

July 16, 2012

Edward F. Randolph
Director of Energy Division
California Public Utilities Commission
505 Van Ness Ave., Room 4004
San Francisco, CA 94102

Re: Southern California Edison Company Report on
Feasibility of Using AMI Data To Make Solar Production
Data Available to California Solar Initiative Participants
(Report)

Dear Mr. Randolph:

In Decision (D.)11-07-031 of Rulemaking (R.)10-05-004, the California Public Utilities Commission ordered that the California Solar Initiative (CSI) Program Administrators (PAs) evaluate the feasibility of and projected timeline for using Advanced Metering Infrastructure (AMI) data to make solar production data available to CSI participants. Ordering Paragraph 7 of D.11-07-031 requires that the PAs submit a report of the evaluation within one year of the date of the decision, which was July 14, 2011.

In addition, the PAs are required to mail a copy of the report to the Service List of R.10-05-004. SCE therefore submits the Report as the attachment to this letter. In addition, SCE is electronically mailing this letter and the report to the Service List of R.10-05-004 this date.

If you have any questions, please do not hesitate to contact me at (626) 302-0536.

Very truly yours,



Gary W. Barsley

ATTACHMENT

Before the Public Utilities Commission of the State of California

Southern California Edison Company

**Report on Feasibility of Using AMI Data To Make Solar
Production Data Available To California Solar Initiative
Participants**

July 16, 2012



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I. Introduction

In Decision (D.) 11-07-031, the California Public Utilities Commission (Commission) ordered the California Solar Initiative (CSI) Program Administrators (PAs) to report on the feasibility of using Advanced Metering Infrastructure (AMI) data to make solar production data available to CSI participants.¹ Specifically, Ordering Paragraph (OP) 7 of D.11-07-031 requires:

7. The California Solar Initiative (CSI) Program Administrators (namely Pacific Gas and Electric Company, Southern California Edison Company, and the California Center for Sustainable Energy) shall report within one year of this decision to Energy Division on the feasibility of using advanced metering infrastructure data to make solar production data available to CSI participants, and ensure a copy of this report is sent to the service list of this rulemaking.²

This report complies with the requirements of OP 7. For the purpose of this feasibility report, SCE interprets “solar production data” to be the total generation output of a customer’s solar generation system.

SCE has determined that, at this time, it is not feasible to use AMI or AMI data to make solar production data available to CSI participants. In addition to this Introduction section, this report includes four additional sections. Section 2 provides background information that is important to understand the rationale behind SCE’s determination that providing solar production data using AMI data is not currently feasible. Section 3 details the key factors that make the use of AMI data to provide solar production data not feasible. Section 4 describes SCE’s current capabilities for providing solar data to customers. Section 5 presents SCE’s conclusion.

¹ D.11-07-031, *mimeo*, at p. 34 and Ordering Paragraph 7.

² D.11-07-031, *mimeo*, at p. 66.

II. Pertinent Background

In D.11-07-031, the Commission expressed an interest in determining the feasibility of whether AMI systems can be used to make solar production data available to CSI participants. This interest arose because many CSI applicants for the Expected Performance Based Buydown (EPBB) incentive track had been invoking the exemption to the performance monitoring and reporting services (PMRS) requirement.³ This section describes important aspects of the CSI program and its metering and performance monitoring requirements. It also provides information about SCE's net energy metering (NEM) and Edison SmartConnect® (SmartConnect) programs, which are important factors in SCE's current inability to use AMI to measure customer solar generation and SCE's current capabilities in presenting net solar data to customers.

A. Regulatory Background on CSI Program

1. CSI Program

In D.06-08-028 and D.06-12-033, the Commission implemented the CSI Program to provide incentives⁴ for solar system installations to the customers of California's three investor-owned utilities: Pacific Gas & Electric, San Diego Gas & Electric, and SCE. SCE is the PA for the CSI Program in its service territory. The detailed requirements for customer participation and program administration are included in the CSI Program Handbook.

The CSI program offers eligible customers two different incentive participation tracks – Performance Based Incentive (PBI) and EPBB. The PBI incentive

³ The Commission has removed the cost-cap exemption previously adopted in D.06-08-028, in order to improve collection of CSI production data as explained later in this report. Now all EPBB systems over 10 kW, except those funded through the Multifamily Affordable Solar Housing or Single-family Affordable Solar Housing programs, take PMRS service at the applicants own cost, and must report 15-minute interval kWh production data to the PAs on a quarterly basis for five years. D.11-07-031, Conclusion of Law 13, p 63.

⁴ The CSI Program provides upfront incentives for solar systems installed on existing residential homes, as well as existing and new commercial, industrial, government, non-profit, and agricultural properties

is a flat cents-per-kWh payment for all output from a solar energy system over its initial five years of operation.⁵ The EPBB incentives are paid based on verified solar energy system characteristics such as location, system size, shading, and orientation.⁶

2. Metering and Performance Monitoring Requirements

The CSI Program Handbook identifies certain metering and performance monitoring requirements for each type of CSI incentive. These requirements allow the PAs to monitor the performance of systems receiving CSI incentives and to perform program evaluations required by Senate Bill (SB) 1 and D.06-12-033.⁷

As outlined in the CSI Program Handbook, accurate energy production meters are required for all projects that receive CSI incentives.⁸ Specifically, systems receiving an EPBB incentive require “a basic meter with accuracy of ± 5 percent” and PBI systems require “an interval data meter (or equivalent Metering System) with a combined accuracy of ± 2 percent or better, taking into consideration current and transformer accuracy, potential transformer accuracy, and computational errors.”⁹

Customers participating within the PBI incentive track are required to use PMRS and a performance data provider (PDP) as a condition of eligibility. Monthly incentive payments are based on gross solar production data. This provides the PAs with the PBI participating customers’ gross solar production data at fifteen-minute intervals.

CSI customers with systems greater than 10 kW participating within the EPBB incentive track are only required to use PMRS. The PMRS provider

⁵ CSI Program Handbook, p. 4.

⁶ *Id.*

⁷ SB 1 and D.06-12-033 require the PAs, in consultation with the Commission, to track and monitor the success of the CSI Program in relation to the number of installed residential and commercial solar projects and their corresponding committed or paid incentive amount, electrical generating capacity, and installation costs to allow for the submission of evaluations on a yearly, bi-annually, and quarterly basis.

⁸ CSI Program Handbook, p. 32.

⁹ *Id.*

must remotely acquire and process gross solar production data at fifteen-minute intervals. The meter for the EPBB track does not need to be a separate interval data recording meter and can be internal to inverters. Customers with systems less than or equal to 10 kW participating within the EPBB incentive track are not required to use PMRS or PDP.

3. Removal of Cost-Cap Exemption Criteria

Prior to the issuance of D.11-07-031, the Commission required PMRS for all CSI systems, but allowed EPBB systems to apply for a “cost-cap exemption” if the cost of PMRS exceeded one percent of total system cost.¹⁰ In the *Staff Proposal for Program Modifications to the California Solar Initiative (CSI) Program (Staff Proposal)*¹¹, the Energy Division noted that most EPBB systems under 15 kW applied for the cost-cap exemption and did not include PMRS.¹² Thus, in D.11-07-031, the Commission removed the cost-cap exemption and required all EPBB systems over 10 kW¹³ to take PMRS service and to report 15-minute interval kWh production data on a quarterly basis for five years.¹⁴

The removal of the cost-cap exemption mitigates the Commission’s concern regarding the limited amount of data being provided by systems that were exempt from PMRS. However, removal of the cost-cap exemption did not alleviate cost considerations for PMRS that the CSI program participant must still bear. As a potential solution to this barrier, the Commission ordered the examination of providing solar production data through AMI as a potential option for solar systems where costs to customers create barriers to participation.

¹⁰ D.11-07-031, p. 32.

¹¹ The Staff Proposal was attached as Attachment A to the *Administrative Law Judge’s Ruling Setting Prehearing Conference and Requesting Prehearing Conference Statements on Staff Proposal For California Solar Initiative Program Modifications*, dated July 26, 1910.

¹² ALJ’s Ruling Setting Prehearing Conference and Requesting Prehearing Conference Statements on Staff Proposal For CSI Program Modifications (Attachment A), p. 28.

¹³ The Commission opted to use 10kW as the limit because it the common dividing line between large and small commercial solar systems.

¹⁴ D.11-07-031, p. 34.

B. Background on Net Energy Metering

SCE customers who produce their own power can participate in the NEM option. SCE's NEM rate schedule allows that any solar customer who is a "net" energy producer may receive a credit for any surplus electricity supplied to SCE's grid over the course of 12 months. The solar customer may receive the Net Surplus Compensation as a check or as a credit to the customer's bill to offset all or part of the costs associated with the energy consumed. Under this billing option, any customer who is a "net" energy consumer is billed once a year for the "net" energy consumed over the previous 12 months. Customers are also billed monthly for nominal costs associated with account administrative fees.

With a non-NEM account, a meter measures the amount of kWh of electricity consumed from SCE. With an NEM account, the meter measures the amount of kWh consumed from SCE and the excess energy being generated by the customer's solar generation system beyond what the customer consumes. When the customer generates more electricity than the customer consumes from SCE, the net surplus energy flows into SCE's electric grid.

C. Background on Edison SmartConnect®

SmartConnect is SCE's AMI solution for residential and non-residential customers with demands below 200 kW. The SmartConnect digital meters and two-way communications system enable customers to better understand their energy consumption and more effectively manage their electricity use, thus helping them save energy and better manage their overall energy bill. SmartConnect meters are also equipped to support a home area network (HAN) on the customer's premises. The HAN enables the meter to provide information into the home and to communicate with HAN-enabled devices (such

as smart thermostats and in-home displays) through a Zigbee¹⁵ two-way wireless interface.

III. Feasibility of Using AMI

In developing this report, SCE identified several factors, such as SCE's overall AMI deployment, that make it infeasible to provide such a capability at this time. Moreover, the system modifications necessary to generate solar production data from AMI are not available and would be costly and would require a long time to develop and implement.

A. Edison SmartConnect Deployment Schedule

In 2009, SCE began its SmartConnect meter deployment, which will be complete by the end of 2012. As the meters are deployed in a district, a period of approximately five months passes before the meters are "cut over to operations" in that particular district and customers are able to use the full functionality of the AMI. As of June 2012, SCE had deployed more than 4.4 million smart meters. Of this 4.4 million meters deployed, approximately 3.2 million meters have been cut over to operations. Thus, approximately 1.8 million of SCE's customers do not yet have the full AMI functionality and would be unable to take advantage of any potential AMI capability to measure solar generation data.

B. Availability of HAN-Capable Submeters For Measuring Solar Output

One potential scenario that would enable AMI systems to facilitate the presentment of solar generation data for CSI participants is the use of a national standards-based, Zigbee-enabled submeter that could communicate the total generation of the solar system to SCE's SmartConnect meter through the HAN. Such a submeter arrangement could be built into the solar inverter or be attached to the inverter. At this

¹⁵ Zigbee is a standards-based, low-cost, low-power wireless technology. The Zigbee Smart Energy standard governs interoperability among products that monitor, control, inform, and automate energy delivery and use.

time, Zigbee-enabled submeters that operate with a solar generation system are not commonly available. Additionally, a submetering protocol needs to be established with the necessary rules, roles, and responsibilities for collecting, gathering, and presenting the solar output data from the submeter.

C. Costly and Extensive System Upgrades to Enable Submetering

Even if it were feasible at this time for a national standards-based submeter to connect to SCE's SmartConnect meter via the HAN, SCE would need to analyze the size and volume of solar generation data and determine whether the SmartConnect meters can store the data and whether meter firmware upgrades would be necessary to enable storage. Additionally, SCE's back-office systems, such as the Meter Data Management System, Customer Service System (CSS), SmartConnect Data Warehouse, SCE.com, and others, would require extensive analysis and potentially costly system enhancements to be able to store, process, and present the data to the customer. Finally, business processes to support the measurement, processing, and communication of solar generation data for CSI participants would need to be developed. SCE has not planned for these meter, system, or business process changes and they would require major analysis, design, and scope changes as well as be very costly and require a large amount of time to develop and implement.

D. Accuracy of Solar Generation Meters

The CSI Program Handbook requires EPBB systems to have meters with accuracy of ± 5 percent and PBI systems to have meters with accuracy of ± 2 percent. SCE's SmartConnect meters report usage at $\pm 0.5\%$ accuracy. Presenting net usage data to CSI participants at different accuracy tolerances than their total solar generation will cause customer confusion, particularly if a customer attempts to calculate their total consumption (total of consumption from both SCE and the customer's solar system).

IV. SCE's Current Capabilities Provide Net Solar Data to CSI Participants

SCE does not meter the customer's total solar generation output and has not identified a workable proxy. Through its NEM process, SCE can provide CSI participants and other NEM customers with usable information about the performance and net energy production of their onsite generation systems. SCE's NEM customers can effectively obtain net energy information in one of three ways: cumulative net generation directly from the meter, monthly net billing data on the SCE bill, and previous day net usage online via MyAccount.

A. Information Provided at Meter

The SmartConnect meter has the capability to display NEM information. A SmartConnect meter that has been cut over to operations cycles through four screen displays; each screen stays visible for approximately five seconds. The first screen displays the customer's total energy consumed from SCE, and can be identified by the number "001" in the upper left-hand corner. The fourth screen is unique to NEM customers and displays the customer's excess energy generation, or the energy sent from the customer into SCE's grid. This fourth screen can be identified by the number "071" in the upper left-hand corner. These readouts ("001" and "071") are similar to a balance sheet. The sum of the readouts on each screen depends on how much energy is consumed versus how much is generated. For example, if a customer's usage averages 20 kilowatt hours consumed in a day versus 15 kilowatt hours generated during that same day, the readout would show 5 kilowatt hours consumed (readout "001") and 0 kilowatt hours generated into the grid (readout "071") for that day (in other words, the customer used all of the energy generated by their solar system and did not deliver any surplus energy into the grid).

B. Information Provided on SCE Bill

In addition to displaying pertinent NEM data on the meter, SmartConnect enables billing for NEM customers by communicating the information collected at the meter to SCE's back-office systems. NEM customers are billed monthly and annually. The monthly bill includes each month's non-energy charges, such as utility taxes and city and county fees, which are due and payable each month. The monthly bill also includes that month's energy usage charges, which are not required to be paid each month. Specifically, the monthly bill provides the following information regarding energy charges (in \$):

- *“Previous month tracked energy charge total”*: the total amount of energy the customer has been charged from all previous months since their relevant period began
- *“Current month tracked energy charge total”*: total energy charges for the current billing month
- *“Cumulative tracked energy charges year to date”*: total of all energy charges, including current month, since relevant period began

On an annual basis, NEM customers are billed for their energy usage charges for the entire 12-month relevant period. At the end of the relevant period, any net surplus compensation is either applied to the account or sent to the customer in the form of a check, depending on the customer's choice. Any positive balance is the total amount due, as shown on the annual energy bill.

C. Information Provided on MyAccount

All customers with smart meters, including NEM customers, can view their previous day's energy usage information online the next day. When an NEM customer signs in to MyAccount on SCE.com, the customer has access to their net energy usage on an hour-by-hour basis. In other words, the customer will be able to view the net

energy that was consumed as well as the net energy generated for each of the previous 24 hours.

V. Conclusion

SCE appreciates the Commission's desire to use AMI systems to provide CSI participants with data regarding the total output of their solar generation system. Such information is useful for customers, as well as the CSI PAs and Commission, to monitor system performance and compliance with the CSI Program Handbook. However, at this time, it is not feasible for SCE to provide solar generation system production data via its SmartConnect AMI system. The SmartConnect meters are only designed and installed to measure the flow of electricity between the customer's premises and the electric grid. The meters cannot directly measure the energy produced by the solar system and used by the customer. At some time in the future, it may become feasible for an AMI system to collect solar generation production data from a submeter and communicate that information to the customer, but that option is not feasible today due to several constraints discussed in this report.