reliability and security as a non-export relay. We will also approve a software-based option, but contingent on Commission determination that the electric IOUs' communication infrastructures are capable of communication with Electric Rule 21 Phase II and Phase III communication-compliant inverters.

Small NEM-eligible GFs with paired storage devices (at 10 kW (AC) or less maximum discharge capacity) may, at the system owner's option, adhere to the metering requirements prescribed for large NEM-paired storage GFs when it is technically feasible to do so. In DC-coupled solar plus storage systems, storage device capacity should be determined as the lesser of the storage device's continuous output rating and the nameplate capacity of the inverter that is shared with the NEM-eligible GF. Continuous output of a storage device should be determined in a manner consistent with the SGIP Handbook, which is:

- Maximum continuous output may be determined by the calculated maximum continuous discharge power of the energy storage system or by the continuous rated power output of the inverter, depending on which is less.

Findings of Fact

Amend Finding of Fact 12 as follows:

12. Small NEM-eligible GFs (with storage sized at 10 kW (AC) or less), or small solar plus storage systems, should be permitted to use an estimation methodology based on a presumed generation profile of the GF's NEM generator to validate the eligible NEM credits accrued to the GF. Large NEM-eligible GFs, or large solar plus storage systems, are NEM-eligible GFs paired with storage sized larger than 10 kW. In AC-coupled solar plus storage systems, storage device capacity is determined as the (AC) maximum discharge capacity. In DC-coupled solar plus storage systems, storage device capacity is determined as the lesser of the storage device's continuous output rating and the nameplate capacity of the inverter that is shared with the NEM-eligible GF. Continuous output of a storage device is determined in a manner consistent with the SGIP Handbook, which is:

Maximum continuous output may be determined by the calculated maximum continuous discharge power of the energy storage system or by the continuous rated power output of the inverter, depending on which is less.

Conclusions of Law

Amend Conclusions of Law 1, 8, 9, 10, 11, 12, 14 and 15 as follows:

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

8. NEM-paired storage systems with storage devices sized at 10 kW or smaller, as determined pursuant to Finding of Fact 12, should have no requirement to be sized to the customer demand or the NEM generator.

9. NEM-paired storage systems with storage devices sized larger than 10 kW, as determined pursuant to Finding of Fact 12, should have a maximum output power no larger than 150% of the NEM generator's maximum output capacity.

10. Qualified NEM-paired storage systems should be configured and/or metered in order to ensure that NEM credit can only be earned by the eligible renewable electric generation.

11. 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, as determined pursuant to Finding of Fact 12.

12. Small NEM eligible GFs (~~with storage sized at 10 kW (AC) or less~~), as determined pursuant to Finding of Fact 12, should be permitted to use an estimation methodology based on a presumed generation profile of the GF's NEM generator to validate the eligible NEM credits accrued to the GF.

14. Qualifying large NEM-eligible GFs (~~with paired storage systems larger than 10 kW (AC)~~), as determined pursuant to Finding of Fact 12, should be required to: 1) adhere to metering requirements similar to those in the NEM-MT tariff; 2) use equipment that prevents electricity to be exported to the grid from the storage device; or 3) use equipment that prevents electricity to be imported from the grid to charge a storage device to ensure that only NEM eligible generation receives NEM credit. NEM-eligible GFs with storage devices sized at 10 kW or less, as determined pursuant to Finding of Fact 12, should have the option to adhere to the metering requirements prescribed for large NEM-paired storage GFs when it is technically feasible to do so.

15. 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 storage devices greater than 10 kW (AC) maximum discharge capacity and those sized at or below 10 kW (AC) maximum discharge capacity~~ large NEM-eligible GFs and small NEM-eligible GFs, as defined and determined pursuant to Finding of Fact 12, upon Commission approval of an estimation methodology based on a presumed generation profile of eligible NEM generators. This modified tariff should apply to NEM-paired storage systems interconnected under the NEM Tariff.

Include new Conclusion of Law as follows:

For systems interconnecting under net energy metering aggregation (NEMA), electricity exported to the grid from a paired solar and storage system will generate NEM credits for the NEMA arrangement.

Ordering Paragraphs

Amend Ordering Paragraphs 3, 4, 5, 6, 8 and 9 as follows:

3. Net Energy Metering (NEM)-paired storage systems with storage devices sized at 10 kilowatts ~~alternating current~~ or smaller, as determined pursuant to Finding of Fact 12, shall have no requirement to be sized to the customer demand or the NEM generator.

4. ~~For~~ Net Energy Metering (NEM)-paired storage systems with storage devices larger than 10 kilowatts ~~alternating current~~, as determined pursuant to Finding of Fact 12, shall have a maximum output power no larger than 150% of the NEM-eligible generator's maximum output capacity.

5. Small Net Energy Metering (NEM)-eligible generating facilities, ~~those with NEM-paired storage devices sized at 10 kilowatts alternating current or less~~ as determined pursuant to Finding of Fact 12, shall utilize an estimation

methodology based on a presumed generation profile of the generating facility's NEM generator as adopted by the Commission subsequent to this decision.

6. The Commission shall issue a separate ruling in this proceeding, Rulemaking 12-11-005, describing the process for finalizing the presumed generation profile based estimation methodology for eligible Net Energy Metering (NEM) generators to be incorporated into a revised NEM tariff for small NEM-eligible generating facilities with NEM paired storage devices sized at 10 kilowatts alternating current or less, as determined pursuant to Finding of Fact 12.

8. Small Net Energy Metering (NEM)-eligible systems with storage devices sized at 10 kilowatts alternating current or less GFs, as determined pursuant to Finding of Fact 12, 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.

9. Large Net Energy Metering (NEM) paired storage systems, those with NEM-paired storage devices larger than 10 kilowatts ~~alternating current,~~ as determined pursuant to Finding of Fact 12, shall be required to: 1) install a non-export relay on the storage device(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); 4) use equipment that prevents electricity to be exported from the storage device to the grid; or 5) use equipment that prevents electricity imported from the grid to charge a storage device. Firmware-based equipment that prevents electricity to be exported from the storage device to the grid must provide equal reliability and security as a non-export relay. Software-based equipment is permitted after the Commission determines that the electric investor owned utilities' communication infrastructures are capable of communication with Electric Rule 21 Phase II and Phase III communication-compliant inverters.