

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



Pacific Gas & Electric Company
ELC (Corp ID 39)
Status of Advice Letter 6612E
As of May 20, 2024

Subject: Operational Flexibility Pilot Proposal Pursuant to R. 17-07-007 Rule 21 Working Group 4
Decision 21-06-006 Ordering Paragraph 18

Division Assigned: Energy

Date Filed: 06-01-2022

Date to Calendar: 06-08-2022

Authorizing Documents: D2106006

Disposition:

Signed

Effective Date:

05-09-2024

Resolution Required: Yes

Resolution Number: E-5260

Commission Meeting Date: None

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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
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Energy Division's Tariff Unit by e-mail to
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June 1, 2022

Advice 6612-E

(Pacific Gas and Electric Company U 39 E)

Public Utilities Commission of the State of California

**Subject: Operational Flexibility Pilot Proposal Pursuant to R. 17-07-007 Rule 21
Working Group 4 Decision 21-06-006 Ordering Paragraph 18**

Purpose

Pacific Gas and Electric Company (PG&E) hereby submits this Tier 3 advice letter to propose an “Operational Flexibility” pilot, or OpFlex pilot, pursuant to California Public Utilities Commission (CPUC, Commission) Decision (D.) 21-06-006, Ordering Paragraph (OP) 18. The OpFlex pilot is intended to determine whether a distributed energy resource (DER) operational alternative would be sufficient mitigation for operational flexibility constraints.

Background**Rulemaking 17-07-007**

Rulemaking 17-07-007 the *Order Instituting Rulemaking to Consider Streamlining Interconnection of Distributed Energy Resources and Improvements to Rule 21*, was initiated in late 2017 where “the primary objective in this proceeding is to streamline the interconnection application process, which the adopted proposals aim to accomplish.”¹

In the original scoping memo and subsequent refinements, the proceeding was broken into two phases. The issues to be addressed in the first phase was further divvied up between four working groups. Each Working Group convened with the Commission, the IOUs² and various other parties over a period, culminating in a final working group report. That report was then used to inform the Commission in the preparation of a final decision addressing implementation of the various working group’s issues.

Pertinent to this advice letter, the November 16, 2018, Assigned Commissioner’s Amended Scoping Memo and Joint Administrative Law Judge Ruling (Amended

¹ D. 21-06-002 Background, p2.

² The IOUs, or investor-owned utilities, consist of Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company.

Scoping Memo) revised the scope and schedule for this proceeding in response to the Motion of the California Solar & Storage Association (CALSSA).

Issue F, which was identified in the Amended Scoping Memo is pertinent to this advice letter. It addresses the question of “what interconnection rules should the Commission adopt to account for the ability of DERMS and aggregator commands to address operational flexibility need?”³ The Amended Scoping Memo assigned Issue F (as well as other issues) to Working Group Four.

Working Group Four

Working Group Four first convened February 12, 2020, with twelve subsequent in-person and virtual meetings. On August 13, 2020, representatives of Working Group Four filed the final Working Group Four Report (Report). As noted in the Report, parties and other stakeholders participated in discussion of and developed proposals on the issues, including Issue F.⁴

In its background it explains:

During the Integration Capacity Analysis (ICA) Working Group in 2016-2017, participants developed methodology for the Integration Capacity Analysis. The Working Group agreed that ICA should be based on five constraints – thermal limits, steady state voltage, voltage fluctuation, protection, and operational flexibility.

The operational flexibility constraint was particularly difficult. The concept of operational flexibility with the ICA context is that utilities need the flexibility to reconfigure circuits during maintenance or unplanned outages. Because customers sometimes get switched to adjacent circuits, the impact of DERS on circuits that they might be connected to must be studied, even if they are not connected to those circuits in normal circumstances.

Five proposals to address Issue F were included in the report. This advice letter addresses Proposal F-1. The first, Proposal F-1, as described in the Working Group Four Report, requires:

Proposal F-1. Determine Whether a DER Operational Alternative Would Be a Sufficient Mitigation for Operational Flexibility Constraints⁵.

Following the resolution of Working Group Two issues 8 (Incorporating the Integration Capacity Analysis Results into Rule 21) and 9 (Conditions that allow Distributed

³ IBID p-6.

⁴ IBID p-4.

⁵ [Working Group 4 Final Report](#) p. 86.

Energy Resources to perform while avoiding upgrades) with Decision 20-09-035, Proposal F-1 in essence becomes:

If the output of a generating facility being interconnected is larger than the ICA values for that location with operating flexibility constraints taken into account (ICA-OF), but smaller than the ICA values without operational flexibility constraints taken into account (ICA-SG), then the distribution provider shall determine whether a DER operational alternative would be sufficient mitigation for operational flexibility constraints, consistent with the Commission decision on operationalizing ICA values within Rule 21.⁶

The Report goes on to explain:

This proposal will potentially allow more DER capacity to be added to a circuit while remaining within hosting capacity limits. The proposal addresses the problem that the ICA operation flexibility constraints may be severely limiting for many locations even if circuit reconfiguration at that location are rare. This leads to underutilization of existing hosting capacity. Also, DERs may be able to provide some grid support more effectively and/or at a cheaper cost than traditional approaches, but systems have not been established to make use of those opportunities.

Smart Invert Operationalization Working Group (SIWOG)

Proposal F-5 and Annex 4 of the Working Group Four Report, provides the Working Group Objectives, Scope, Formation, Oversight, and Timing.⁷ Further discussion of proposal F-1 were held at the SIWOG.

Decision 21-06-006⁸

Decision 21-06-006 was issued to address the remaining Phase 1 issues including those from Working Group 4. Pertinent to this advice letter, it address Proposal F-1.

Proposal F-1,

Section 5.4.2. of D. 21-06-006 addresses Issue F, and regarding this advice letter, Proposal F-1. In the summary discussion it concludes:

... we are concerned with statements from PG&E and SDG&E that neither have a system in place at this time to accommodate the operational alternatives anticipated in this proposal. Further, we agree that the evolution of operational alternatives may require re-evaluation, testing, or pilots. Accordingly, we adopt Proposal F-1, but find it prudent to initially pilot it. Further, we delay such piloting until utilities have implemented necessary equipment allowing the proposal capabilities.⁹

⁶ IBID p86.

⁷ IBID p98 and p121 respectively.

⁸ [D. 21-06-002](#) - Decision Addressing Remaining Phase I Issues - Issued June 4, 2021.

⁹ IBID, p71.

Ordering Paragraph 18

D. 21-06-006, in OP 18, the Commission directs that:

*18. Pacific Gas and Electric Company, San Diego Gas & Electric Company and Southern California Edison Company (Utilities) shall develop a proposal for a pilot of Proposal F-1, which would determine whether a distributed energy resource operational alternative would be a sufficient mitigation for operational flexibility constraints. **Six months after Utilities have implemented IEEE 2030.5 CSIP compliant production servers but not later than June 1, 2022, Utilities shall submit a Tier 3 Advice Letter seeking approval of the Proposal F-1 pilot; the Advice Letter shall include implementation timelines.***

[emphasis added]

This Advice Letter

This advice letter proposes a pilot to demonstrate the “Operational Flexibility Use Case” as defined by the objectives of Proposal F-1.

Proposal

The objective of Proposal F-1 is to determine whether a DER operational alternative would be sufficient mitigation, “if the output of a generating facility being interconnected is larger than the Integration Capacity Analysis (ICA) values for that location with operating flexibility constraints taken into account (ICA-OF), but smaller than the ICA values without operational flexibility constraints taken into account (ICA-SG).”¹⁰

The ICA OpFlex limit is the calculated limit of reverse power flows through SCADA enabled devices on the as-built system when interconnecting new generating facilities on the distribution system. This is used as a proxy to determine if the generation facility could impact the grid adversely during alternative switching configurations. The draft of Resolution E-5172, proposes to update the Electric Rule 21 Screen M tariff language to allow interconnecting customers to bypass Screen M if the generating facility’s aggregate gross nameplate rating is less than or equal to 90% of the lowest ICA-SG (Generation Hosting Capacity without OpFlex) 576 **and** the lowest ICA-OF (Generation Hosting Capacity with OpFlex) 576 profile¹¹. Because the ICA-SG will always be greater than or equal to the ICA-OF, the proposed resolution would require a supplemental review be done if customers want to connect above the ICA-OF and up to the ICA-SG amount (ICA-

¹⁰ D. 20-06-002 p68. Also, ICA –OF is Integrated Capacity Analysis – Operational Flexibility, and ICA-SG is Integrated Capacity Analysis – Static Grid.

¹¹ E-5172 Draft Comment Resolution (PGE AL5915-E SCE AL 4561-E and SDGE AL 3677-E), Appendix A, p48.

<https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M477/K844/477844644.PDF>

SG incorporates the remaining 4 constraints within ICA: thermal limits, steady state voltage, voltage fluctuation, and protection).

PG&E's OpFlex Pilot intends to demonstrate capabilities to curtail generating facilities in the case of abnormal switching conditions to avoid safety and/or reliability issues and to evaluate whether the operationalization of these capabilities could allow participating interconnecting customers to bypass the supplemental review, and any associated costs and delays, while connecting to the as-built system at the ICA-SG value. This assumes that switching scenarios that impact the customer are infrequent, and therefore connecting up to the ICA-SG would allow for a better utilization of hosting capacity.

PG&E sees four distinct areas of development that will be required in order to fully operationalize the OpFlex use case into day-to-day grid operations. The primary focus of PG&E's OpFlex Pilot demonstration will be on the first area below with results informing future activities to operationalize and scale the use case.

1. Demonstrate Ability to Curtail Participating Generating Facilities:

The communications and curtailment control signals need to be tested to ensure PG&E can send control commands, limits, or schedules, and that end devices properly receive and interpret them. While initially such types of controls could be done over SCADA, since IEEE 2030.5 was specifically mentioned regarding the timeline of filing, it is expected that a CSIP implementation of IEEE 2030.5 is to be used. PG&E has thus far tested telemetry capabilities of CSIP-certified IEEE 2030.5 devices and experienced considerable challenges in terms of interoperability and off-the-shelf functionality. Therefore PG&E is not confident in the off-the-shelf ability for CSIP certified devices to properly receive and respond to controls without significant testing and verification which will be a key focus of the pilot.

2. Identify Triggers for OpFlex Curtailment:

The methods to trigger an OpFlex curtailment are important regarding how this could eventually be implemented in a production system. While manual triggering could be achieved via process steps and increased situational awareness of affected generating facilities, automated triggering would require systems such as an Advanced Distribution Management System (ADMS) to be developed and this functionality tested. In addition, informational systems will need to be updated to provide information on the OpFlex capabilities of any particular generating facility.

3. Develop Curtailment Calculation and Allocation Methodology:

A process or system would need to be developed to determine the amount of curtailment required at each generating facility during an OpFlex event. The complexity of this analysis can vary depending on implementation. The simplest

method would be to curtail to a fixed value (e.g. ICA-OF value) every time regardless of the switching scenario. A more complex solution would require a specific analysis done for each generating facility within an abnormally switched area to determine a specific curtailment amount per customer. This process would need to be developed manually at first using current tools but could be built into systems like ADMS for more automated and optimized functionality.

4. Develop Operational Processes to Implement OpFlex:

Operational processes and engineering tools will need to be developed to implement OpFlex at scale. These processes will need to instruct Operators and Engineers how to build OpFlex into their switching plans. This includes providing Engineers ways to analyze switching scenarios with various curtailment capabilities of defined generators. Operators will then need to be able to assign those curtailment capabilities to generators in the field at the appropriate time in the switching sequence. Additionally, mitigation processes will need to be developed in the scenario where generation facilities do not respond, or inadequately respond, to controls from the utility.

Staged Approach to Developing and Piloting OpFlex Capabilities

PG&E proposes a three-stage pilot to meet the objective of Proposal F-1 in a timeline that is consistent with the guidance that “we delay such piloting until utilities have implemented necessary equipment allowing the proposal capabilities.”

Stage 1: Redwood Coast Airport Microgrid (RCAM) – Q3 2022 – Q2 2023

To begin the analysis immediately, PG&E proposes leveraging the Redwood Coast Airport Microgrid implementation to evaluate the manual process and implementation of control during abnormal switching. RCAM recently became operational at the end of May 2022, and includes the capability for Operators to curtail the battery charge and discharge amounts during abnormal switching as contemplated in the proposal F-1 for the OpFlex pilot. Using this site will allow PG&E to begin initial analysis for the scopes of work:

- Dispatch of Curtailment – Evaluate reliability of dispatch communications and Operator ability and comfort level to perform dispatch under the defined processes
- Triggers for OpFlex curtailment – Evaluate the situations that trigger a curtailment, and how are Operators informed
- Curtailment Amount Determination – Evaluate the process steps and manual studies required to determine the amount of curtailment
- Operational Process Impacts – Evaluate how well does the initially defined RCAM process work for the OpFlex use case, and identify any improvements in the current process

RCAM provides PG&E insight into how the manual processes and implementation of constraints via SCADA work in the near-term, prior to the development of more advanced capabilities via CSIP-certified IEEE 2030.5 systems or ADMS.

Stage 2: CSIP-certified IEEE 2030.5 Controls Testing – Q2 2022 – Q4 2022

Through the EPIC 3.03 project, PG&E has deployed a CSIP-certified IEEE 2030.5 server, completed interoperability testing with two CSIP-certified client gateways from different manufacturers for the telemetry-only use case, and has deployed the telemetry use case to a production environment. There were significant challenges overcome through the EPIC 3.03 project particularly related to vendor maturity with a new standard and interoperability of CSIP-certified devices. Based on this experience, PG&E believes that it is essential to test the functionality in a lab environment prior to any field deployment of these capabilities, and a technical assessment of the CSIP-certified equipment's ability to perform controls is needed to evaluate the dispatch of curtailment.

For Stage 2, PG&E proposes initial control testing be completed with the existing CSIP IEEE 2030.5 vendor in a lab test environment to identify any issues with functions limiting real power. However, the CSIP IEEE 2030.5 DER Headend system developed as part of the EPIC 3.03 pilot project will soon be retired and replaced with PG&E's ADMS vendor, currently scoped for deployment in 2023. Rather than making additional investments in a system that is soon to be retired, the learnings from the Stage 2 testing will be incorporated into the production ADMS rollout. The EPIC team has already performed a similar transfer of knowledge involving CSIP IEEE 2030.5 telemetry, transferring lessons learned from EPIC and being involved in the ADMS testing of telemetry-related functions to implement that technology more efficiently.

Stage 3: ADMS Rollout (CSIP IEEE 2030.5) – Q1 2023 – Q1 2024

In 2023 PG&E will be replacing the existing EPIC 3.03 CSIP-certified IEEE 2030.5 Headend server as part of the larger ADMS deployment. The ADMS system will also be CSIP-certified. In the first half of 2023 the ADMS will undergo acceptance testing for interoperability with customer-owned telemetry vendor clients as well as the basic control functionality required for OpFlex.

Once PG&E has tested and deployed this system in ADMS in the second half of 2023, PG&E can then conduct a field demonstration of these capabilities. This will complete the pilot by finalizing implementation of the manual dispatches and processes developed in stages 1 and 2.

Post OpFlex pilot: ADMS Rollout (Advanced Functionality) – 2024 and beyond

PG&E plans to include advanced functionality for ADMS with analysis and design starting in 2023. It is expected that at scale, OpFlex would be difficult to manage via manual studies and processes and will require the advanced functions that will be included in future ADMS releases. ADMS could potentially automate some of these functions

through tools like load-flow analysis, forecasting, switching integration, and enhanced situational awareness and modeling of DERs. Learnings from the OpFlex pilot will influence the ADMS development.

Distribution Grid Services - Additional Scope

The OpFlex pilot as described in Working Group 4 F-1 is rooted in the interconnection use case with the ultimate goal of streamlining interconnection while maintaining safety and reliability of the grid. This is made evident by its classification in the “Interconnection Use Cases” of Annex G in the Working Group 3 Final Report.

Annex G of the Working Group 3 Final Report also contemplates other grid services, specifically, capacity, constant voltage boost, and voltage reduction. PG&E has demonstrated these functions using IEEE 2030.5 (prior to the latest version of CSIP) with aggregators in the field in PG&E’s [EPIC 2.02 DERMS project¹²](#). These “Grid Services” functions are not required to achieve the OpFlex pilot objectives. These functions are currently being discussed and prioritized in the Smart Inverter Operationalization Working Group (SIOWG) under the High-DER OIR Track 3. Therefore, PG&E’s proposal exclusively focuses on the OpFlex pilot on constraint management in relation to ICA values as specified in Working Group 4 proposal F-1¹³.

Funding

No funding sources were specified for the OpFlex pilot. PG&E is planning to use existing funds from EPIC and the GRC funded ADMS project to satisfy the objectives and timeline of the OpFlex pilot as defined in this proposal.

Protests

Anyone wishing to protest this submittal may do so by letter sent electronically via E-mail, no later than **June 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

¹² https://www.pge.com/pge_global/common/pdfs/about-pge/environment/what-we-are-doing/electric-program-investment-charge/PGE-EPIC-2.02.pdf.

¹³ [WG 4 Report](#) p. 86.



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 (U 39 E)

Utility type:

- ELC GAS WATER
 PLC HEAT

Contact Person: Stuart Rubio

Phone #: (415) 973-4587

E-mail: PGETariffs@pge.com

E-mail Disposition Notice to: SHR8@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) #: 6612-E

Tier Designation: 3

Subject of AL: Operational Flexibility Pilot Proposal Pursuant to R. 17-07-007 Rule 21 Working Group 4 Decision 21-06-006 Ordering Paragraph 18

Keywords (choose from CPUC listing): Compliance

AL Type: Monthly Quarterly Annual One-Time Other:

If AL submitted in compliance with a Commission order, indicate relevant Decision/Resolution #: D.21-06-006

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: N/A

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:

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

Telephone (xxx) xxx-xxxx: (415)973-2093
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

**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 Blasing 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
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Hanna & Morton
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Kelly Group
Ken Bohn Consulting
Keyes & Fox LLP
Leviton Manufacturing Co., Inc.

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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
Stoel Rives LLP

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TerraVerde Renewable Partners
Tiger Natural Gas, Inc.

TransCanada
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Yep Energy