PUBLIC UTILITIES COMMISSION
505 Van Ness Avenue
San Francisco CA 94102-3298

Pacific Gas & Electric Company
ELC (Corp ID 39)
Status of Advice Letter 6543E
As of May 16, 2022

Subject: Modifications to Electric Rule 21 Pursuant to Emergency Load Reduction Program Decision 21-02-015

Division Assigned: Energy

Date Filed: 04-01-2022

Date to Calendar: 04-08-2022

Authorizing Documents: D2112015

Disposition:	**Accepted**
Effective Date:	**05-01-2022**

Resolution Required: No

Resolution Number: None

Commission Meeting Date: None

CPUC Contact Information:

edtariffunit@cpuc.ca.gov

AL Certificate Contact Information:

Kimberly Loo
415-973-4587
PGETariffs@pge.com

STATE OF CALIFORNIA **GAVIN NEWSOM,** *Governor*

PUBLIC UTILITIES COMMISSION
505 Van Ness Avenue
San Francisco CA 94102-3298

To: Energy Company Filing Advice Letter

From: Energy Division PAL Coordinator

Subject: Your Advice Letter Filing

The Energy Division of the California Public Utilities Commission has processed your recent Advice Letter (AL) filing and is returning an AL status certificate for your records.

The AL status certificate indicates:

Advice Letter Number
Name of Filer
CPUC Corporate ID number of Filer
Subject of Filing
Date Filed
Disposition of Filing (Accepted, Rejected, Withdrawn, etc.)
Effective Date of Filing
Other Miscellaneous Information (e.g., Resolution, if applicable, etc.)

The Energy Division has made no changes to your copy of the Advice Letter Filing; please review your Advice Letter Filing with the information contained in the AL status certificate, and update your Advice Letter and tariff records accordingly.

All inquiries to the California Public Utilities Commission on the status of your Advice Letter Filing will be answered by Energy Division staff based on the information contained in the Energy Division's PAL database from which the AL status certificate is generated. If you have any questions on this matter please contact the:

Energy Division's Tariff Unit by e-mail to
edtariffunit@cpuc.ca.gov

Pacific Gas and Electric Company

Sidney Bob Dietz II
Director
Regulatory Relations

Pacific Gas and Electric Company
77 Beale St., Mail Code B13U
P.O. Box 770000
San Francisco, CA 94177

Fax: 415-973-3582

April 1, 2022

Advice 6543-E
(Pacific Gas and Electric Company ID U 39 E)

Public Utilities Commission of the State of California

Subject: **Modifications to Electric Rule 21 Pursuant to Emergency Load Reduction Program Decision 21-02-015**

Purpose

Pursuant to Ordering Paragraph (OP) 6 and Attachment 2 of Decision (D.) 21-12-015 (the "Decision")[1], Pacific Gas and Electric Company (PG&E) hereby submits this advice letter to modify Electric Rule 21 to create a temporary exception from UL 1741-SA smart inverter requirements.

Background

Rule 21 History of UL 1741-SA requirements in Rule 21

Rulemaking R. 11-09-011

On September 22, 2011, the CPUC filed *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.* Open Rulemaking (R.) 11-09-011.

On December 18, 2014, the commission issued D.14-12-035[2] In this decision, the Commission noted:

---

[1] Decision 21-12-015 December 2, 2021," Phase 2 Decision Directing Pacific Gas and Electric Company, Southern California Edison Company, And San Diego Gas & Electric Company to Take Actions to Prepare for Potential Extreme Weather in the Summers Of 2022 And 2023" in Rulemaking 20-11-003 (Date of Issuance 12/6/2021)

[2] D.14-12-035 -- *Interim Decision Adopting Revisions to Electric Tariff Rule 21 for Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company to Require "Smart" Inverters* - Date of Issuance 12/22/2014

> *We also accept the consensus from the parties on the following revisions: (1) Section Hh.2.f.i.; (2) the Frequency Ride-Through Table, Hh-2; (3) Voltage Ride-Through Table Hh-1; and (4) the Definitions VRef, VRefOfs, Mandatory Operation and Voltage Excursion. These consensus revisions are set forth in Attachment A.*
>
> *1. Effective Mandatory Date of Enhanced Inverter Requirements In their draft revisions to Electric Tariff Rule 21, the utilities recommended that inverters that can perform functions which autonomously contribute to grid support during excursions from normal operating conditions – "smart inverters" – be required mandatory effective the later of December 31, 2015 or the date Underwriter Laboratory approves the new standards.[4]...*
>
> _____
>
> *[4] Specifically, the date the Supplement SA of UL-1741 (with California requirements) is approved by the full UL-1741 Standards Technical Panel[3]*

D. 14-12-0235 notes that "On July 18, 2014, PG&E, SCE and SDG&E filed and served in this docket a draft Advice Letter filing setting forth revisions to Electric Tariff Rule 21 to conform to the seven recommendations made by the Working Group, and any other revisions needed to Electric Tariff Rule 21 to facilitate deployment of smart inverter capabilities."[4]

AL 4565-E

On January 20, 2015, PG&E submitted AL-4565-E[5] that formally modified Rule 21 to add the language to section H below:

> *H. GENERATING FACILITY DESIGN AND OPERATING REQUIREMENTS*
> *Section H shall be used for interconnection of non-inverter based technologies.*
>
> *Section H shall also continue to be used for interconnection of inverter based technologies until the later of two dates: either (1) December 31, 2015 or (2) twelve (12) months after the date the Supplement SA of UL-1741 (with CA requirements) is approved by the full UL-1741 Standards Technical Panel (STP). Following such date, Section Hh shall apply for interconnection of inverter based technologies. Until such date, Section*

[3] D.14-12-035 page 9; note this was a draft advice letter that was served; an actual advice letter was not submitted.

[4] D.14-12-035 page 5

[5] Advice 4565-E - *Revisions to Electric Tariff Rule 21 in Compliance with Decision 14-12-035* - Advice Letter 4565-E became effective as of January 20, 2015.

Hh may be used in all or in part, for inverter based technologies by mutual agreement of the Distribution Provider and the Applicant.

On September 8, 2016, the UL announced the approval of the new UL 1741 Supplement A (SA) to test and certify inverters and other utility interconnected distributed generation equipment for grid support functions enabling smarter, safer, reactive grid interconnection.

Advice 4914-E

On September 13, 2016, PG&E submitted AL 4914-E[6], pursuant to OP 4 of D.14-12-035, in which PG&E updated Rule 21 to reflect that the date the use of smart inverters became mandatory based upon the approval date of the Supplement SA of UL-1741 (with California requirements).

AL 5107-E

On June 30, 2017, PG&E submitted AL 5107-E[7],

Based on OP 5[8] of D.14-12-035 In the intervening time since the revised UL standards were announced, stakeholder calls were held by the IOUs to address the details of interconnection processing, certification details, inverter settings and other supporting implementation topics.

Tariff changes were developed to supplement the technical requirements to fully implement UL 1741-Supplement SA. AL 5107-E, along with those of the other IOUs, represents the results of the Phase 1 SIWG efforts.

The Rule 21 revisions proposed in AL 5107-E relevant here are in:

1) The Applicability Section B.3 was modified to state:
   UL1741- Supplement SA has been utilized for certification of phase I Smart Inverters (Phase 1 Smart Inverter Functions) as outlined in section Hh.

2) Section Hh - Smart Inverter Generating Facility Design and Operating Requirements

---

6 AL 4914-E - *Modifications to Pacific Gas and Electric Company's Electric Rule 21 Tariff Pursuant to Decision 14-12-035 to Reflect the Approval Date of Inverter Based Technologies Requirements* - Advice Letter 4914-E became effective as of September 13, 2016.

7 AL 5107-E - *Modifications to PG&E's Electric Rule 21 Tariff and Interconnection Agreements and Forms to Incorporate Smart Inverter Phase 1 Modifications* - Advice Letter 5107-E became effective as of July 29, 2017.

8 OP 5. "One year after the adoption of Revised Electric Tariff Rule 21, the utilities will make a proposal regarding: the provisions for Uninterruptible Power Supplies, Critical Loads, and Microgrids; enhanced Volt/Var specifications based on detailed analysis gathered from utilizing these functions; inclusion of a consensus-based ramp down specification"

The inverter requirements are intended to be consistent with UL 1741 - Supplement SA using Section Hh of Rule 21 as the source requirement document and ANSI/IEEE 1547-2003 and 1547a Standard for Interconnecting Distributed Resources with Electric Power Systems (IEEE 1547 including amendment 1547a), where possible. In the event of conflict between this Rule, and UL 1741 - Supplement SA, and/or IEEE 1547-2003 or IEEE 1547a, this Rule shall take precedence...

3) Section L, Certification And Testing Criteria, 3. Type Testing

a. Type Tests and Criteria for Interconnection Equipment Certification

Table L.1 defines the test criteria by Generator or inverter technology. While UL 1741(1) and UL 1741 – Supplement SA were written specifically for inverters, the requirements are readily adaptable to synchronous Generators, induction Generators, as well as single/multi-function controllers and protection relays. Until a universal test standard is developed, Distribution Provider or NRTL shall adopt the procedures referenced in Table L.1 as appropriate and necessary for a Generating Facility and/or Interconnection Facilities or associated equipment performance and its control and Protection Functions. These tests shall be performed in the sequence shown in Table L.2 [changes were made to table 2]

History of Rule 21 UL 1741-SA Exception Requirement

Rulemaking 20-11-003

Order Instituting Rulemaking to Establish Policies, Processes, and Rules to Ensure Reliable Electric Service in California in the Event of an Extreme Weather Event in 2021.

D.21-12-015

On December 12, 2021, D.21-12-015[9] was issued in R.20-11-003. D.21-12-015 adopted "several supply- and demand-side requirements to ensure there is adequate electric power in the event of extreme weather during times of greatest need in summers 2022 and 2023."[10] This was driven by the July 30, 2021, Governor Newsom Emergency Proclamation "urging all state energy agencies to ensure there is adequate electricity to meet the needs of Californians in 2022."[11] Among those requirements adopted, it

[9] D.21-12-015 - *Phase 2 Decision Directing Pacific Gas and Electric Company, Southern California Edison Company, And San Diego Gas & Electric Company to Take Actions To Prepare For Potential Extreme Weather In The Summers Of 2022 And 2023* -

[10] D. 21-12-015, "Background" page 2

[11] IBID

"...expanded on electric vehicle potential by allowing aggregations of vehicle to grid managed charging and discharge to support the grid at net peak."[12]

D.21-12-015, Attachment 2 describes to the Emergency Load Reduction Program (ELRP) measures:

> "*The Commission adopted the initial program parameters for ELRP in the second decision in this proceeding, D.21-03-056. That decision explained the purpose of ELRP is to allow the large electric IOUs and the CAISO to have access to additional load reduction opportunity during times of high grid stress and inadequate market resources. The goal of developing ELRP was to provide additional tools for the avoidance of rotating outages while also minimizing costs to ratepayers*."

D.21-12-015 in OP 6 requires:

> [OP] 6. *Modifications to the Emergency Load Reduction Program administered by Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company shall be made,* ***as outlined in Attachment 2,*** *as a tool that can provide emergency load reduction and serve as an insurance policy against the need for future rotating outages*.[13]

OP 6 adopts D.21-12-015 Attachment 2. In Attachment 2, Section A.5. *Vehicle-Grid-Integration Aggregators Eligibility* states:

> "*In recognition of a nascent market, any DC V2G EVSE that has UL 1741 certification -* ***but not UL 1741 SA certification, any subsequent UL 1741 supplement certification required in Rule 21, or Smart Inverter Working Group-recommended smart inverter functions*** *- may interconnect initially for the purpose of participating in the ELRP, subject to all other Rule 21 interconnection requirements. IOUs may request the termination of this interconnection pathway via Tier 2 AL after the 2024 ELRP season if the market has developed to provide multiple V2G capable EVSEs that meet the full smart inverter certification standards required in Rule 21. Termination of this pathway would not affect previously interconnected EVSE, and they may*

[12] D. 21-12-015, page 3

[13] D. 21-12-015, OP 6 p162. OPs 7 and 24 also reference adopting the requirements of Attachment 2.

continue to operate parallel to the grid as per their Interconnection Agreement. "[14] [emphasis added]

This Advice Letter

This advice letter proposes to modify Rule 21 to reflect the D.21-12-015 Attachment 2 exemption for any DC V2G EVSE from requirement for UL 1741 SA certification, and any subsequent UL 1741 supplement certification that is currently in Rule 21.

Tariff Revisions

In compliance Ordering Paragraph (OP) 6 and Attachment 2 of Decision (D.) 21- 12-015, PG&E modifies its Electric Rule 21 Sheets as described below.

ELECTRIC RULE NO. 21 Sheet 191 and 192

Hh. SMART INVERTER GENERATING FACILITY DESIGN AND OPERATING

REQUIREMENTS

Section H shall continue to be used for interconnection of inverter based technologies until September 8, 2017. Following such date, Section Hh shall apply for interconnection of inverter based technologies. Until such date, Section Hh may be used in all or in part, for inverter based technologies by mutual agreement of the Distribution Provider and the Applicant.

_____

[1]"The Standard for Inverters, Converters, and Controllers for Use in Independent Power Systems".

The inverter requirements are intended to be consistent with UL 1741 - Supplement SA* using Section Hh of Rule 21 as the source requirement document and ANSI/IEEE 1547-2003 and 1547a Standard for Interconnecting Distributed Resources with Electric Power Systems (IEEE 1547 including amendment 1547a), where possible. In the event of conflict between this Rule, and UL 1741 - Supplement SA, and/or IEEE 1547-2003 or IEEE 1547a, this Rule shall take precedence. Exceptions are taken to IEEE 1547 Clauses 4.1.4.2 Distribution Secondary Spot Networks and Clauses 4.1.8.1 or 5.1.3.1, which address Protection from Electromagnetic Interference. Rule 21 does not adopt the Generating Facility power limitation of 10 MW incorporated in IEEE 1547.

...

[14] D.21-12-015 Attachment 1-3, Attachment 2 at 6.

*Any DC V2G Electric Vehicle Service Equipment (EVSE) that has UL 1741 certification - but not UL 1741 SA certification, any subsequent UL 1741 supplement certification required in Rule 21, or Smart Inverter Working Group-recommended smart inverter functions - may interconnect initially for the purpose of participating in the Emergency Load Reduction Program (ELRP), subject to all other Rule 21 interconnection requirements.

PG&E may request the termination of this interconnection pathway via a Tier 2 Advice Letter after the 2024 ELRP season if the market has developed to provide multiple V2G capable EVSEs that meet the full smart inverter certification standards required in Rule 21. Termination of this pathway would not affect previously interconnected EVSE, and they may continue to operate parallel to the grid as per their Interconnection Agreement.

Sheet 236

L. CERTIFICATION AND TESTING CRITERIA (Cont'd.)

3. TYPE TESTING

a. Type Tests and Criteria for Interconnection Equipment Certification Type testing provides a basis for determining that equipment meets the specifications for being designated as Certified equipment under this Rule. The requirements described in this Section cover only issues related to Interconnection and are not intended to address device safety or other issues.

Table L.1 defines the test criteria by Generator or inverter technology.

While UL 1741(1) and UL 1741 – Supplement SA** were written specifically for inverters, the requirements are readily adaptable to synchronous Generators, induction Generators, as well as single/multi-function controllers and protection relays. Until a universal test standard is developed, Distribution Provider or NRTL shall adopt the procedures referenced in Table L.1 as appropriate and necessary for a Generating Facility and/or Interconnection Facilities or associated equipment performance and its control and Protection Functions. These tests shall be performed in the sequence shown in Table L.2.

Non-Export AC/DC Converters must satisfy the requirements in its definition in Section C...

**An exemption exists for DC V2G Electric Vehicle Service Equipment (EVSE) interconnecting for the purpose of participating in the Emergency Load Reduction Program, see footnote* in the opening paragraphs of Section Hh.

Protests

Anyone wishing to protest this submittal may do so by letter sent electronically via E-mail, no later than April 21, 2022, which is 20 days after the date of this submittal. Protests must be submitted to:

CPUC Energy Division
ED Tariff Unit
E-mail: EDTariffUnit@cpuc.ca.gov

The protest shall also be electronically sent to PG&E via E-mail at the address shown below on the same date it is electronically delivered to the Commission:

Sidney Bob Dietz II
Director, Regulatory Relations
c/o Megan Lawson
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 and 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).

Effective Date

Pursuant to General Order (GO) 96-B, Rule 5.2, , this advice letter is submitted with a Tier 2 designation. PG&E requests that this Tier 2 advice submittal become effective on regular notice, May 1, 2022, which is 30 calendar days after the date of submittal.

Notice

In accordance with General Order 96-B, Section IV, a copy of this advice letter is being sent electronically to parties shown on the attached list and the parties on the service list for , R.17-07-007 (Rule 21), R. 20-11-003 (ELRP). 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

Attachments:
Attachment 1: Tariff
Attachment 2: Redline Tariff Revisions

cc: Service List R.17-07-007, R. 20-11-003

California Public Utilities Commission

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 U39 E)

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) #: 6543-E

Tier Designation: 2

Subject of AL: Modifications to Electric Rule 21 Pursuant to Emergency Load Reduction Program Decision 21-02-015

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 #: D.21-12-015

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: 5/1/22

No. of tariff sheets: 6

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: See Attachment 1

Service affected and changes proposed[1]: N/A

Pending advice letters that revise the same tariff sheets: 5915-E-B

[1]Discuss in AL if more space is needed.

Clear Form

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

California Public Utilities Commission
Energy Division Tariff Unit Email:
EDTariffUnit@cpuc.ca.gov

Contact Name: Sidney Bob Dietz II, c/o Megan Lawson
Title: Director, Regulatory Relations
Utility/Entity Name: Pacific Gas and Electric Company

Telephone (xxx) xxx-xxxx:
Facsimile (xxx) xxx-xxxx:
Email: PGETariffs@pge.com

Contact Name:
Title:
Utility/Entity Name:

Telephone (xxx) xxx-xxxx:
Facsimile (xxx) xxx-xxxx:
Email:

CPUC
Energy Division Tariff Unit
505 Van Ness Avenue
San Francisco, CA 94102

Clear Form

Cal P.U.C. Sheet No.	Title of Sheet	Cancelling Cal P.U.C. Sheet No.
52844-E*	ELECTRIC RULE NO. 21 GENERATING FACILITY INTERCONNECTIONS Sheet 192	50855-E
52845-E	ELECTRIC RULE NO. 21 GENERATING FACILITY INTERCONNECTIONS Sheet 193	50856-E
52846-E	ELECTRIC RULE NO. 21 GENERATING FACILITY INTERCONNECTIONS Sheet 194	50857-E
52847-E	ELECTRIC RULE NO. 21 GENERATING FACILITY INTERCONNECTIONS Sheet 236	50899-E
52848-E*	ELECTRIC TABLE OF CONTENTS Sheet 1	51657-E
52849-E*	ELECTRIC TABLE OF CONTENTS Sheet 20	51987-E*

Hh. SMART INVERTER GENERATING FACILITY DESIGN AND OPERATING REQUIREMENTS (Cont'd.)

The inverter requirements are intended to be consistent with UL 1741 - Supplement SA* using Section Hh of Rule 21 as the source requirement document and ANSI/IEEE 1547-2003 and 1547a Standard for Interconnecting Distributed Resources with Electric Power Systems (IEEE 1547 including amendment 1547a), where possible. In the event of conflict between this Rule, and UL 1741 - Supplement SA, and/or IEEE 1547-2003 or IEEE 1547a, this Rule shall take precedence. Exceptions are taken to IEEE 1547 Clauses 4.1.4.2 Distribution Secondary Spot Networks and Clauses 4.1.8.1 or 5.1.3.1, which address Protection from Electromagnetic Interference. Rule 21 does not adopt the Generating Facility power limitation of 10 MW incorporated in IEEE 1547. (T)

The Smart Inverter default settings and default activation states may be modified upon mutual agreement between Applicant or Producer and Distribution Provider. (P)

Process for changing default settings for new Interconnection Requests:

Distribution Provider, in the study process for new Generating Facilities, may determine and provide the optimum Smart Inverter Settings for the reactive power settings, including changes to the reactive power default settings (Example: Deactivate Volt/Var and activate Fixed Power Factor at given power factor).

Distribution Provider, in the study process for new Generating Facilities, may determine and provide the optimum Smart Inverter Settings for the Ramp Rate settings depending on the Generating Facility technology (such as solar, storage).

Distribution Provider, in the study process for new Generating Facilities, may determine the optimum Smart Inverter Settings for the volt/watt settings including changes to the default settings (Example: Change the volt/watt set points). The Applicant may select to agree on the new settings or select to perform upgrades to operate using the existing default volt/watt settings.

*Any DC V2G Electric Vehicle Service Equipment (EVSE) that has UL 1741 certification - but not UL 1741 SA certification, any subsequent UL 1741 supplement certification required in Rule 21, or Smart Inverter Working Group-recommended smart inverter functions - may interconnect initially for the purpose of participating in the Emergency Load Reduction Program (ELRP), subject to all other Rule 21 interconnection requirements. (N)

PG&E may request the termination of this interconnection pathway via a Tier 2 Advice Letter after the 2024 ELRP season if the market has developed to provide multiple V2G capable EVSEs that meet the full smart inverter certification standards required in Rule 21. Termination of this pathway would not affect previously interconnected EVSE, and they may continue to operate parallel to the grid as per their Interconnection Agreement. (N)

(Continued)

Hh. SMART INVERTER GENERATING FACILITY DESIGN AND OPERATING REQUIREMENTS (Cont'd.)

Process for changing default settings for new Interconnection Requests (Cont'd): (L)

Default settings for voltage ride-through, frequency ride-through requirements, and Frequency/Watt should not be modified on an individual project basis unless the Interconnection Studies have determined that the default settings may not meet grid reliability requirements. (L)

Process for changing default settings for Generating Facilities with an executed Interconnection Agreement:

When grid changes or Generating Facility changes require that the Smart Inverter operating parameters be reevaluated, the Distribution Provider or Producer may request changes to the Smart Inverter operating parameters. The request must include the reason for and timing of the proposed changes. The requested changes must be within the Smart Inverter function adjustability limits, must be within the limits specified in this tariff, and must be mutually agreed upon.

1. GENERAL INTERCONNECTION AND PROTECTIVE FUNCTION REQUIREMENTS

The Protective Functions and requirements of this Rule are designed to protect Distribution Provider's Distribution and Transmission System and not the Generating Facility. A Producer shall be solely responsible for providing adequate protection for its Generating Facility and Interconnection Facilities. Producer's Protective Functions shall not impact the operation of other Protective Functions on Distribution Provider's Distribution and Transmission System in a manner that would affect Distribution Provider's capability of providing reliable service to its customers.

a. Protective Functions Required

Smart Inverters operating in parallel with Distribution Provider's Distribution or Transmission System shall be equipped with the following Protective Functions to sense abnormal conditions on Distribution Provider's Distribution or Transmission System and cause the Smart Inverter to be automatically disconnected from Distribution Provider's Distribution or Transmission System or to prevent the Smart Inverter from being connected to Distribution Provider's Distribution or Transmission System inappropriately:

(L)
(L)

(Continued)

Hh. SMART INVERTER GENERATING FACILITY DESIGN AND OPERATING REQUIREMENTS (Cont'd.)

1. GENERAL INTERCONNECTION AND PROTECTIVE FUNCTION REQUIREMENTS (Cont'd.)

a. Protective Functions Required (Cont'd.)

(i) Over and under voltage trip functions and over and under frequency trip functions; (L) (L)

(ii) A voltage and frequency sensing and time-delay function to prevent the Smart Inverter from energizing a de-energized Distribution or Transmission System circuit and to prevent the Smart Inverter from reconnecting with Distribution Provider's Distribution or Transmission System unless Distribution Provider's Distribution System service voltage and frequency is within the ANSI C84.1-1995 Table 1 Range B voltage Range of 106 volts to 127 volts (on a 120 volt basis), inclusive, and a frequency range of 58.5 Hz to 60.5 Hz, inclusive, and are stable for at least 15 seconds; and

(iii) A function to prevent the Smart Inverter from contributing to the formation of an Unintended Island, and cease to energize Distribution Provider's Distribution System within two seconds of the formation of an Unintended Island.

The Smart Inverter shall cease to energize Distribution Provider's Distribution System for faults on Distribution Provider's Distribution System circuit to which it is connected (IEEE 1547-4.2.1). The Smart Inverter shall cease to energize Distribution Provider's Distribution circuit prior to re-closure by Distribution Provider's Distribution System equipment (IEEE 1547-4.2.2).

b. Momentary Paralleling Generating Facilities

With Distribution Provider's approval, the transfer switch or scheme used to transfer Producer's loads from Distribution Provider's Distribution or Transmission System to Producer's Generating Facility may be used in lieu of the Protective Functions required for Parallel Operation.

(Continued)

L. CERTIFICATION AND TESTING CRITERIA (Cont'd.)

3. TYPE TESTING

a. Type Tests and Criteria for Interconnection Equipment Certification

Type testing provides a basis for determining that equipment meets the specifications for being designated as Certified equipment under this Rule. The requirements described in this Section cover only issues related to Interconnection and are not intended to address device safety or other issues.

Table L.1 defines the test criteria by Generator or inverter technology. While UL 1741(1) and UL 1741 – Supplement SA** were written specifically for inverters, the requirements are readily adaptable to synchronous Generators, induction Generators, as well as single/multi-function controllers and protection relays. Until a universal test standard is developed, Distribution Provider or NRTL shall adopt the procedures referenced in Table L.1 as appropriate and necessary for a Generating Facility and/or Interconnection Facilities or associated equipment performance and its control and Protection Functions. These tests shall be performed in the sequence shown in Table L.2. (T)

Non-Export AC/DC Converters must satisfy the requirements in its definition in Section C.

_____

** An exemption exists for DC V2G Electric Vehicle Service Equipment (EVSE) interconnecting for the purpose of participating in the Emergency Load Reduction Program, see footnote ***** in the opening paragraphs of Section Hh. (N) (N)

(Continued)

ELECTRIC TABLE OF CONTENTS Sheet 1

TABLE OF CONTENTS

(Continued)

ELECTRIC TABLE OF CONTENTS Sheet 20

(Continued)

Advice 6543-E
April 1, 2022

Attachment 2

Redline Tariff Revisions

For convenience of the reader, PG&E has included redline revisions in Attachment 2. Where Electric Rule 21 has been revised, the affected sheets are included in Attachment 1.

In this advice letter and accordance to CPUC General Order 96B, Section 9.5.3, PG&E has implemented the use of the "(P)" symbol to signify material subject to change under a pending advice letter. The redlines in Attachment 2 are color coded to the specific advice letter. The color coding is as follows:

Redline Text Color	Advice Letter	Subject	Comments
	5915-E-B	Second Supplemental: Advice Letter Modifying Electric Rule 21 Pursuant to Decision 20-09-035 for Working Group 2 and 3 (due 120 Days from Issuance) for Ordering Paragraphs 6 and 11	Pending Approval
	6543-E	Modifications to Electric Rule 21 Pursuant to Emergency Load Reduction Program Decision 21-02-015	In this advice letter, revisions are made according to D.21-12-015.

Hh. SMART INVERTER GENERATING FACILITY DESIGN AND OPERATING REQUIREMENTS (Cont'd.)

The inverter requirements are intended to be consistent with UL 1741 - Supplement SA* using Section Hh of Rule 21 as the source requirement document and ANSI/IEEE 1547-2003 and 1547a Standard for Interconnecting Distributed Resources with Electric Power Systems (IEEE 1547 including amendment 1547a), where possible. In the event of conflict between this Rule, and UL 1741 - Supplement SA, and/or IEEE 1547-2003 or IEEE 1547a, this Rule shall take precedence. Exceptions are taken to IEEE 1547 Clauses 4.1.4.2 Distribution Secondary Spot Networks and Clauses 4.1.8.1 or 5.1.3.1, which address Protection from Electromagnetic Interference. Rule 21 does not adopt the Generating Facility power limitation of 10 MW incorporated in IEEE 1547. (T)

The Smart Inverter default settings and default activation states may be modified upon mutual agreement between Applicant or Producer and Distribution Provider. (P)

Process for changing default settings for new Interconnection Requests:

Distribution Provider, in the study process for new Generating Facilities, may determine and provide the optimum Smart Inverter Settings for the reactive power settings, including changes to the reactive power default settings (Example: Deactivate Volt/Var and activate Fixed Power Factor at given power factor).

Distribution Provider, in the study process for new Generating Facilities, may determine and provide the optimum Smart Inverter Settings for the Ramp Rate settings depending on the Generating Facility technology (such as solar, storage).

Distribution Provider, in the study process for new Generating Facilities, may determine the optimum Smart Inverter Settings for the volt/watt settings including changes to the default settings (Example: Change the volt/watt set points). The Applicant may select to agree on the new settings or select to perform upgrades to operate using the existing default volt/watt settings.

(N)
* Any DC V2G Electric Vehicle Service Equipment (EVSE) that has UL 1741 certification - but not UL 1741 SA certification, any subsequent UL 1741 supplement certification required in Rule 21, or Smart Inverter Working Group-recommended smart inverter functions - may interconnect initially for the purpose of participating in the Emergency Load Reduction Program (ELRP), subject to all other Rule 21 interconnection requirements.

PG&E may request the termination of this interconnection pathway via a Tier 2 Advice Letter after the 2024 ELRP season if the market has developed to provide multiple V2G capable EVSEs that meet the full smart inverter certification standards required in Rule 21. Termination of this pathway would not affect previously interconnected EVSE, and they may continue to operate parallel to the grid as per their Interconnection Agreement. (N)

(Continued)

Hh. SMART INVERTER GENERATING FACILITY DESIGN AND OPERATING REQUIREMENTS (Cont'd.)

Process for changing default settings for new Interconnection Requests (Cont'd): (L)

Default settings for voltage ride-through, frequency ride-through requirements, and Frequency/Watt should not be modified on an individual project basis unless the Interconnection Studies have determined that the default settings may not meet grid reliability requirements. (L)

Process for changing default settings for Generating Facilities with an executed Interconnection Agreement:

When grid changes or Generating Facility changes require that the Smart Inverter operating parameters be reevaluated, the Distribution Provider or Producer may request changes to the Smart Inverter operating parameters. The request must include the reason for and timing of the proposed changes. The requested changes must be within the Smart Inverter function adjustability limits, must be within the limits specified in this tariff, and must be mutually agreed upon.

1. GENERAL INTERCONNECTION AND PROTECTIVE FUNCTION REQUIREMENTS

The Protective Functions and requirements of this Rule are designed to protect Distribution Provider's Distribution and Transmission System and not the Generating Facility. A Producer shall be solely responsible for providing adequate protection for its Generating Facility and Interconnection Facilities. Producer's Protective Functions shall not impact the operation of other Protective Functions on Distribution Provider's Distribution and Transmission System in a manner that would affect Distribution Provider's capability of providing reliable service to its customers.

a. Protective Functions Required

Smart Inverters operating in parallel with Distribution Provider's Distribution or Transmission System shall be equipped with the following Protective Functions to sense abnormal conditions on Distribution Provider's Distribution or Transmission System and cause the Smart Inverter to be automatically disconnected from Distribution Provider's Distribution or Transmission System or to prevent the Smart Inverter from being connected to Distribution Provider's Distribution or Transmission System inappropriately: (L)

(Continued)

Hh. SMART INVERTER GENERATING FACILITY DESIGN AND OPERATING REQUIREMENTS (Cont'd.)

1. GENERAL INTERCONNECTION AND PROTECTIVE FUNCTION REQUIREMENTS (Cont'd.)

a. Protective Functions Required (Cont'd.)

(i) Over and under voltage trip functions and over and under frequency trip functions; (L) (L)

(ii) A voltage and frequency sensing and time-delay function to prevent the Smart Inverter from energizing a de-energized Distribution or Transmission System circuit and to prevent the Smart Inverter from reconnecting with Distribution Provider's Distribution or Transmission System unless Distribution Provider's Distribution System service voltage and frequency is within the ANSI C84.1-1995 Table 1 Range B voltage Range of 106 volts to 127 volts (on a 120 volt basis), inclusive, and a frequency range of 58.5 Hz to 60.5 Hz, inclusive, and are stable for at least 15 seconds; and

(iii) A function to prevent the Smart Inverter from contributing to the formation of an Unintended Island, and cease to energize Distribution Provider's Distribution System within two seconds of the formation of an Unintended Island.

The Smart Inverter shall cease to energize Distribution Provider's Distribution System for faults on Distribution Provider's Distribution System circuit to which it is connected (IEEE 1547-4.2.1). The Smart Inverter shall cease to energize Distribution Provider's Distribution circuit prior to re-closure by Distribution Provider's Distribution System equipment (IEEE 1547-4.2.2).

b. Momentary Paralleling Generating Facilities

With Distribution Provider's approval, the transfer switch or scheme used to transfer Producer's loads from Distribution Provider's Distribution or Transmission System to Producer's Generating Facility may be used in lieu of the Protective Functions required for Parallel Operation.

(Continued)

L. CERTIFICATION AND TESTING CRITERIA (Cont'd.)

3. TYPE TESTING

a. Type Tests and Criteria for Interconnection Equipment Certification

Type testing provides a basis for determining that equipment meets the specifications for being designated as Certified equipment under this Rule. The requirements described in this Section cover only issues related to Interconnection and are not intended to address device safety or other issues.

Table L.1 defines the test criteria by Generator or inverter technology. While UL 1741(1) and UL 1741 – Supplement SA** were written specifically for inverters, the requirements are readily adaptable to synchronous Generators, induction Generators, as well as single/multi-function controllers and protection relays. Until a universal test standard is developed, Distribution Provider or NRTL shall adopt the procedures referenced in Table L.1 as appropriate and necessary for a Generating Facility and/or Interconnection Facilities or associated equipment performance and its control and Protection Functions. These tests shall be performed in the sequence shown in Table L.2. (T)

Non-Export AC/DC Converters must satisfy the requirements in its definition in Section C.

**An exemption exists for DC V2G Electric Vehicle Service Equipment (EVSE) interconnecting for the purpose of participating in the Emergency Load Reduction Program, see footnote * in the opening paragraphs of Section Hh. (N) (N)

(Continued)

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.
Braun Blaising Smith Wynne, P.C.
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
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
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
McClintock IP
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
Uplight
Water and Energy Consulting Wellhead Electric Company
Western Manufactured Housing Communities Association (WMA)
Yep Energy