

PUBLIC UTILITIES COMMISSION

505 VAN NESS AVENUE



February 19, 2021

**Advice Letter 5832-E; 5832-E-A**

Erik Jacobson  
Director, Regulatory Relations  
Pacific Gas and Electric Company  
77 Beale Street, Mail Code B10C  
P.O. Box 770000  
San Francisco, CA 94177

**SUBJECT: Proposed Reporting Methodology to Monitor the Frequency and Amount of Voltage Excursion Events Pursuant to Resolutions E-4898 and E-5016.**

Dear Mr. Jacobson:

Advice Letter 5832-E; 5832-E-A is effective as of February 10, 2021.

Sincerely,

A handwritten signature in cursive script that reads "Edward Randolph".

Edward Randolph  
Deputy Executive Director for Energy and Climate Policy/  
Director, Energy Division

February 10, 2021

**Advice 5832-E-A**

(Pacific Gas and Electric Company ID U 39 E)

Public Utilities Commission of the State of California

**Subject: Supplemental: Proposed Reporting Methodology to Monitor the Frequency and Amount of Voltage Excursion Events Pursuant to Resolutions E-4898 and E-5016**

**Purpose**

Pacific Gas and Electric Company (PG&E) hereby submits this supplemental Tier 2 Advice Letter (“AL”) pursuant to E-4898<sup>1</sup> and E-5016<sup>2</sup>. This supplemental advice letter replaces AL 5832-E<sup>3</sup> in part and is intended to address the issues raised in the protests to AL 5832-E with a new eight-step process that reflects the consensus achieved among the IOUs and IREC<sup>4</sup>.

**Background**

The California Public Utilities Commission (CPUC or Commission) initiated Rulemaking (R.) 11-09-011 on September 22, 2011 to review and, if necessary, revise the rules and regulations governing the interconnection of generation and storage facilities to the electric distribution systems of the investor-owned utilities (IOUs).<sup>5</sup> The IOUs’ rules and regulations pertaining to the interconnection of generating facilities are set forth in the Electric Rule 21 Tariff.

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<sup>1</sup> Resolution [E-4898](#). *Approval, with Modifications, of Request for Modifications to Electric Rule 21 Tariff to Incorporate Smart Inverter Phase 3 Advanced Functions in Compliance with Decision 16-06-052* - dated April 26, 2018.

<sup>2</sup> Resolution E-5016

<sup>3</sup> [AL 5832-E](#) *Proposed Reporting Methodology to Monitor the Frequency and Amount of Voltage Excursion Events Pursuant to Resolutions E-4898 and E-5016* - submitted May 21, 2020

<sup>4</sup> IREC - Interstate Renewable Energy Council, the protesting party.

<sup>5</sup> IOUs or the investor-owned utilities, i.e., Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas & Electric (SDG&E).

In early 2013, the Smart Inverter Working Group (SIWG) was formed by parties of R.11-09-011 to develop proposals to take advantage of the new, rapidly advancing technical capabilities of inverters. In March 2016, the SIWG completed its first set of recommendations for the Phase 3 advanced functions.<sup>6,7</sup>

Among the key Phase 3 advanced functions of relevance to this advice letter function 6, the Volt Watt Mode. In E-4898<sup>8</sup> it is described as:

*“As a general rule, the production of active power raises voltage. This relationship can be problematic when solar photovoltaic (PV) systems interconnect in large numbers on distribution circuits where utilities have not planned for voltage rise and where existing distribution equipment cannot lower voltage. Volt Watt Mode modifies active power from DERs based on predetermined voltage ranges to prevent the local voltage on the distribution circuit from rising/dropping outside of allowable levels. Voltage regulators are a common mitigation measure used on circuits with and without PV to ensure that voltage stays within acceptable levels all the way to the end of the circuit. As PV injects power to the grid at various points along a circuit, the complex interaction of ever-changing load and generation conditions can cause imbalances in voltage levels. **These voltage excursions can be mitigated by the smart inverter’s Volt Watt Mode raising or lowering voltage but that change in voltage reduces the amount of real power that is exported.**”* (Emphasis added)

On June 23, 2016, the Commission adopted Decision (D.) 16-06-052<sup>9</sup>, which directed the IOUs to submit ALs proposing revisions to Rule 21 setting forth any agreed-upon technical requirements, testing and certification processes, and effective dates for Phase 3 functions. On November 17, 2016, the Energy Division hosted a public workshop with the purpose of providing guidance to the IOUs on the Advice Letter submittals.

On December 20, 2016, the IOUs jointly submitted Tier 1 AL 4983-E<sup>10</sup> that provided a work plan and an outline of next steps for tariff development including a status update on the activities outlined in the work plan by March 30, 2017.

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<sup>6</sup> SIWG Phase 3 DER Functions: Recommendations to the CPUC for Rule 21, Phase 3 Function Key Requirements, and Additional Discussion Issues, Issued March 31, 2017

<sup>7</sup> The SIWG’s Phase 1 and Phase 2 recommendations were incorporated into Rule 21 in April 2015 and April 2017.

<sup>8</sup> E-4898, page 4.

<sup>9</sup> [D. 16-06-052](#) *Alternate Decision Instituting Cost Certainty, Granting Joint Motions To Approve Proposed Revisions To Electric Tariff Rule 21, And Providing Smart Inverter Development A Pathway Forward For Pacific Gas And Electric Company, Southern California Edison Company, And San Diego Gas & Electric Company-* Issued July 1, 2016.

<sup>10</sup> [AL 4983-E](#) *Information-Only Advice Letter Joint Investor-Owned Utilities Status Report and Supporting Action Plan for the Development of Advanced Inverter Functions for Smart Inverters (Phase 3)*, submitted December 20, 2016, approved January 26, 2017, and made effective January 19, 2017.

On March 31, 2017, the SIWG submitted final revisions to the Phase 3 recommendations. In addition, the IOUs filed the required status update on March 30, 2017. In accordance with the work plan, the IOUs each anticipated submitting a Tier 3 Advice Letter in June 2017.

On June 27, 2017, the IOUs were granted a requested to extend the submittal date of the Tier 3 Advice Letters to August 18, 2017. On August 18, 2017, PG&E submitted AL 5129-E<sup>11</sup> to comply with D.16-06-052 proposing Rule 21 tariff revisions.

Following the submission of AL 5129-E, the Energy Division held a public workshop to discuss and, if possible, resolve issues raised in protests to the Advice Letters.

On April 27, 2018 the CPUC issued Resolution E-4898 - Approval, with Modifications, of Request for Modifications to Electric Rule 21 Tariff to Incorporate Smart Inverter Phase 3 Advanced Functions in Compliance with Decision 16-06-052. Among other things, OP 1 stated that PG&E 5129-E Advice Letter is approved as modified herein.

However, E-4898 OP 5 also required:

*“Pacific Gas and Electric, Southern California Edison, and San Diego Gas & Electric shall work with stakeholders to develop standardized reporting methodologies to monitor the frequency and amount of voltage excursions and, in consultation with the Commission’s Energy Division, shall each file a Tier 1 Advice Letter on the proposed methodologies by October 1, 2018.”* [Emphasis added]

In its Discussion<sup>12</sup> about this requirement it noted<sup>13</sup>

*“...The activation of the Volt Watt Mode function and the utility voltage resolution process serve to both fix voltage issues as they arise and determine the appropriate responsibility for resolving the voltage issues. Thus, the activation of Volt Watt Mode is warranted and valuable.*

*In order to monitor that the IOUs are satisfying their Rule 2 obligations, we order the IOUs to monitor the frequency and amount of voltage excursions, in particular on circuits where smart inverters are being utilized that have the Volt Watt Mode function activated, and present findings to the Commission. The IOUs shall coordinate with the Smart Inverter Working Group to develop appropriate reporting methodologies to estimate the impact of activating Function 6 and to allow the Commission to examine and enforce utility compliance with Rule 2. We encourage stakeholders to provide*

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<sup>11</sup> [AL 5129-E](#) - Modifications to PG&E’s Electric Rule 21 Tariff and Interconnection Agreements and Forms to Incorporate Smart Inverter Phase 3 Modifications – submitted August 18, 2018, and approved May 8, 2018 effective April 25, 2018, per E-4898.

<sup>12</sup> Sub-issue: Impact of Activation of Function 6 starting on Page 30 of E-4898

<sup>13</sup> Ibid, Page 32

*their own data as well to compare with the IOU data and better inform the Commission. We order Commission Staff to monitor IOU compliance with Rule 2 and IOU response to DER or non-DER customer complaints about Rule 2 voltage violations. We expect smart inverter communication functions to facilitate the gathering and analysis of this data. After working with the SIWG, the IOUs shall file Advice Letters with proposed reporting methodologies via Tier 1 Advice Letter by October 1, 2018. The Advice Letter will include the data that will be provided and the source of the data that will be provided in the reporting. The IOUs shall also consider whether it is appropriate to report on customer-sourced data in the Advice Letters. [Emphasis added]*

*To provide in-depth monitoring when activation of Function 6 begins, the IOUs shall file quarterly reports via Tier 1 Advice Letter utilizing the approved reporting methodologies on voltage excursions for one full calendar year, i.e. four reports, starting three months after the mandatory activation of Function 6. Following this year, the IOUs shall file annual reports on voltage excursions via Tier 1 Advice Letter with a file date based on the anniversary of the activation of Function 6. No sooner than five years after the activation of Function 6, the IOUs may file proposals via Tier 2 Advice Letter on whether to continue or modify the reporting requirement.*

...

AL 5395-E<sup>14</sup> was submitted to respond to this requirement to develop standardized reporting methodologies to monitor the frequency and amount of voltage excursions, pursuant to E-4898 OP5 and included a Proposal For A Standardized Reporting Methodologies To Monitor The Frequency And Amount Of Voltage Excursions

On December 26, 2019, AL 5395-E was rejected per Resolution E-5016<sup>15</sup> Ordering Paragraph (OP) 1. E-5016 went on to require:

OP 2 ordered the IOUs “**to hold at least two meetings with the Smart Inverter Working Group. Meetings are to commence within 45 days of issuance of this Resolution. Items to discuss include, but are not limited to:**

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<sup>14</sup> [AL 5395-E](#) - *Proposal For Standardized Reporting Methodologies To Monitor The Frequency And Amount Of Voltage Excursions, Pursuant to Resolution E-4898* – submitted October 1, 2018.

<sup>15</sup> Resolution [E-5016](#) *Rejecting Pacific Gas and Electric Company’s, Southern California Edison Company’s, and San Diego Gas & Electric Company’s Proposal for Standardized Reporting Methodologies to Monitor the Frequency and Amount of Voltage Excursions.*- issued December 23, 2019.

- i) If PVWatts or other modeling PV tool/profile is best suited;*
- ii) Alternate proposed methodologies (large IOUs, IREC, NREL or others); and*
- iii) What AMI data and capabilities are available to determine PV power curtailment, more specificity on the amount of data that would need to be processed under different monitoring approaches, and the feasibility and costs involved in using alarms and/or alerts in lieu of widespread data processing.*

And OP 3 ordered the IOUs “to re-submit Tier 1 Advice Letters, within 150 days, after issuance of this Resolution and after meeting with the Smart Inverter Working Group. The Advice Letters should contain all material discussed in the Discussion section of this Resolution and shall meet all the requirements of Resolution E-4898.”

Subsequently on May 21, 2020, in compliance with E-5016, PG&E submitted AL 5832-E with its proposed methodology for monitoring the frequency and amount of voltage excursion events pursuant to Resolutions E-4898 and E-5016.

Based on the consensus in the SIWG, the IOUs proposed an eight-step process that would rely on the established customer voltage complaints process to trigger collecting voltage and other data needed to estimate PV production curtailment in accordance with Resolution E-5016.

As stated in AL 5832-E, stakeholders did not raise objections to the majority of the eight steps. One stakeholder stated that additional internal review was required on certain items; however, no additional feedback was provided following the conclusion of the SIWG discussions and follow-up email/phone communications. Another stakeholder commented against applying parameters to the duration of events to be included in the report.

The IOUs with the SIWG discussed that step 2.c of the IOUs proposal to exclude events below a certain minimum duration aligns with acceptable operational parameters contained in Rule 2, i.e., Rule 2 allows for limited voltage excursions beyond American National Standards Institute (ANSI) Range A (i.e., normal conditions) that may result from some temporary grid configurations or equipment problems<sup>16</sup>. Moreover, Resolution E-4898 recognized that some limited voltage excursion can occur without violating Rule 2: “*If the activation of Function 6 is harmful to a particular system owner, it will only be because the voltage levels on the circuit are regularly outside acceptable Rule 2 limits*” (emphasis added)<sup>17</sup>.

On June 10, 2020, IREC protested SDG&E’s AL 3546-E, PG&E’s AL 5832-E, and SCE’s AL 4217-E.

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<sup>16</sup> PG&E Rule 2 Section C.1d.5 sheet 5

<sup>17</sup> E-4898, p27

This supplemental advice letter addresses the issues raised in the protests below. In its protest, IREC asserts that step 2.c should be removed from the proposed methodologies. Step 2 of the process provides:

*The IOUs will provide curtailment calculations for volt/watt enabled customers in the voltage complaint process with voltage readings over 106% of nominal voltage with the following characteristics:*

- a. Include calculations for all utility-caused, customer-reported issues per reporting period.*
- b. Report on up to 20 of the first customer-caused and reported issues on an annual basis.*
- c. ~~When the event duration is less than 48 hours, it will be considered a limited anomaly and will not be reported.~~ Up to two overvoltage events per year, each of a duration less than 48 hours and correlated with a known, corrected utility equipment failure or abnormal grid configurations/operations, will be considered a limited anomaly and will not be reported.*

On June 17, 2020, the IOUs each replied to IREC’s protest. The IOUs subsequently collaborated with IREC to resolve the protest issues and refine the proposed eight-step process for monitoring the frequency and amount of voltage excursion events.

With this supplement to its original AL 5832-E, PG&E proposes updates to the eight-step process to reflect the consensus achieved among the IOUs and IREC.

**Proposal - Eight-Step Voltage Complaint and Estimation Process**

<b>Step</b>	<b>Activity</b>
1	The IOU voltage complaint process will be the basis for voltage reporting to satisfy CPUC requirements.
2	The IOUs will provide curtailment calculations for Volt-Watt-enabled customers in the voltage complaint process with voltage readings over 106% of nominal voltage with the following characteristics:
	a) Include calculations for all utility-caused, customer-reported issues per reporting period
	b) Report on up to 20 of the first customer-caused and -reported issues annually
	c) Up to two overvoltage events per customer per year, each of a duration less than 48 hours and correlated with a known, corrected utility equipment failure or abnormal grid configurations/operations, will be considered a limited anomaly and will not be reported <sup>18</sup>

<sup>18</sup> Initial reporting periods are quarterly for one year and then yearly. During the reporting period, the previous one year of a customer’s data will be reviewed. The two longest-duration events less than 48 hours per customer will be excluded.

3	<p>IOUs will use NREL Method 1 process, using currently available AMI data, to calculate estimated curtailment utilizing the following processes for estimation calculation:</p> <p>a) Voltage intervals of 1-hour for residential or 15-minute for commercial, as available</p> <p>b) Average voltage readings utilized over the voltage interval for SDG&amp;E and SCE and instantaneous voltage readings for PG&amp;E, based on existing capabilities</p> <p>c) NREL Method 1 is only being approved for generalized/anonymous reporting but not for potential individual customer claims</p> <p>d) For three-phase service points, the average voltage per phase will be used for curtailment estimation</p> <p>e) Any missing or removed data due to data quality will be removed from numerator and denominator of % curtailment calculations</p>
4	Report will provide yearly % energy loss calculation using the previous 12 months of the available voltage data per customer <sup>19</sup>
5	Report will provide 1 month % energy loss calculations using the previous 30 days of data as available per customer
6	Report will provide the utility mitigation used in the voltage complaint process or indicate if the reported complaint was a customer-caused issue
7	<p>Report will summarize the customer curtailment studies by the number of customers with curtailment estimates in the following buckets:</p> <p>a) <math>\leq 2\%</math>,</p> <p>b) <math>2\% \leq 4\%</math>,</p> <p>c) <math>&gt;4\%</math></p>
8	Provide voltage histogram for % of total hours in Volt-Watt curtailment range ( $>106\%$ ) for the worst-case customer with energy loss $>5\%$ .

### **Protests**

Pursuant to CPUC General Order 96-B, Section 7.5.1, PG&E hereby requests the protest period be waived.

<sup>19</sup> Will use available data within these date ranges from data stored in centralized AMI databases (PG&E/SCE) or the limit of meter memory (SDG&E). The yearly and 30-day reports are triggered when the voltage complaint is received. The report will present the data in two groupings. The first group will include all the data for events identified in Step 2 (*i.e.*, will exclude only the two overvoltage events permitted to be excluded pursuant to Step 2(c)). The second group includes the same data as the first group but excludes all events that are due to abnormal grid configurations and operations.

**Effective Date**

Pursuant to E-5016 OP 3, this advice letter is submitted with a Tier 1 designation. PG&E requests that this Tier 1 advice submittal become effective upon date of submittal, which is February 10, 2021.

**Notice**

In accordance with General Order 96-B, Section IV, a copy of this advice letter is being sent electronically and via U.S. mail to parties shown on the attached list and the parties on the service list for Rulemaking (R.)17-07-007 (Rule .21), and R. 14-07-002 (NEM Successor). Address changes to the General Order 96-B service list should be directed to PG&E at email address PGETariffs@pge.com. For changes to any other service list, please contact the Commission's Process Office at (415) 703-2021 or at Process\_Office@cpuc.ca.gov. Send all electronic approvals to PGETariffs@pge.com. Advice letter submittals can also be accessed electronically at: <http://www.pge.com/tariffs/>.

/s/

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Erik Jacobson  
Director, Regulatory Relations

cc: Service List R.17-07-007  
Service List R.14-07-002



# ADVICE LETTER SUMMARY

## ENERGY UTILITY



MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No.: Pacific Gas and Electric Company (ID U39E)

Utility type:

- ELC       GAS       WATER  
 PLC       HEAT

Contact Person: Kimberly Loo

Phone #: (415)973-4587

E-mail: PGETariffs@pge.com

E-mail Disposition Notice to: KELM@pge.com

EXPLANATION OF UTILITY TYPE

ELC = Electric      GAS = Gas      WATER = Water  
 PLC = Pipeline      HEAT = Heat

(Date Submitted / Received Stamp by CPUC)

Advice Letter (AL) #: 5832-E-A

Tier Designation: 1

Subject of AL: Supplemental: Proposed Reporting Methodology to Monitor the Frequency and Amount of Voltage Excursion Events Pursuant to Resolutions E-4898 and E-5016

Keywords (choose from CPUC listing): Compliance

AL Type:  Monthly  Quarterly  Annual  One-Time  Other:

If AL submitted in compliance with a Commission order, indicate relevant Decision/Resolution #: Res. E-4898 and E-5016

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL: No

Summarize differences between the AL and the prior withdrawn or rejected AL:

Confidential treatment requested?  Yes  No

If yes, specification of confidential information:

Confidential information will be made available to appropriate parties who execute a nondisclosure agreement. Name and contact information to request nondisclosure agreement/ access to confidential information:

Resolution required?  Yes  No

Requested effective date: 2/10/21

No. of tariff sheets: 0

Estimated system annual revenue effect (%): N/A

Estimated system average rate effect (%): N/A

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected: N/A

Service affected and changes proposed<sup>1</sup>: N/A

Pending advice letters that revise the same tariff sheets: N/A

<sup>1</sup>Discuss in AL if more space is needed.

**Protests and all other correspondence regarding this AL are due no later than 20 days after the date of this submittal, unless otherwise authorized by the Commission, and shall be sent to:**

CPUC, Energy Division  
Attention: Tariff Unit  
505 Van Ness Avenue  
San Francisco, CA 94102  
Email: [EDTariffUnit@cpuc.ca.gov](mailto:EDTariffUnit@cpuc.ca.gov)

Name: Erik Jacobson, c/o Megan Lawson  
Title: Director, Regulatory Relations  
Utility Name: Pacific Gas and Electric Company  
Address: 77 Beale Street, Mail Code B13U  
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State: California Zip: 94177  
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Facsimile (xxx) xxx-xxxx: (415)973-3582  
Email: PGETariffs@pge.com

Name:  
Title:  
Utility Name:  
Address:  
City:  
State: District of Columbia Zip:  
Telephone (xxx) xxx-xxxx:  
Facsimile (xxx) xxx-xxxx:  
Email:

**PG&E Gas and Electric  
Advice Submittal List  
General Order 96-B, Section IV**

AT&T  
Albion Power Company

Alta Power Group, LLC  
Anderson & Poole

Atlas ReFuel  
BART

Barkovich & Yap, Inc.  
California Cotton Ginners & Growers Assn  
California Energy Commission

California Hub for Energy Efficiency  
Financing

California Alternative Energy and  
Advanced Transportation Financing  
Authority  
California Public Utilities Commission  
Calpine

Cameron-Daniel, P.C.  
Casner, Steve  
Cenergy Power  
Center for Biological Diversity

Chevron Pipeline and Power  
City of Palo Alto

City of San Jose  
Clean Power Research  
Coast Economic Consulting  
Commercial Energy  
Crossborder Energy  
Crown Road Energy, LLC  
Davis Wright Tremaine LLP  
Day Carter Murphy

Dept of General Services  
Don Pickett & Associates, Inc.  
Douglass & Liddell

East Bay Community Energy Ellison  
Schneider & Harris LLP Energy  
Management Service  
Engineers and Scientists of California

GenOn Energy, Inc.  
Goodin, MacBride, Squeri, Schlotz &  
Ritchie

Green Power Institute  
Hanna & Morton  
ICF

IGS Energy  
International Power Technology  
Intestate Gas Services, Inc.  
Kelly Group  
Ken Bohn Consulting  
Keyes & Fox LLP  
Leviton Manufacturing Co., Inc.

Los Angeles County Integrated  
Waste Management Task Force  
MRW & Associates  
Manatt Phelps Phillips  
Marin Energy Authority  
McKenzie & Associates

Modesto Irrigation District  
NLine Energy, Inc.  
NRG Solar

Office of Ratepayer Advocates  
OnGrid Solar  
Pacific Gas and Electric Company  
Peninsula Clean Energy

Pioneer Community Energy

Redwood Coast Energy Authority  
Regulatory & Cogeneration Service, Inc.  
SCD Energy Solutions  
San Diego Gas & Electric Company

SPURR  
San Francisco Water Power and Sewer  
Sempra Utilities

Sierra Telephone Company, Inc.  
Southern California Edison Company  
Southern California Gas Company  
Spark Energy  
Sun Light & Power  
Sunshine Design  
Tecogen, Inc.  
TerraVerde Renewable Partners  
Tiger Natural Gas, Inc.

TransCanada  
Utility Cost Management  
Utility Power Solutions  
Water and Energy Consulting Wellhead  
Electric Company  
Western Manufactured Housing  
Communities Association (WMA)  
Yep Energy