

PUBLIC UTILITIES COMMISSION

505 VAN NESS AVENUE



December 14, 2021

Advice Letter 6093-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: Supplemental: Modifications to Electric Rule 21 Pursuant to Resolution E-5000 Ordering Paragraphs 6, 7, and 8 for IEEE 1547.1 Standards — Supplemental advice letter replaces AL 6093-E in its entirety.

Dear Mr. Jacobson:

Advice Letter 6093-E-A is effective as of November 22, 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

November 19, 2021

Advice 6093-E-A

(Pacific Gas and Electric Company ID U 39 E)

Public Utilities Commission of the State of California

Subject: Supplemental: Modifications to Electric Rule 21 Pursuant to Resolution E-5000 Ordering Paragraphs 6, 7, and 8 for IEEE 1547.1 Standards

I. Purpose

Pacific Gas and Electric Company (PG&E) submits this Tier 2 supplemental Advice Letter (AL) to update and extend the attestation submittal timeframe referenced in PG&E AL 6093-E,¹ in the section labeled the “Proposing the New Testing Regime – Phase 3 Function 1 – Monitor Key Data.” This revision incorporates the Institute of Electrical and Electronic Engineers (IEEE) 1547.1 test procedures into the testing regime for Phase 2 and 3 requirements as established by Resolution E-5000 and modified in Resolution E-5036.² PG&E will accept manufacturer attestations as sufficient evidence of compliance with the Phase 3 Function 1 (Monitor Key Data) until March 28, 2023. The key change in this supplemental is that the attestation timeframe has been modified from **November 21, 2021**, to **March 28, 2023**, due to the Underwriters Laboratory (UL) clarification to the IEEE 1547.1 testing standard being published on September 28, 2021.

The approved IEEE testing procedures or regime for Phase 2 and 3 requirements as established by Resolution E-5000 and modified in Resolution E-5036 will be clarified in a future advice letter, which will include provisions for allowing a dual path where existing Section Hh will be utilized for available existing technologies and will also include a provision within Rule 21 to allow technology that complies with requirements under UL1741SB. This provision will allow the industry to adapt to new requirements as requested by stakeholders in the October 28, 2021 Smart Inverter Working Group (SIWG). As such, this supplemental advice letter replaces AL 6093-E in its entirety, extends only the attestation timeframe herein, and defers the proposed tariffs and

¹ PG&E Advice Letter [6093-E](#) – *Modifications to Electric Rule 21 Pursuant to Resolution E-5000 Ordering Paragraphs 6, 7, and 8 for IEEE 1547.1 Standards*, submitted on February 22, 2021.

² Resolution E-5000 was effective July 12, 2019. Resolution E-5036 was effective December 5, 2019.

discussion contained within AL 6093-E to be addressed in a future, stand-alone advice letter.³

II. Background

The Commission initiated Rulemaking (R.) 11-09-011⁴ 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 PG&E, San Diego Gas and Electric Company (SDG&E) and Southern California Edison Company (SCE), (collectively, the “Utilities”). The Utilities’ rules and regulations pertaining to the interconnection of generating facilities are set forth in each of the Utilities’ Commission-approved Electric Rule 21 Tariffs (Rule 21).

On June 23, 2016, the Commission adopted Decision (D.)16-06-052,⁵ which effectively established the Commission’s clear policy direction toward communications-capable smart inverters. The decision directed⁶ the Utilities to file proposed revisions to Rule 21 setting forth any agreed-upon technical requirements, testing and certification processes, and effective dates for the Phase 2 communications requirements and Phase 3 advanced functions. On December 20, 2016, PG&E submitted Advice Letter (AL) 4982-E⁷ establishing these requirements.

Resolution E-4832⁸ approved AL 4982-E with modifications and established a mandatory effective date for Phase 2 communications that was defined as: the later of (a) March 1, 2018, or (b) nine months after the release of the SunSpec Alliance communication protocol certification test standard or the release of another industry-recognized communication protocol certification test standard. Additionally, E-4832 in Ordering Paragraph (OP) 2 established the compliance deadlines for the Phase 2 communication requirements and for Phase 3 Functions 1 (Monitor Key Data) and 8 (Scheduling) as nine

³ The changes proposed herein are made in accordance with General Order (GO) 96-B, General Rule 7.5.1, which authorizes utilities to make additional changes to an advice letter through the submittal of a supplemental advice letter.

⁴ R. 11-09-011 - *Order Instituting Rulemaking on the Commission’s Own Motion to improve distribution level interconnection rules and regulations for certain classes of electric generators and electric storage resources.* – Filing Date September 22, 2011

⁵ [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* -Date of Issuance 7/1/2016

⁶ D. 16-06-052 OP 9 see p50

⁷ [AL 4982-E](#) - *Modifications to Electric Tariff Rule 21 to Incorporate Communication Requirements for Smart Inverters (Phase 2)* – submitted December 20, 2016

⁸ [E-4832](#) - *Resolution E-4832. Pacific Gas and Electric (PG&E), Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E), Approval with Modification of Revisions to Electric Tariff Rule 21 to Incorporate Smart Inverter Working Group (SIWG) Phase 2 Communications Recommendations in Compliance with Decision (D.) 16-06-052* - Date of Issuance: April 7, 2017

months after the release of the SunSpec Alliance (SunSpec) communication protocol certification test standard, which set the effective deadline as: “*the later of (a) March 1, 2018 or (b) nine months after the release of the SunSpec Alliance communication protocol certification test standard or the release of another industry-recognized communication protocol certification test standard.*”⁹

On March 31, 2017, the Smart Inverter Working Group (SIWG) issued final revisions to the Phase 3 recommendations. PG&E submitted AL 5129-E¹⁰ to incorporate the recommendation with proposed Rule 21 tariff revisions that set forth agreed-upon technical requirements, testing and certification processes, and effective dates for the Phase 3 functions. In addition, the Phase 3 ALs proposed revisions to the smart inverters Phase 2 communications.

On April 26, 2018, the Commission issued Resolution E-4898¹¹ that approved, with modifications, the revisions to Rule 21 put forth in AL 5129-E, thereby adopting the Phase 3 recommendations.

Additionally, E-4898 revised the compliance deadlines for the Phase 2 communication requirements and for Phase 3 Functions 1 (Monitor Key Data) and 8 (Scheduling) as nine months after the release of the SunSpec Alliance (SunSpec) communication protocol certification test standard, which set February 22, 2019, as the effective deadline.

On November 19, 2018, CALSSA submitted a letter to the Executive Director requesting a six-month extension of this compliance deadline. This request was granted,¹² extending the compliance deadline to August 22, 2019.

Subsequently on February 11, 2019, CALSSA submitted a Petition for Modification (Petition)¹³ of Resolutions E-4832 and E-4898, to request that the Commission “*include more details and not exceed areas of consensus.*” In response to the Petition, the Commission issued Resolution E-5000 that clarified the implementation details of the smart inverter Phase 2 communications requirements and of Phase 3 Functions 1 and 8. In addition, Resolution E-5000 extended the compliance deadlines to January 22, 2020, for:

⁹ E-4832, SEE OP 2, p5.

¹⁰ [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, 2017.

¹¹ [E-4898](#) - *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* - Date of Issuance: April 27, 2018

¹² The request was approved by the Executive Director of the Energy Division, Alice Stebbins, on January 2, 2019.

¹³ *Petition of The California Solar & Storage Association for Modification of Resolution E-4832 And Resolution E-4898* – dated February 8, 2019

- 1) Phase 2 communications requirements
- 2) Phase 3 Functions 1 and 8
- 3) Phase 3 Functions 2 (DER Disconnect and Reconnect) and 3 (Limit Maximum Active Power)

Resolution E-5000, OP 6 ordered the Utilities to submit a Tier 2 Advice Letter within 9 months of publication of IEEE 1547.1, proposing the new testing regime and reporting on the which elements thereof were supported by the consensus of the SIWG. Additionally, the Utilities were required to report the items of non-consensus. The IEEE 1547.1 test procedures were published May 21, 2020. Accordingly, on February 22, 2021, PG&E submitted AL 6093-E to comply with OP 6 of Resolution E-5000.

III. Discussion

Aligning IEEE 1547-2018 with Rule 21

Resolution E-5000 OP 6 required the Utilities to work with the SIWG to incorporate the new testing procedures, as appropriate, into the testing regime for Phase 2 and Phase 3 requirements.

In order to incorporate the IEEE 1547.1 testing procedures into Rule 21, it was necessary that the base standard requirements (IEEE 1547-2018¹⁴) also be incorporated into Rule 21. It is impractical and incomplete to only include the IEEE 1547.1 testing procedures without incorporating the base standard requirements.

In addition, as these testing procedures account for many functions within the base standard, the Utilities used this opportunity to align all the applicable technical requirements for inverter-based technology, mainly outlined in Rule 21 Section Hh, to the IEEE 1547-2018 standard.

PG&E's had proposed changes in AL 6093-E to align PG&E's Rule 21 to the applicable sections of IEEE 1547-2018 and IEEE 1547.1-2020. However, instead PG&E now plans to submit these Rule 21 revisions in a subsequent advice letter.

Working with the Smart Inverter Working Group

Following the publication of the IEEE 1547.1 test procedures, Resolution E-5000 OP 6 required the utilities to work with the SIWG to incorporate the new procedures, as appropriate, into the testing regime for the Phase 2 and 3 requirements.

¹⁴ [IEEE 1547-2018](#) - *IEEE Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces – Amendment 1547a-2020*
Published Date:2018-04-06

SIWG discussions commenced on July 23, 2020, and continued through January 2021. Throughout these discussions, the Utilities discussed each clause of IEEE 1547-2018 and related Rule 21 proposed modifications. In general, these discussions involved the Utilities proposing initial changes based on a specific IEEE 1547-2018 clause. Input from SIWG members was sought for each proposal and revisions were then incorporated based upon stakeholder feedback until consensus or clear non-consensus was achieved. This process continued until the last SIWG meeting held on January 21, 2021. A total of 11 SIWG meetings were held between July 23, 2020 and January 21, 2021.

The process outlined above allowed the Utilities to modify their Rule 21 proposals, which led to consensus proposals to nearly all categories including:

- Applicability of IEEE 1547 to interconnection requests at voltage < 50KV
- Inclusion of Generating Facility Rapid Voltage Changes
- Limitations of overvoltage over one fundamental frequency period
- Limitations of cumulative instantaneous overvoltage events
- Enter Service ramp controls
- Storage Inverter Normal Operation Ramp Control requirements
- Replacement of existing Frequency-Watt function with Frequency-Droop
- Requirement on measurement and calculation accuracies
- Prioritization of Smart Inverter requirements
- Ride-through of consecutive voltage disturbances
- Restore output without dynamic voltage support
- Transition between performance operating regions
- Constant reactive power mode
- Inclusion of Reference Point of Applicability (RPA) and implication to generating facility operating requirements
- Update of existing Rule 21 language related to flicker and harmonic distortion
- Replacement of existing voltage ride-through and trip tables for Section Hh with new IEEE 1547-2018 tables
- Replacement of existing frequency ride through and trip tables for Section Hh with new IEEE 1547-2018 tables
- Update of existing IEEE 1547-2003 references to IEEE 1547-2018 references
- Requirement for Rate of Change of Frequency (ROCOF) ride-through requirement
- Update of reactive power requirements for Smart Inverters and default settings
- Update to communication requirements

Non-Consensus Items

The Utilities and SIWG members worked diligently and resolved differences to achieve consensus. However, there appears to be only one item where one SIWG stakeholder did not concur with the Utilities' proposal, even with the inverter manufacturers supporting the Utilities' position. This non-consensus issue is related to the default setting for the Frequency-Droop function (the replacement of the existing Rule 21 frequency-watt function). The Utilities propose that this function continues to perform as approved by the Commission in Resolution E-4898. The stakeholder asserted that it would be more appropriate to use the IEEE 1547-2018 default settings given that rest of the industry has not yet adopted the CPUC approved default setting for the frequency-watt function.

The Utilities believe that the default settings, as currently utilized, are identical and no more restrictive than what was approved by the Commission in Resolution E-4898. In addition, the Utilities believe that going to a slower frequency-droop default value essentially reduces the capabilities that Smart Inverters can provide to the grid during potential emergency conditions where frequency may deviate from nominal. This requirement has been in place for new Smart Inverters since September 7, 2017 and the Utilities have not received any complaints that this function may be reducing energy production. Therefore, the Utilities' position is that the Commission approved default settings should remain.

Attestation Requirements

Phase 3 Function 1 – Monitor Key Data

In accordance with OP 7 of Resolution E-5000, manufacturer attestations are accepted as sufficient evidence of compliance with Phase 3 Function 1 (Monitor Key Data) until 18 months after the publication of a nationally recognized test procedure containing Phase 3 Function 1. While IEEE 1547.1 was published on May 21, 2020, subsequent UL clarifications to the testing standard were published on September 28, 2021. This moves the 18 month effective date to March 28, 2023, consistent with E-5000 direction, and therefore, **attestations for Function 1 requirements would be accepted by PG&E until March 28, 2023.**

Phase 3 Function 8 - Scheduling

OP 8 of Resolution E-5000 allows manufacturer attestations as sufficient evidence of compliance with Phase 3 Function 8 (Scheduling) until 12 months after the publication of a nationally recognized test procedure containing Phase 3 Function 8. Since IEEE 1547-2018 and therefore IEEE 1547.1 did not address Function 8, **attestation will continue to be used for compliance with this function as outlined in OP 8 until such time that a nationally recognized test standard is published** to address this function. At this time, the Utilities have no projections as to when this may occur.

Proposed Tariff Changes

PG&E provided proposed tariff changes within AL 6093-E to incorporate the IEEE 1547 2018 Standards into Rule 21. Protests were received from California Solar & Storage Association (CALSSA) and Tesla to IOU¹⁵ advice letter March 15, 2021. As such, and consistent with the other IOUs, PG&E proposes to retract the Rule 21 proposed changes in AL 6093-E incorporating IEEE 1547 2018 Standards and will instead address areas of concerns within a future advice letter in early 2022.

No cost information is required for this advice letter.

This advice letter will not increase any rate or charge, cause the withdrawal of service, or conflict with any other schedule or rule.

IV. Protests

*****Due to the COVID-19 pandemic, PG&E is currently unable to receive protests or comments to this advice letter via U.S. mail or fax. Please submit protests or comments to this advice letter to EDTariffUnit@cpuc.ca.gov and PGETariffs@pge.com*****

Anyone wishing to protest this submittal may do so by letter sent via U.S. mail, facsimile, or E-mail, no later than December 9, 2021, which is 20 days after the date of this submittal. Protests must be submitted to:

CPUC Energy Division
ED Tariff Unit
505 Van Ness Avenue, 4th Floor
San Francisco, California 94102

Facsimile: (415) 703-2200
E-mail: EDTariffUnit@cpuc.ca.gov

Copies of protests also should be mailed to the attention of the Director, Energy Division, Room 4004, at the address shown above.

The protest shall also be sent to PG&E either via E-mail or U.S. mail (and by facsimile, if possible) at the address shown below on the same date it is mailed or delivered to the Commission:

¹⁵ The IOUs or independently owned utilities consist of Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE) and San Diego Gas & Electric Company (SDG&E).

Sidney Bob Dietz II
Director, Regulatory Relations
c/o Megan Lawson
Pacific Gas and Electric Company
77 Beale Street, Mail Code B13U
P.O. Box 770000
San Francisco, California 94177

Facsimile: (415) 973-3582
E-mail: PGETariffs@pge.com

Any person (including individuals, groups, or organizations) may protest or respond to an advice letter (General Order 96-B, Section 7.4). The protest shall contain the following information: specification of the advice letter protested; grounds for the protest; supporting factual information or legal argument; name, telephone number, postal address, and (where appropriate) e-mail address of the protestant; and statement that the protest was sent to the utility no later than the day on which the protest was submitted to the reviewing Industry Division (General Order 96-B, Section 3.11).

V. Effective Date

Pursuant to General Order (GO) 96-B, Rule 5.2, and OP 6 of Resolution E-5000, this advice letter is submitted with a Tier 2 designation. PG&E requests that this Tier 2 advice submittal become effective on **November 22, 2021**, the day after the original date for which PG&E had agreed to accept manufacturer attestations as sufficient evidence of compliance with Phase 3 Function 1, November 21, 2021. This effective date will allow for continuity and prevent gaps in compliance.

VI. 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 lists GO 96-B and R.11-09-011 and R.17-07-007. 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/

Sidney Bob Dietz II
Director, Regulatory Relations

cc: Service Lists GO 96-B and R.11-09-011 and R.17-07-007



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) #: 6093-E-A

Tier Designation: 2

Subject of AL: Supplemental: Modifications to Electric Rule 21 Pursuant to Resolution E-5000 Ordering Paragraphs 6, 7, and 8 for IEEE 1547.1 Standards

Keywords (choose from CPUC listing): Compliance, Rule 21

AL Type: Monthly Quarterly Annual One-Time Other:

If AL submitted in compliance with a Commission order, indicate relevant Decision/Resolution #: Res. E-5000

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: 11/22/21

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 proposed¹: N/A

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

¹Discuss 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

Name: Sidney Bob Dietz II, c/o Megan Lawson
Title: Director, Regulatory Relations
Utility Name: Pacific Gas and Electric Company
Address: 77 Beale Street, Mail Code B13U
City: San Francisco, CA 94177
State: California Zip: 94177
Telephone (xxx) xxx-xxxx: (415)973-2093
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
International Power Technology

Intertie

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

OnGrid Solar
Pacific Gas and Electric Company
Peninsula Clean Energy

Pioneer Community Energy

Public Advocates Office

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