PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE

February 7, 2020

Advice Letter 5735-E

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: Modification to Electric Rule 21 to Revise the Effective Date For Smart Inverter Phase 3 Functions 1, 2, and 8 to March 22, 2020

Dear Mr. Jacobson:

Advice Letter 5735-E is effective as of January 10, 2020.

Sincerely,

Edward Randolph

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

Erik Jacobson
Director
Regulatory Relations

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

Fax: 415-973-3585

January 10, 2020

Advice 5735-E
(Pacific Gas and Electric Company ID U 39 E)

Public Utilities Commission of the State of California

Subject: **Modification to Electric Rule 21 to Revise the Effective Date For Smart Inverter Phase 3 Functions 1, 2, and 8 to March 22, 2020.**

Purpose

The purpose of this advice letter is to revise Pacific Gas and Electric Company's (PG&E) Electric Rule 21 based on the California Public Utilities Commission (CPUC) approval of a request submitted by CALSSA[1] to revise the deployment date for smart inverter Phase 3 Functions 1,2, 3 and 8[2] from January 22, 2020, until March 22, 2020.

Background

CPUC Rulemaking (R.)11-09-11[3] initiated on September 22, 2011, with the goal to review, and if necessary, revise the rules and regulation governing the interconnection of generation and storage facilities to the IOUs[4] electrical distributions systems, as set out in the IOUs' respective Electric Rule 21 tariff.

One portion of R.11-09-11 addressed the establishment of a clear policy towards the use the deployment of communications-capable smart inverters. In the first of several decision relating to new "smart" inverters, Decision (D) 14-12-035[5] established Phase 1

[1] CALSSA, or California Solar & Storage Association (formerly known as CALSEA).
[2] Phase 3 Functions 1 (Monitor Key Data) and 8 (Scheduling) and Phase 3 Functions 2 (DER Disconnect and Reconnect) and 3 (Limit Maximum Active Power).
[3] 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*.
[4] California's Independently Owned Utilities consists of PG&E, Southern California Edison Company, and San Diego Gas & Electric Company.
[5] 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.*

that included new smart inverter functions. These were incorporated into Rule 21 in PG&E Advice Letter (AL) 4565-E[6].

Subsequently, on June 23, 2016, CPUC D.16-06-052[7] was issued. It captured the results of three years of discussion the Smart Inverter Working Group (SIWG)[8] and as set out in Ordering Paragraph 9 and Appendix D, directed the IOUs to submit within 6 months proposed revisions to Rule 21 setting forth the:

(i) technical requirements, testing and any certification for communications requirements as defined in "Phase 2" and
(ii) for similar requirements for advance smart inverter functionality as defined in "Phase 3".

As required by D. 16-06-052, on December 20, 2016, PG&E along with the other IOUs jointly submitted Advice Letter (AL) 4982-E[9], and PG&E separately submitted AL 4983-E[10]. The purpose of AL 4982-E was "to modify Electric Tariff Rule 21, Generating Facility Interconnections, to incorporate communication requirements for generating facilities utilizing inverter-based technologies based on the Phase 2 recommendations put forth by the SIWG and as adopted in D.16-06-052 (or the Decision)." The purpose of AL 4983-E, a joint IOU Information-Only submission was "to provide both a status report and related Work Plan regarding further development of the Phase 3 Functions." The CPUC by letter approved AL 4983-E and on April 6, 2017 in Resolution E-4832[11] ordering paragraph 3 approved AL 4982-E. E-4832 Ordering Paragraph 2 and 3 told the IOUs they were "permitted to add a subsection of communications requirements in Electric Tariff Rule 21 to incorporate the Smart Inverter Working Group Phase 2 recommendation" and "the new subsection will become mandatory for generating facilities utilizing inverter-based technologies for which an interconnection request is submitted on or after the effective date which is defined as: the later of

[6] AL 4565-E submitted January 20, 2015 - *Revisions to Electric Tariff Rule 21 in Compliance with Decision 14-12-035.*

[7] 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*

[8] D.16-06-052, Finding of Fact 20.

[9] AL 4982-E - *Modifications to Electric Tariff Rule 21 to Incorporate Communication Requirements for Smart Inverters (Phase 2).*

[10] AL 4983-E - *Information Only Filing – Joint Investor-Owned Utilities Status Report and Supporting Action Plan for the Development of Advanced Inverter Functions for Smart Inverters (Phase 3).*

[11] 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.*

(a) March 1, 2018, or
(b) Nine months after the release of the SunSpec Alliance Communication Protocol certification standard or the release of another industry-recognized communication protocol certification test standard."

Final revisions to the Phase 3 recommendations were issued at the March 31, 2017, Smart Inverter Working Group (SIWG). On August 18, 2017, PG&E submitted AL 5129-E[12] "in compliance the California Public Utilities Commission's (CPUC or Commission) Decisions (D.) 14-12-035 and 16-06-052 that addresses Phase 2 and 3 recommendation of the SIWG…in order to facilitate smart inverter deployment." AL 5129-E updated Rule 21 with these recommendations, and at the same time included revisions to the smart inverter Phase 2 communications requirements. On April 25, 2018, CPUC Resolution E-4898[13] approved AL 5129-E with modification adopting these Phase 3 recommendations and requiring **Functions 1 and 8** capable inverters be deployed on "**9 months following SunSpec Alliance Communication Protocol Certification Test Standard**"[14] and **Functions 2 and 3 capable** inverters be deployed on the "Earlier of: 1) **December 2019** or 2) 12 months after approval of the IEEE 1547.1 standard revision."[15]

PG&E later submitted ALs 5302-E[16], 5302-E-A, 5302-E-B and 5302-E-C.

AL 5302-E's purpose was to "to make additional modifications to the Rule 21 changes made in AL 5129-E for Phase 3 Smart Inverters pursuant to Resolution E-4898 (the Resolution) Ordering Paragraph 2." It modified Rule 21 to make the effective date of Functions 1 and 8 to be February 22, 2019 since the SunSpec Alliance issued the SunSpec Common Smart Inverter Profile (CSIP) Conformance Test Procedures (SunSpec test procedure) on May 22, 2018 and February 22, 2019 is six months later.

Before the final supplement, AL 5302-E-C, was completed, "due to the complex technical and procedural nature of the rollout of the Smart Inverter capabilities, on November 19, 2018, CALSSA submitted a petition-for-modification requesting **a six-month extension of the deadline (from February 22, 2019, to August 22, 2019) to comply with both the Smart Inverter Phase II communications and Phase III, Functions 1 and 8,** as established by E-4898[17]."

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[12] AL 5129-E *Modifications to PG&E's Electric Rule 21 Tariff and Interconnection Agreements and Forms to Incorporate Smart Inverter Phase 3 Modifications.*

[13] 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.*

[14] E-4998, Table 2: Final Effective Dates.

[15] Ibid.

[16] AL 5302-E submitted May 25, 2018 - *Additional Modifications to the Electric Rule 21 Changes made in PG&E Advice Letter 5129-E for Phase 3 Smart Inverters Pursuant to Resolution E-4898*

[17] AL 5302-E-C page 4.

Therefore when PG&E submitted AL 5302-E-C[18], PG&E noted, "The purpose of this supplemental advice letter is to make additional modifications to Electric Rule 21, Generating Facility Interconnections, to incorporate **a six month extension of time (until August 22, 2019)** to comply with the deadline for Smart Inverter Phase II communication requirements, pursuant to (i) Resolution E-4832, Ordering Paragraph (OP) 2 and 4, and for Phase III **Functions 1 and 8**, (ii) Resolution E-4898, OP 2.a. and (iii) the January 2, 2019, letter from the California Public Utilities Commission (CPUC or Commission) modifying the timelines" (emphasis added). AL 5302-E-C was approved May 14, 2019.

CALSSA again submitted a Petition for Modification of E-4832 and E-4898 on February 11, 2019, noting that "further extension of the effective date for certain inverter capabilities may be needed" to the February 22, 2019 smart inverter Phase 2 and 3 deployment date, and citing specific issues. In response the petition, the CPUC issued Resolution E-5000[19,20] on July 11, 2019, in Ordering Paragraphs 10[21] and 11[22] that revised the deployment dates in Appendix D of E-4898 from those noted in (a) and (b) in the E-4898 discussion above to **January 22, 2020**.

On November 21, 2019, with the January 22, 2020 new smart inverter functionality deployment date approaching, CALSSA requested a third extension - "a two-month extension of the deadline to comply with Functions 1,2, 3 and 8 (collectively 'smart inverter requirements') … CALSSA requested an extension from the deadline from January 22, 2020 to **March 22, 2020**"[23] in a letter to CPUC Executive Director Alice Stebbins. On December 24, 2019, the Energy Division of the CPUC shared a response letter[24], noting "We find the extension requested by CALSSA is necessary" and it agreed to extend the

[18] AL 5302-E-C submitted February 20, 2019.

[19] E-5000 - *Resolution E-5000. Clarifies smart inverter communications requirements in response to the Petition of the California Solar & Storage Association for Modification of Resolution E-4832 and Resolutions E-4898.*

[20] E-5036 *Resolution E-5036. Clarifies the testing requirements for smart inverter Phase 2 communications and corrects a typographical error in Resolution E-5000*; E-5036 was issued December 5, 2019 modifying E-5000.

[21] Ordering Paragraph 10: The compliance deadline for the Phase 2 communications requirements and for Phase 3 **Functions 1 (Monitor Key Data) and 8 (Scheduling)** is extended until **January 22, 2020**. This direction alters deadlines established by Resolutions E-4832 and E-4898. Changes to the original ordering paragraphs are shown in Appendix D. (emphasis added)

[22] Ordering Paragraph 11: The compliance deadline for Phase 3 **Functions 2 (DER Disconnect and Reconnect) and 3 (Limit Maximum Active Power)** is extended until **January 22, 2020**. This direction alters deadlines established by Resolution E-4898. Changes to the original ordering paragraph are shown in Appendix D. (emphasis added).

[23] As described in the response letter cited in Footnote 24.

[24] CPUC Letter from CPUC Executive Director with Subject: RE: Request of the California Solar and Storage Association for Extension of Time to Comply with Rule 21 Smart Inverter Communications Requirements., dated December 24, 2019.

date to March 22, 2020. On Jan 6, 2020 CALSSA served notice to the service list for E-5000 of the letter with the CPUC approval of the extension request to March 22, 2020.

This Tier 1 Advice Letter is being submitted to update Rule 21 to reflect the revised the smart inverter deployment date for Function 1, 2, 3 and 8 from January 22, 2020, to March 22, 2020.

Tariff Changes

PG&E updates the January 22, 2020, deployment date for smart inverter Function 1, 2, 3, and 8 to March 22, 202, in Rule 21 in the following locations

1) Section Hh, 2.p Phase 3 Functions, Table of Phase 3 Effective Dates Pursuant to Resolutions E-4898 and E-5000 [Also, added a note on source of date change to the table header]
    a. Function 1 – Monitor Key DER Data
    b. Function 2 – DER Disconnect and Reconnect Command
    c. Function 3 – Limit Maximum Power
    d. Function 8 – Scheduling Power Value and Modes
2) Section Hh, 5.a Communications Requirements
3) Section Hh, 6.a Scheduling Capability Requirements [Function 8]
4) Section Hh, 7.a Monitoring and Telemetry Requirements [Function 1]

Protests

Anyone wishing to protest this Tier 1 submittal may do so by letter sent via U.S. mail, facsimile or E-mail, no later than January 30, 2020, 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:

Erik Jacobson
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).

Effective Date

PG&E requests that this Tier 1 advice letter become effective on regular notice, January 10, 2020.

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 for R.14-07-002 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 filings can also be accessed electronically at: http://www.pge.com/tariffs/.

/S/
Erik Jacobson
Director, Regulatory Relations

Attachments

cc: Service Lists R.14-07-002, and R.17-07-007

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 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) #: 5735-E

Tier Designation: 1

Subject of AL: Modification to Electric Rule 21 to Revise the Effective Date For Smart Inverter Phase 3 Functions 1, 2, 3and and 8 to March 22, 2020.

Keywords (choose from CPUC listing): Compliance, Tariff

AL Type: ☐ Monthly ☐ Quarterly ☐ Annual ☑ One-Time ☐ Other:

If AL submitted in compliance with a Commission order, indicate relevant Decision/Resolution #: D.14-12-035, D.16-06-052

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: 1/10/20

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: N/A

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

Clear Form

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: Erik Jacobson, 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:

Clear Form

Cal P.U.C. Sheet No.	Title of Sheet	Cancelling Cal P.U.C. Sheet No.
46104-E	ELECTRIC RULE NO. 21 GENERATING FACILITY INTERCONNECTIONS Sheet 201	44781-E
46105-E	ELECTRIC RULE NO. 21 GENERATING FACILITY INTERCONNECTIONS Sheet 204	44782-E
46106-E	ELECTRIC RULE NO. 21 GENERATING FACILITY INTERCONNECTIONS Sheet 207	44783-E
46107-E	ELECTRIC RULE NO. 21 GENERATING FACILITY INTERCONNECTIONS Sheet 209	44784-E
46108-E	ELECTRIC TABLE OF CONTENTS Sheet 1	45741-E
46109-E	ELECTRIC TABLE OF CONTENTS Sheet 20	44786-E

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

2. PREVENTION OF INTERFERENCE (Cont'd.)

p. Phase 3 Functions

Table of Phase 3 Effective Dates Pursuant to Resolution E-4898 and Resolution E-5000 and CPUC Letter of December 24, 2019 responding to a request to extend the date for Functions 1, 2, 3 and 8: (T) (T)

Phase 3 Function #		
	Description	**Effective Date (note)**
1	Monitor Key DER Data	**March 22, 2020** (T)
2	DER Disconnect and Reconnect Command (Cease to Energize and Return to Service)	**March 22, 2020** (T)
3	Limit Maximum Active Power Mode	**March 22, 2020** (T)
4	Set Active Power Mode	12 months after approval of a nationally recognized standard that includes the function.
5	Frequency Watt Mode	**February 22, 2019**, which is 9 months following SunSpec Alliance Communication Protocol Certification Test Standard.
6	Volt Watt Mode	**February 22, 2019**, which is 9 months following SunSpec Alliance Communication Protocol Certification Test Standard.
7	Dynamic Reactive Support	12 months after approval of a nationally recognized standard that includes the function.
8	Scheduling Power Values and Modes	**March 22, 2020** (T)

Note: The utilization of any of these functions is permissible under mutual agreement between the utility and the generating facility before the effective date.

(Continued)

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

5. COMMUNICATION REQUIREMENTS

a. The communication protocol requirements included in this section Hh.5 shall become mandatory for Generating Facilities utilizing inverter-based technologies for which an Interconnection Request is submitted March 22, 2020. Until such date, this subsection may be used in all or in part by inverter-based technologies by mutual agreement of the Distribution Provider and the Applicant. The communications requirements herein shall be between: (T)

(i) the Distribution Provider and the individual Generating Facility's inverter control or energy management system;

(ii) the Distribution Provider and communication to the Generating Facility through an aggregator not co-located or part of the Generating Facility; or

(iii) other communication options as are mutually agreed to are by Applicant and the Distribution Provider.

(Continued)

ELECTRIC RULE NO. 21 Sheet 207
GENERATING FACILITY INTERCONNECTIONS

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

6. SCHEDULING CAPABILITY REQUIREMENTS

a. Generating Facilities which incorporate Smart Inverters shall incorporate scheduling capabilities with a minimum scheduling memory capability of at least 24 events. The capability for this requirement will be mandatory for Generating Facilities utilizing inverter-based technologies for which an Interconnection Request is submitted on or after March 22, 2020. (T)

The utilization of this function is permissible under mutual agreement between the utility and the generating facility before the effective date.

Each event is composed of modifications to each, selected group of, or all of the following Smart Inverter function.

(i) Modifications to the voltage and reactive set-points of the Dynamic volt/var function.

(ii) Modifications to the reactive power set-points for the fixed power factor function.

(iii) Modifications to the voltage and watt-reduction level set-points for the volt/watt function.

(Continued)

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

7. MONITORING AND TELEMETRY REQUIREMENTS

a. The capability for this requirement will be mandatory for Generating Facilities utilizing inverter-based technologies for which an Interconnection Request is submitted on or after March 22, 2020. (T)

The utilization of this function is permissible under mutual agreement between the utility and the generating facility before the effective date.

Smart Inverter shall have the capability to communicate its performance information including:

(i) Smart Inverter production or consumption of active power (Watts).

(ii) Smart Inverter consumption or production of reactive power (VARs)

(iii) Phase measured at the AC terminals of the Smart Inverter (Volts)

(iv) Frequency measured at the AC terminals of the Smart Inverter (Hz)

(Continued)

ELECTRIC TABLE OF CONTENTS Sheet 1

TABLE OF CONTENTS

(Continued)

ELECTRIC TABLE OF CONTENTS Sheet 20

RULE	TITLE OF SHEET	CAL P.U.C. SHEET NO.

Rules (Cont'd)

(Continued)

Advice 5735-E
January 10, 2020

Attachment 2

Redline Tariff

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

2. PREVENTION OF INTERFERENCE (Cont'd.)

p. Phase 3 Functions (T)

Table of Phase 3 Effective Dates Pursuant to Resolution E-4898 and Resolution E-5000 and CPUC Letter of December 24, 2019 responding to a request to extend the date for Functions 1, 2, 3 and 8:

Phase 3 Function #		
	Description	**Effective Date (note)**
1	Monitor Key DER Data	~~January 20~~March 22, **2020**
2	DER Disconnect and Reconnect Command (Cease to Energize and Return to Service)	~~January 20~~March 22, **2020**
3	Limit Maximum Active Power Mode	~~January 20~~March 22, **2020**
4	Set Active Power Mode	12 months after approval of a nationally recognized standard that includes the function.
5	Frequency Watt Mode	**February 22, 2019**, which is 9 months following SunSpec Alliance Communication Protocol Certification Test Standard.
6	Volt Watt Mode	**February 22, 2019**, which is 9 months following SunSpec Alliance Communication Protocol Certification Test Standard.
7	Dynamic Reactive Support	12 months after approval of a nationally recognized standard that includes the function.
8	Scheduling Power Values and Modes	~~January 20~~March 22, **2020**

(T) (T) (T)

Note: The utilization of any of these functions is permissible under mutual agreement between the utility and the generating facility before the effective date.

(Continued)

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

5. COMMUNICATION REQUIREMENTS

a. The communication protocol requirements included in this section Hh.5 shall become mandatory for Generating Facilities utilizing inverter-based technologies for which an Interconnection Request is submitted ~~January~~ March 22, 2020. Until such date, this subsection may be used in all or in part by inverter-based technologies by mutual agreement of the Distribution Provider and the Applicant. The communications requirements herein shall be between: (T) (D)

(i) the Distribution Provider and the individual Generating Facility's inverter control or energy management system;

(ii) the Distribution Provider and communication to the Generating Facility through an aggregator not co-located or part of the Generating Facility; or

(iii) other communication options as are mutually agreed to are by Applicant and the Distribution Provider.

(Continued)

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

6. SCHEDULING CAPABILITY REQUIREMENTS

a. Generating Facilities which incorporate Smart Inverters shall incorporate scheduling capabilities with a minimum scheduling memory capability of at least 24 events. The capability for this requirement will be mandatory for Generating Facilities utilizing inverter-based technologies for which an Interconnection Request is submitted on or after ~~January~~ March 22, 2020. (T) (D) (D)

The utilization of this function is permissible under mutual agreement between the utility and the generating facility before the effective date.

Each event is composed of modifications to each, selected group of, or all of the following Smart Inverter function.

(i) Modifications to the voltage and reactive set-points of the Dynamic volt/var function.

(ii) Modifications to the reactive power set-points for the fixed power factor function.

(iii) Modifications to the voltage and watt-reduction level set-points for the volt/watt function.

(Continued)

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

7. MONITORING AND TELEMETRY REQUIREMENTS

a. The capability for this requirement will be mandatory for Generating Facilities utilizing inverter-based technologies for which an Interconnection Request is submitted on or after ~~January~~ March 22, 2020. (T) (D) (D)

The utilization of this function is permissible under mutual agreement between the utility and the generating facility before the effective date.

Smart Inverter shall have the capability to communicate its performance information including:

(i) Smart Inverter production or consumption of active power (Watts).

(ii) Smart Inverter consumption or production of reactive power (VARs)

(iii) Phase measured at the AC terminals of the Smart Inverter (Volts)

(iv) Frequency measured at the AC terminals of the Smart Inverter (Hz)

(Continued)

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

AT&T
Albion Power Company
Alcantar & Kahl LLP

Alta Power Group, LLC
Anderson & Poole

Atlas ReFuel
BART

Barkovich & Yap, Inc.
P.C. CalCom Solar
California Cotton Ginners & Growers Assn
California Energy Commission
California Public Utilities Commission
California State Association of Counties
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
County of Tehama - Department of Public Works
Crossborder Energy
Crown Road Energy, LLC
Davis Wright Tremaine LLP
Day Carter Murphy

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

Downey & Brand
East Bay Community Energy
Ellison Schneider & Harris LLP
Energy Management Service

Engineers and Scientists of California

Evaluation + Strategy for Social Innovation
GenOn Energy, Inc.
Goodin, MacBride, Squeri, Schlotz & Ritchie
Green Charge Networks
Green Power Institute
Hanna & Morton
ICF

International Power Technology
Intestate Gas Services, Inc.
Kelly Group
Ken Bohn Consulting
Keyes & Fox LLP
Leviton Manufacturing Co., Inc. Linde
Los Angeles County Integrated Waste Management Task Force
Los Angeles Dept of Water & Power
MRW & Associates
Manatt Phelps Phillips
Marin Energy Authority
McKenzie & Associates

Modesto Irrigation District
Morgan Stanley
NLine Energy, Inc.
NRG Solar

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

Pioneer Community Energy
Praxair

Redwood Coast Energy Authority
Regulatory & Cogeneration Service, Inc.
SCD Energy Solutions

SCE
SDG&E and SoCalGas

SPURR
San Francisco Water Power and Sewer
Seattle City Light
Sempra Utilities
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
Troutman Sanders LLP
Utility Cost Management
Utility Power Solutions
Utility Specialists

Verizon
Water and Energy Consulting Wellhead Electric Company
Western Manufactured Housing Communities Association (WMA)
Yep Energy