

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



**Pacific Gas & Electric Company**  
**ELC (Corp ID 39)**  
**Status of Advice Letter 6638E**  
**As of August 15, 2022**

Subject: Demonstration of Pathways to Scale Implementation of PG&E's Vehicle-Grid Integration (VGI) Pilot #3: Microgrids Pilot

Division Assigned: Energy

Date Filed: 07-07-2022

Date to Calendar: 07-08-2022

Authorizing Documents: E-5192

|                        |                   |
|------------------------|-------------------|
| <b>Disposition:</b>    | <b>Accepted</b>   |
| <b>Effective Date:</b> | <b>08-11-2022</b> |

Resolution Required: No

Resolution Number: None

Commission Meeting Date: None

CPUC Contact Information:

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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
- 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- Disposition of Filing (Accepted, Rejected, Withdrawn, etc.)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](mailto:edtariffunit@cpuc.ca.gov)**

July 1, 2022

**Advice 6638-E**

(Pacific Gas and Electric Company ID U 39 E)

Public Utilities Commission of the State of California

**Subject: Demonstration of Pathways to Scale Implementation of PG&E's Vehicle-Grid Integration (VGI) Pilot #3: Microgrids Pilot**

**Purpose**

To provide potential pathway(s) to scale implementation of the Microgrids Pilot, pursuant to Ordering Paragraph (OP) 5 of Resolution (Res.) E-5192.

**Background**

On July 15, 2021, PG&E filed Advice Letter (AL) 6259-E, proposing four V2X pilot programs, including the Microgrid Pilot (Pilot 3). The Microgrids Pilot would utilize EVs to charge and discharge in a multi-customer microgrid to support community resiliency during a Public Safety Power Shutoff (PSPS) event.

On May 5, 2022, the California Public Utilities Commission (Commission) issued Res. E-5192 approving Pilot 3. However, the Commission noted that the VGI pilots template application requires applicants to (1) analyze the potential to scale the pilot to a full utility program and (2) describe how the pilot could be scaled if successful and on what timeframe.<sup>1</sup> Accordingly, OP 5 of the resolution directs PG&E to file a Tier 2 Advice Letter demonstrating potential pathways to scale implementation through existing or potential new programs that would further the goals of Senate Bill (SB) 676.

**PGE's Response to Ordering Paragraph 5 of Resolution E-5192****I. Analysis on Potential to Scale the Pilot**

The potential to scale the Microgrids Pilot is dependent on the resolution of several unknowns. To date, PG&E has identified the following technical, market, and customer factors that will influence the ability to scale:

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<sup>1</sup> Res. E-5192, pp. 27-28; footnote 96.

- The technical sufficiency of the Rule 21 Advanced Inverter functionality to support microgrid use cases;
- The cost-effectiveness and compatibility of the additional distribution operations/controls and Front of the Meter (FTM) generation with the behind-the-meter (BTM) distributed energy resources (DERs) such as electric vehicles that is needed to support a microgrid solution; and
- The EV owners' desire for participation in a program that will impact their vehicle's state-of-charge and mobility in order to support a microgrid, and/or the vehicle manufacturers' development of software to manage the vehicle's state-of-charge when participating in a microgrid.

### ***1. Scalable technical feasibility - Rule 21 Advanced Inverter Functionality***

As part of the California Energy Commission funded Electric Program Investment Charge (EPIC) 3.11B project, PG&E is developing the capability to control behind-the-meter (BTM) distributed energy resources (DERs) via a frequency-droop scheme which leverages the existing Rule 21 Advanced Inverter functions. The frequency-droop (also known as "frequency watt") inverter function varies the output of the DER to either charge or discharge based on high or low frequencies. If system frequency can be controlled, this frequency droop function enables the front-of-the-meter (FTM) generation source to gain control of the DER's behavior.

When grid-connected, system frequency is universally 60 Hz so the frequency droop function does not control the BTM DER's output. However, when in islanded mode, frequency is a common value for every point in the microgrid and can be varied slightly above or below 60 Hz by controlling the FTM generator that is acting as the grid source as a frequency modulating device. This varying of the FTM generator's frequency can then be utilized to directly control the BTM DER outputs resulting in their response to charge or discharge the vehicle provided the vehicle battery has the necessary state-of-charge.

Since the Microgrids Pilots will utilize existing Rule 21 Advanced Inverter functions, it is anticipated that using electric vehicles (EVs) to support microgrids could be highly scalable with little to no additional cost to the customer beyond the cost of the bi-directional charger itself, if the following technical matters are true: 1) the BTM DERs frequency-droop functionality behaves consistently and a successful outcome of the EPIC 3.11B project is achieved, 2) a set of frequency-droop settings exist that work for both grid-connected and islanded modes, 3) Rule 21 interconnection requirements are updated to adopt these settings, and 4) preference settings on the charger/vehicle that preserve customer mobility are developed and put into place.

## ***2. Cost-Effectiveness and Compatibility of Additional Resources Needed to Support a Resiliency Microgrid***

As described above, for a microgrid to function, the BTM DERs must have the capability to respond to frequency and the FTM generator(s) must be able to set a microgrid frequency that triggers the desired response from the BTM DERs. There are two tiers of resiliency that can be obtained from the system with varying requirements for generators and operations and with differing impacts on cost-effectiveness.

First, there is Tier 1 – Microgrid Stabilization. In this tier, regardless of advanced control over the FTM generator, the BTM DERs can support resiliency by either charging or discharging when frequency is too low or too high. This automatic response from the BTM DERs will aid in keeping the microgrid from destabilizing and tripping offline from either over or under generation, but it will not allow for optimizing power flow from the BTM DERs (in this case: intentionally discharging a vehicle) for the purposes of offsetting microgrid fuel consumption or emissions. While scaling this Tier 1 capability has little to no barriers with respect to integration with FTM generators through Rule 21, this type of control may not be cost-effective because it is unoptimized and only available as a last resort when the microgrid is at the edge of tripping offline. This capability alone is unlikely to reduce the need for FTM generation (diesel or otherwise) and would not result in a reduction of cost to operations and thus would not be cost-effective in and of itself outside of an event that would cause an unintentional outage.

The second tier of resiliency is Tier 2 – Islanded Microgrid Energy Optimization. With an advanced controller on the FTM generator, the frequency can be varied intentionally up or down allowing for the ability to optimize the output of the BTM DERs. This type of control can allow for additional resiliency capability where the vehicles could be charged from excess solar generation or discharged as a preference to consuming additional FTM generator fuel. However, for Tier 2, integration barriers with FTM generators do exist that could impact scalability. The FTM generator would need to have the technical and process capabilities to vary its frequency deliberately with differing levels of control, capability, and value depending on how optimized the control can be. This variation can depend based on whether or not the FTM generator is inverter based or a rotating machine and the quality and capabilities within the controller of the FTM generator. This is an area of exploration as part of the EPIC 3.11B program and the feasibility of integrating this capability into operations will vary the cost-effectiveness of the overall solution. If a solution can be identified that is easy to scale, implement, and compatible with existing FTM generators for coordinating the discharge of the electric vehicle during island events, then a cost-effective solution that reduces fuel consumption, emissions, or reduces the maximum capacity factor of the FTM generator could be obtained.

### **3. Customer preferences for state-of-charge management and Vehicle Manufacturer capabilities**

Use of the customer's vehicle to support the microgrid will charge or discharge the vehicle's battery, thereby momentarily changing the available range and mobility of the vehicle and incurring a cost to the customer for energy exported or purchased. Longer term, a small amount of wear will be imparted on the vehicle's battery, but this is likely considered to be de minimis due to the low occurrence of PSPS and the lower magnitude of the usage in comparison to driving or DC fast charging the vehicle. Furthermore, the vehicle or charger manufacturer would need to put in place the capability to limit discharging to ensure the customer always has a minimum amount of battery capacity for mobility purposes.

These complexities and costs may impact customer willingness to participate which could require additional compensation that would then need to be evaluated for cost-effectiveness. The types and amount of compensation that may be required to entice customer participation can be quantitative (such as: energy lost due to export, efficiency losses, battery degradation, setup costs, or otherwise) as well as qualitative (such as: the loss of mobility) while also remaining economic to the system. Through this pilot, PG&E looks to learn about customer and system costs, in ascertaining the amount of compensation that will impact the customer uptake and determine the feasibility of scalability of a follow-on utility program.

## **II. Methods for Scaling the Pilot, If Successful, and Possible Timeframes**

The proposed approach to scaling Pilot 3 is to first offer incentives to spur growth and gain immediate learnings, and to then design and transition over to a cost-effective program if feasible. The source of the incentive to spur growth is from the VGI Decision pilot funds with the follow-on cost-effective program yet to be determined but can be potentially designed out from the learnings of the pilot.

A typical scenario for an eligible customer entering the Pilot would be as follows:

- Customer enrolls in *Pilot #1 – V2X Residential* or *Pilot #2 – V2X Commercial*
  - From this enrollment, the customer will also be required to enroll into the Emergency Load Reduction Program (ELRP) for grid-connected control
  - The customer can receive up to \$5,000<sup>2</sup> upfront for an eligible bidirectional charger installation.

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<sup>2</sup> Pilot 1 customers can receive up to \$2,500 (\$3,000 for those in AB 841 Prioritized Communities) upfront. PG&E proposes to update the Pilot 2 upfront incentives in AL 4626-G/6637-E. If approved, customers with "low power" DC bidirectional chargers < 50 kW can receive up to \$2,500 (\$3,000 for those in AB 841 Prioritized Communities) and customers with "high power" DC bidirectional chargers ≥ 50 kW can receive up to \$4,500 (\$5,000 for those in AB 841 Prioritized Communities).

- Customer within a compatible Public Safety Power Shutoff (PSPS) or Community Microgrid Enablement Program (CMEP) microgrid is marketed to directly by PG&E and is enrolled in *Pilot #3 – Vehicle-to-Microgrid Pilot*
  - From this enrollment, the customer’s bi-directional inverter will need to be updated with the appropriate frequency-droop settings
  - Customer can receive up to an additional \$3,750 to \$5,000 for participation in Pilot #3
- Customer continues to participate in supporting the microgrid for the duration of Pilot #3
  - Customer retains option to disconnect the vehicle from the grid or to place preference on charging/discharging such that their mobility is not significantly impacted during emergency events
  - Additional data on customer preference and limitations will be gathered through the course of Pilot #3

PG&E proposes an additional \$3,750 to \$5,000 per customer/site to participate in Pilot #3, which is **additive to any Pilot 1 or 2, or other, incentive**. A large incentive is recommended for a few reasons:

1. Since these vehicles would be used during an “emergency” type scenario where the bulk electric system is already unavailable and wider-scale community disruptions are in effect (e.g. community-level PSPS de-energizations), leaving only microgrid resources online, it was hypothesized that the compensation would need to be reasonably high.
2. The overlap of sites that can be used for this purpose (inside an existing and operational PSPS or CMEP microgrid, that also actually experiences an actual PSPS or grid outage) and customers is rather small and we would want to gain adoption during this phase so that there are key learnings ahead of developing a broader program that would apply to the many yet-to-be-built microgrids across the network.

At the current time, PG&E cannot ascertain whether the program is scalable at the proposed incentive levels, as the incentive levels needed per customer for participation in such a configuration potentially may not outweigh the cost of running an incremental amount of additional fuel (e.g. diesel, natural gas, or hydrogen) through a temporary generation resource. However, PG&E believes this economic stimulus via incentives, combined with targeted marketing outreach to customers in compatible multi-customer microgrids, will enable sufficient pilot enrollment to prove out the concept within the next two years. Once the pilot is successful, PG&E can then better calculate the actual costs for deploying microgrid capability, which would in turn be used to inform a cost-effective program.

### **III. Cost effectiveness for scaling programs beyond the initial Pilot**

While PG&E cannot currently ascertain the cost-effectiveness of this program, there are potential perspectives on creating a cost-effective program while simultaneously generating meaningful adoption. The below perspectives will require validation or adjustments based on the learnings of the Pilot.

#### Our proposed market development and pricing approach:

We believe that the value of the bidirectional charging/discharging service of EVs in multi-customer microgrids may be priced up to the cost of an equivalent cost of generation within the microgrid (be it diesel, hydrogen, or other fuel source or a renewable resource such as solar).

Our suggested approach to a follow-on full-scale program:

1. Leverage the VGI Decision V2X Pilots, and any other related programs, to spur adoption of bi-directional vehicles and chargers in the market. As that market grows, an install base of compatible vehicles will be available across the network, including within PSPS and CMEP microgrids.
2. Make available a follow-on program to Pilot #3 which sets compensation no higher than the cost of existing generation.

With this approach, customer compensation will always be at or below the cost of an existing generation resource. Customers located within these PSPS and CMEP microgrids would receive additional compensation for a charger and vehicle asset they already have; which should make the capability attractive depending on how much additional compensation is available.

#### Challenge remains in identifying the relevant cost of existing generation to benchmark against:

An area of learning we're looking to get through Pilot #3 is an understanding of the cost of existing generation as it relates to a bi-directional vehicle-based alternative. As we gather data through this Pilot #3, we will study the cost impacts internally, and then propose via Advice Letter or Application guidelines for a follow-on program, including metrics to evaluate program cost-effectiveness consistent with cost-effectiveness policy determinations in the IDER proceeding, or its successor. This would happen towards the end of the Vehicle-to-Microgrid Pilot #3 in the 2024-2025 timeframe (depending on Pilot launch) and may be combined with an Advice Letter or Application on Rule 21 updates to enable the adoption of the technical capability broadly.

#### **IV. Programs that PG&E could utilize to further the adoption of vehicle-to-microgrid capability**

##### Existing programs

- V2X Pilots #1 and #2 can be combined with Pilot #3
- Community Microgrid Enablement Program (CMEP) would support adoption of microgrids broadly, in which bidirectional vehicles could participate

##### Potential new programs

- Establish a follow-on cost-effective program for vehicles in microgrids utilizing the criteria discussed previously in this advice letter.
- Establish an incentive program for bi-directional EVs, using processes similar to out rebate programs such as energy efficiency, the Self Generation Incentive Program, or Energy Savings Assistance.

##### **Protests**

Anyone wishing to protest this submittal may do so by letter sent electronically via E-mail, no later than July 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, and OP 5 of Resolution E-5192, this advice letter is submitted with a Tier 2 designation. PG&E requests that this Tier 2 advice submittal become effective on regular notice, July 31, 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. 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/>.

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/S/

Sidney Bob Dietz II  
Director, Regulatory Relations



# 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) #: 6638-E

Tier Designation: 2

Subject of AL: Demonstration of Pathways to Scale Implementation of PG&E's Vehicle-Grid Integration (VGI) Pilot #3: Microgrids Pilot

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 #: Resolution E-5192

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: 7/31/22

No. of tariff sheets: 0

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

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

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

Tariff schedules affected: N/A

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

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

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

**Protests and 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](mailto: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  
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Alta Power Group, LLC  
Anderson & Poole

Atlas ReFuel  
BART

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California Cotton Ginners & Growers Assn  
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California Hub for Energy Efficiency  
Financing

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

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Casner, Steve  
Center for Biological Diversity

Chevron Pipeline and Power  
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City of San Jose  
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Coast Economic Consulting  
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Crossborder Energy  
Crown Road Energy, LLC  
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East Bay Community Energy Ellison  
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Kelly Group  
Ken Bohn Consulting  
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Leviton Manufacturing Co., Inc.

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Waste Management Task Force  
MRW & Associates  
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Marin Energy Authority  
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Modesto Irrigation District  
NLine Energy, Inc.  
NRG Solar

OnGrid Solar  
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Pioneer Community Energy

Public Advocates Office

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Sempra Utilities

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Southern California Edison Company  
Southern California Gas Company  
Spark Energy  
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