



# CPUC Actions for Microgrid Deployment – Track II Staff Proposal Workshop

---

Energy Division

Julian Enis, Forest Kaser, Rosanne Ratkiewich, Patrick Saxton, Joyce Steingass, Jessica Tse, Daniel Tutt



## Workshop Logistics, Technical Orientation, and Ground Rules

---



# Webex and Call-In Information

---

## Join by Computer:

<https://cpuc.webex.com/cpuc/onstage/g.php?MTID=e962a9e89b82d4032edb16486da2c26b>

Event Password: 2HjrN3sZKz7

## Join by Phone:

- 1-855-282-6330 (toll free); 1-415-655-0002 (toll)
- Meeting number (access code): 146 230 2927

## Note:

- Staff recommends using your computer's audio if possible.
- Today's presentation is available from the meeting invite (follow link above).
- Today's event is being recorded. The recording will subsequently be distributed to the service list for R.19-09-009.



# Workshop Logistics

---

## Notes for Attendees:

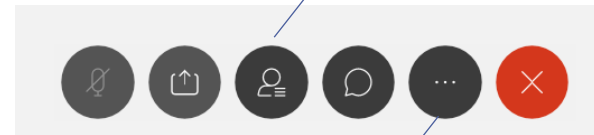
- All attendees are muted on entry to the event by default.
- The chat function will be disabled for this event.
- Please either wait for the Q&A segments to “raise your hand” and ask questions verbally or direct written questions to the Q&A function.
  - See next slide for more details.



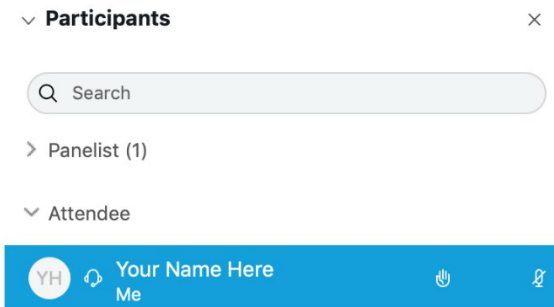
# Workshop Logistics

- Questions can be asked verbally during Q&A segments using the “raise hand” function.
  - The host will unmute you during Q&A portions and you will have a maximum of 2 minutes to ask your question.
  - Please “lower your hand” after your question is answered.
  - If you have another question, please “re-raise your hand” by clicking on the “raise hand” button twice.
- Questions can also be written in the Q&A box and will be answered verbally during Q&A segments.

Click here to access the attendee list to raise and lower your hand



Click here to access the Q&A function.



**Raise your hand** by clicking the hand icon. Lower it by clicking again.



## Opening Remarks and Agenda

---



# Concept Paper and Track II Staff Proposals

## Microgrids and Resiliency Staff Concept Paper

California Public Utilities Commission Energy Division

Pursuant to Senate Bill 1339 (2018) and R. 19-09-009  
July 22, 2020



**Concept Paper  
(97 pages)**

## Staff Proposal for Facilitating the Commercialization of Microgrids Pursuant to Senate Bill 1339

California Public Utilities Commission Energy Division

Pursuant to Senate Bill 1339 (2018) and R. 19-09-009  
July 22, 2020



1 | Page

**Track II Staff Proposal  
(43 pages)**



# Workshop Agenda

---

Introduction	10:00 – 10:30 am
Key Microgrid Concepts	10:30 – 11:00 am
Stretch Break	11:00 – 11:15 am
Proposal 1 & Proposal 2	11:15 – 12:00 pm
Lunch	12:00 – 1:00 pm
Proposal 3 & Proposal 4	1:00 – 2:30 pm
Stretch Break	2:30 – 2:45 pm
Proposal 5	2:45 – 3:15 pm
Secondary Proposals	3:15 – 3:45 pm
Additional Q&A	3:45 – 4:55 pm
Closing Remarks and Next Steps	4:55 – 5:00 pm

**Note: The full detail agenda is provided [here](#).**





## Procedural Context

---



# Milestones

---

- ALJ Ruling with Track 2 Staff Proposal/Concept Paper released – 7/23/2020
  - Link: <https://docs.cpuc.ca.gov/SearchRes.aspx?docformat=ALL&docid=344038386>
  - Comments on ruling due – 8/14/2020
  - Reply comments due – 8/28/2020
- Diesel Alternatives Workshop – 8/25/2020
  - Note that diesel alternatives are not in the scope of this workshop



## Key Microgrid Concepts

---



# Key Microgrid Concepts

---

- Definitions
- Microgrid Attributes
- Value Propositions



# Definitions - Microgrids

---

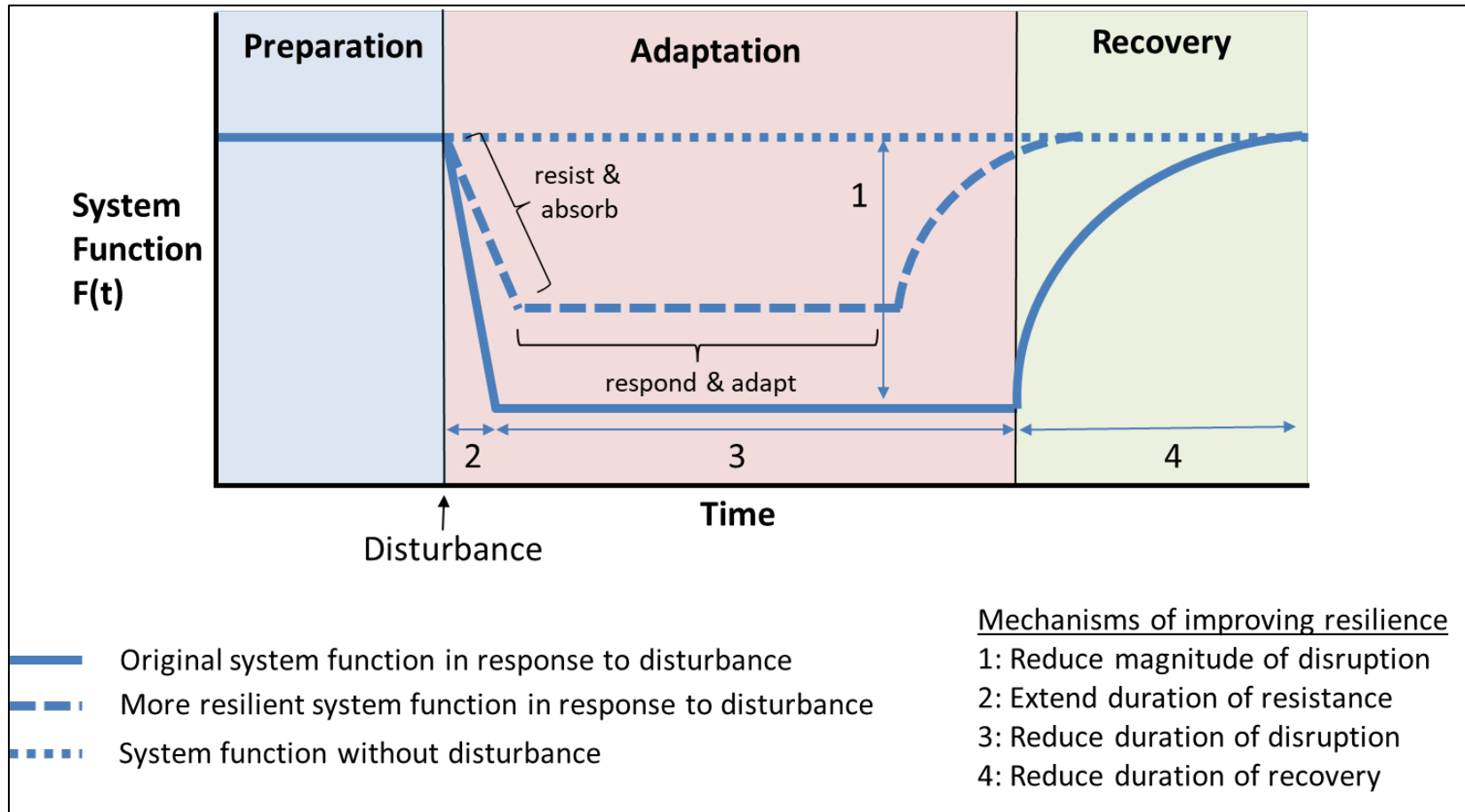
## Core Characteristics

- 1) a relatively small size; and
- 2) the ability to serve loads, as a system, independent of a larger electrical grid. For the purposes of this proposal, unless otherwise specified.

When describing specific barriers and proposals, Staff will denote the specific applicable types of microgrid. This description may include but not be limited to the type of ownership, targeted customers, and electrical configuration.



# Definitions - Resiliency



Resilience Trapezoid (adapted from Panteli, et al. (2017); T. Ding, Y. Lin, G. Li, et al. (2017); T. Ding, Y. Lin, Z. Bie, et al. (2017))



# Definitions - Resiliency

---

Resiliency refers to the ability to mitigate the impact of a large, disruptive event by any one or more of the following mechanisms:

1. Reducing the magnitude of disruption;
2. Extending the duration of resistance;
3. Reducing the duration of disruption;
4. Reducing the duration of recovery.

As discussed in the definition of resiliency, the ability of microgrids to provide resiliency can be characterized using the following parameters:

- a. The system functions that are supported;
- b. The type of disruptive events that are being protected against;
- c. The aspects of resiliency that are affected;
- d. The amount by which each aspect of resiliency is expected to improve.



# Definitions - Commercialization

---

The stages of commercialization can be understood to be:

- 1) Research and development and technology innovation;
- 2) Market testing and pilot projects;
- 3) Early commercialization (early adoption); and
- 4) Scalable or mass production and adoption by market.

Metrics based on what effect regulatory interventions are having on the commercialization of microgrids might be:

1. Consumer awareness
2. Contractor training
3. Number of microgrid interconnections approved
4. Number of alliances formed
5. Number or frequency of microgrids installed in which sectors reduction in microgrid costs
6. Improved capital availability





# Microgrid Attributes

Attribute	Descriptors for Specifying Attributes
<b>Size and Type of Generation and Storage and Fuel</b>	<ul style="list-style-type: none"> <li>● [X] MW [X] technology (e.g., solar PV, wind turbine, solid oxide fuel cell, reciprocating engine, etc.)</li> <li>● [X] MW/ [X] MWh [X] technology energy storage system (e.g., lithium ion battery, vanadium redox flow battery, load leveler, etc.)</li> <li>● [X] fuel (e.g., diesel, biodiesel, natural gas, renewable natural gas, biomethane, hydrogen)</li> </ul>
<b>Location of Assets</b>	<ul style="list-style-type: none"> <li>● Customer Sited</li> <li>● Utility Sited</li> </ul>
<b>Ownership of Assets</b>	<ul style="list-style-type: none"> <li>● Customer Owned</li> <li>● Utility Owned</li> <li>● Third Party Owned</li> </ul>
<b>Real Property</b>	<ul style="list-style-type: none"> <li>● Type I: Single parcel</li> <li>● Type II: 1-2 contiguous parcels not crossing street</li> <li>● Type III: &gt; 2 contiguous parcels, not crossing street</li> <li>● Type IV: assets cross street</li> </ul>



# Microgrid Attributes cont.

Attribute	Descriptors for Specifying Attributes
Operational Responsibilities	<ul style="list-style-type: none"><li>• Unitary operation</li><li>• Split operation</li></ul>
Relationship to Grid	<ul style="list-style-type: none"><li>• Grid-tied</li><li>• Independent</li></ul>
Market Orientation	<ul style="list-style-type: none"><li>• Customer-Facing</li><li>• Grid-Facing</li></ul>
Islanding Duration	<ul style="list-style-type: none"><li>• Long Duration</li><li>• Short Duration</li><li>• Indefinite</li></ul>
Greenhouse Gas and Criteria Air Pollutant Emissions	<ul style="list-style-type: none"><li>• Fossil Fuel</li><li>• Renewable</li><li>• Hybrid</li></ul>
Asset Portability	<ul style="list-style-type: none"><li>• Stationary</li><li>• Portable</li></ul>



# Value Propositions

---

- Backup Power
- Grid Services
- Greenhouse Gas and Criteria Pollutant Emissions Reductions
- Resource Adequacy
- Energy Efficiency, Demand Management, and Distributed Energy Resources
- Customer Choice
- Land Use
- Resiliency



Questions?

---



## Stretch Break (15 Minutes)

---



## Proposal 1: Direct Utilities to Revise Rule 2 to Explicitly Allow IOUs to Install Microgrids as Special Facilities

---



# Rule 2 Barrier Summary

---

## Summary:

- Added/special facilities are defined in each utility's respective versions of Rule 2 as equipment that is in addition to or a substitute for standard equipment required to interconnect to the IOU's system.
- The rule could act as a barrier to microgrid development because the IOUs do not specifically refer to generation control devices or microgrid controllers in their versions of this rule and may feel obligated to seek permission directly from the CPUC to enter arrangements to install microgrid facilities for customers who request them.
- The perceived need to seek explicit authorization from the CPUC can add regulatory uncertainty, delays, and complexity to the project development process.



# Rule 2 Proposal Option 1

---

## Option 1:

Require the IOUs to amend their respective versions of Rule 2 to explicitly state that IOU operated microgrid controllers and generation and storage control devices are covered as added/special facilities under Rule 2.

## Rationale:

- This would ensure that these types of devices are explicitly covered under Rule 2. This would allow customers to seek these types of microgrid arrangements with their utilities without the need for the utility to seek a deviation from Rule 2 from the CPUC.





# Rule 2 Proposal Option 2

---

## Option 2:

Require Southern California Edison (SCE) to amend their respective version of Rule 2 to not specify any examples of added/special facilities.

## Rationale:

- Staff understands that PG&E and SDG&E do not currently cite the added/special facilities section as a barrier to development of this type of microgrid.
- However, SCE received a **one-time** deviation from Rule 2, Subsection H (special facilities) through CPUC resolution for the Fort Irwin National Training Center Microgrid.
- Requiring SCE to rewrite their Rule 2 tariff with a less specific approach to equipment types should prevent the requirement of a CPUC resolution to build these types of microgrids.
- Under this proposal, PG&E and SCE would be required to explain why their versions of Rule 2 do not present a barrier to development of these types of microgrids.



# Rule 2 Proposal Option 3

---

## Option 3:

Maintain the status quo, i.e. do not require the IOUs to make amendments to their respective versions of Rule 2.

## Rationale:

- None of the IOUs raised any concern about using Rule 2 added/special facilities to build or control microgrids behind the customer meter.
- Additionally, projects of this type are relatively rare and require extensive interface with the IOUs to develop and operate



# Rule 2 Recommendation

---

**Recommendation:** Staff recommends Option 2.

**Rationale:**

- Requiring SCE to take a less prescriptive approach to these types of microgrids would reduce administrative barriers to broader deployment.
- Requiring PG&E and SDG&E to enumerate why their current versions of Rule 2 do not prohibit these types of microgrids would eliminate regulatory ambiguities surrounding their construction.



Questions?

---



## Proposal 2: Direct Utilities to Revise Rule 18/19 to Allow Microgrids to Serve Critical Customers on Adjacent Parcels

---



# Rule 18/19 Summary

---

## Barrier:

- Each IOU has an electric rule governing the supply of electricity to separate premises and the use of electricity by others. Generally, if electricity is delivered by the utilities to a premise, the rules prohibit that premise from supplying the electricity to a different premise.
- The electric rule could be perceived as a barrier by microgrid developers who wish to maximize the use and benefit of their microgrid by supplying power to adjacent premises in the event of grid outages, either owned by them or someone else.



## Rule 18/19 Summary cont.

---

- The purpose of the underlying rule is to ensure the safety and reliability of the electricity supplied from the distribution grid to the customers, and to protect customers who may have no or limited choices about who provides their electricity.
- Currently, there is no method for the utilities to monitor the flow of electricity after it reaches the assets behind the utility meter. This lack of visibility poses potential safety, reliability, and operational concerns.
- The utility will also be unable to ensure the sale of electricity only occurs during emergency outages.
- If a customer becomes dependent on the microgrid provider for electricity, the customer may be vulnerable to overcharging.



# Rule 18/19 Proposal Option 1

---

## Option 1:

Allow critical facilities owned by municipal corporations to be exempt from Electric Rule No. 18/19. Subject to the limits of P.U.C 218, allow premises to supply the electricity to an adjacent premise to conduct emergency and/or critical operations during a grid outage. The municipal corporation and/or the adjoining premises or customer is required to install a device, subject to the utilities' review and approval, that prohibits parallel operation of the service line between the premises during normal operation.

The proposal does not require entities to become an electric cooperative.





# Rule 18/19 Proposal Option 2

---

## Option 2:

Like Option 1, allow critical facilities owned by municipal corporations to be exempt from Electric Rule 18/19. However, set a subscription limit of 10 microgrid projects within the three IOU's territory. Once the capacity is reached, the CPUC and IOUs will revisit the exemption to determine if exemption should continue and/or if there are any modifications needed based on observing the exempt projects.



# Rule 18/19 Proposal Option 3

---

## Option 3:

Maintain status quo. No changes to the Electric Rules 18/19.



# Rule 18/19 Recommendation

---

**Recommendation:** Staff recommends Option 2.

Allow critical facilities owned by municipal corporations to be exempt from Electric Rule 18/19. However, set a subscription limit of 10 microgrid projects within the three IOU's territory. Once the capacity is reached, the CPUC and IOUs will revisit the exemption to determine if exemption should continue and/or if there are any modifications needed based on observing the exempt projects. Utilities will file a Tier 2 Advice Letter to implement changes to Rule 18/19.

**Rationale:**

- Option 2 enables municipal critical facilities who wish to maximize the use and benefit of their microgrid by supplying power to adjacent premises in the event of grid outage.
- By setting a subscription limit, the Commission and IOUs will have the opportunity to revisit this exemption to closely review the exempt projects and data to identify any unintended issues.



Questions?

---



Lunch Break (1 Hour)

---



## Proposal 3: Direct Utilities to Develop a Microgrid Rate Schedule

---



# Microgrid Rate Schedule Summary

---

## Summary:

This proposal directs utilities to develop a single rate schedule to enable installation of combinations of component technologies that individually and collectively meet Rule 21 interconnection requirements and together comprise a microgrid.

- **Regulatory Barrier #1:** The **complexity of Rule 21 and NEM rate options** may represent a barrier to sales (and thus by extension, to commercialization) of microgrid projects that combine multiple generation and/or storage resources. It can be difficult and uncertain to determine which rate options are available and most advantageous to the customer.
- **Financial Barrier #1:** Microgrids may face **high initial costs** relative to other solutions that provide a competitive set of services. This is particularly likely to be true for microgrids that generate low to no criteria air pollutant or greenhouse gas emissions
- **Financial Barrier #2:** Microgrid stakeholders have suggested that certain utility-imposed cost responsibility surcharges pose **high ongoing operating costs** of microgrids. These cost responsibility charges include nonbypassable charges, departing load charges, and standby charges.



# Microgrid Rate Schedule Summary cont.

## CPUC Precedent:

**D.16-01.044:** CPUC has consistently required departing customers pay their fair share of utility infrastructure costs incurred on their behalf prior to departure. Additionally, D.16-01-044 confirmed that NEM successor customers **must pay nonbypassable charges** on each kWh of electricity they consume from the grid.

**D.03-04-030:** CPUC has a precedent for cost responsibility adjustment. D.03-04-030 found that the Commission had sufficient policy basis to believe **customer generation confers a positive public benefit.**

1. **Defined categories of customer generation eligible** for exemptions from cost responsibility charges.
2. **Provided a limited time period (3 years)** after which the Commission re-evaluated to consider technological advances and economies of scale in customer generation production and sale.
3. **Categories differentiated by GHG-reducing systems:**
  - a) Clean systems with capacity of under 1 MW (including NEM systems)
  - b) “Ultra-clean and low-emission distributed generation” system with capacity of over 1 MW
  - c) All other types of customer generation
4. **After re-evaluation, Commission re-aligned mandated payment** of cost responsibility payments





# Microgrid Rate Schedule Recommendation

Proposal 3 Option #	Proposed Action	Export Allowed	Net Energy Metering (NEM) Eligibility	Enrollment Cap	Proposed Additional Exemption from Cost Responsibility Surcharges
1	New Rate Schedule	Yes	NEM eligible	No restrictions	Per criteria in Table 3.3
2	New Rate Schedule	No	Not NEM eligible	No restrictions	
3	New Rate Schedule	Yes	NEM eligible	1,200 MW statewide	
4	New Rate Schedule	Yes	NEM eligible	No restrictions	None
5	Study via Working Group	TBD via working group report			

Table 3.2. Summary of options for implementing Proposal 3

Criteria	Proposed Additional Exemption from Cost Responsibility Surcharges		
	Departing Load Charges	Standby Reservation Charges	Nonbypassable Charges*
New or Incremental Load	Yes	No	No
Long Duration or Indefinite Islanding	No	Yes	No
New or Incremental Load and Long Duration or Indefinite Islanding	Yes	Yes	No
Long Duration or Indefinite Islanding for Critical Facilities	Yes	Yes	Yes
All Others	No	No	No

Table 3.3 Proposed criteria for determining cost responsibility surcharge exemptions



# Microgrid Rate Schedule Options

Proposal 3 Option #	Proposed Action	Export Allowed	Net Energy Metering (NEM) Eligibility	Enrollment Cap	Proposed Additional Exemption from Cost Responsibility Surcharges
1	New Rate Schedule	Yes	NEM eligible	No restrictions	Per criteria in Table 3.3
2	New Rate Schedule	No	Not NEM eligible	No restrictions	
3	New Rate Schedule	Yes	NEM eligible	1,200 MW statewide	
4	New Rate Schedule	Yes	NEM eligible	No restrictions	None
5	Study via Working Group	TBD via working group report			

Table 3-2. Summary of options for implementing Proposal 3



Questions?

---



## Proposal 4: Direct Utilities to Develop a Microgrid Pilot Program

---



# Microgrid Pilot Program Summary

---

## Summary:

Require the IOUs to develop an incentive program to fund clean energy community microgrids that support the critical needs of vulnerable populations most likely to be impacted by grid outages.

This includes but not limited to:

- Develop a program delivery plan which will describe but not limited to the following elements: program guidelines, project eligibility and scoring criterion, and program implementation process.
- Establish program criteria eligibility to ensure that incentives are dispersed accordingly with the emphasis listed in this proposal.
- Review project proposals and distribute incentives to eligible projects.



# Microgrid Pilot Program Proposal

---

## Objective and Goals:

- Increase electricity reliability for critical public facilities in communities that 1) are at higher risk of electrical outages in the next five-years and 2) have a lower historical level of electric reliability.
- Prioritizes serving communities with higher proportions of communities with low-income residents, access and functional needs residents and electricity dependents.
- Enable communities with lower ability to fund development of backup generation to maintain critical community services during grid outages.

Critical facilities are defined as those facilities included in the list the large investor owned utilities are required to develop and maintain pursuant to D.19-05-042, Appendix A, p. A4-A5.



# Microgrid Pilot Program Proposal cont.

---

## Project Criteria:

- Proportion of low-income residents, as measured by California Alternate Rates for Energy and Family Electric Rate Assistance Program participation or eligibility.
- Top 25% score using CalEnviroScreen 3.0 criteria.
- Proportion of people with “Access and Functional Needs”, as defined by D.19-05-042.
- Proportion of customers on medical baseline or electricity-depend Medicare patients, if microgrid will serve them.



# Microgrid Pilot Program Proposal cont.

---

## Technology Performance Criteria:

- Must be able to maintain supported loads without interruption during outage.
- Must be electrically isolated from the larger grid during islanded operation (locally sited generation and storage resources).
- Must be able to seamlessly reconnect with grid power when outage is over.
- Must be able to support multiple loads and meters. Although back up for a single-meter service is not the target, single-meter service may be eligible.
- Eligible technology costs should include generation technology and/or storage technology, microgrid controllers, customer outreach, community costs, reconfiguration of electric service equipment on customer side of meters (for example to isolate and serve certain loads) and/or on utility side of meter.





# Microgrid Pilot Program Proposal cont.

---

## Cost-Effectiveness Analysis:

By June 1, 2022 or six months after the commercial operation date of the last project, CPUC will hire, or direct the IOUs to hire, a third-party contractor to conduct a cost-effectiveness analysis to review the program. The review will include:

- an analysis of the participants' bill savings and avoided costs;
- the extent to which the program has supported commercialization;
- the extent to which the program has supported resiliency.

Afterwards, Staff will make a recommendation regarding the status of the program for CPUC consideration.



# Microgrid Pilot Program – Key Program Elements

---

## Load Serving Entities:

- Option 1: PG&E, SDG&E, and SCE will administer this program to all customers within their respective territory.
- Option 2: A competitive process will be used to select a program administrator who will administer this program to all customers within the IOU's territories.

**Staff recommends Option 2.**



# Microgrid Pilot Program – Key Program Elements

---

## Funding Source:

- Option 1: The projects will be funded by the ratepayers from the same county the project is located in. The cost recovery accounting treatment for the program incentives will be designed to come directly from the participant's county ratepayers.
- Option 2: The projects respective funding source will not be limited from a specific region, but instead will be allocated to all distribution customers of the jurisdictional electric utility.

**Staff recommends Option 1.**



# Microgrid Pilot Program – Key Program Elements

---

## Project Eligibility:

- Option 1: The program administrators will develop a scoring prioritization system that demonstrates their eligibility as listed in the overview. Priority will be given to the highest scoring proposals.
- Option 2: The funding will be dispersed on a “first come, first served” basis to projects that are able to demonstrate their eligibility as listed in the overview.

**Staff recommends Option 1.**



# Microgrid Pilot Program – Key Program Elements

---

## Project Subscription Limit:

- Option 1: The program will be paused when the project subscription reaches 15 projects.
- Option 2: There will not be a limit to the number of projects if the project is able to demonstrate its' ability to meet the commercial operation date by January 1, 2022.

**Staff recommends Option 1.**



# Microgrid Pilot Program – Key Program Elements

---

## Utility Infrastructure Eligibility:

- Option 1: In addition to the eligible technology costs described above. Customers within SCE and SDG&E territory will also have access to a one-time matching funds payment to offset some portion of the utility infrastructure upgrade costs associated with implementing the islanding function of the microgrid.
- Option 2: Other than the eligible technology costs described above, no utility infrastructure upgrade costs associated with implementing the islanding function of the microgrid will be eligible.

**Staff recommends Option 1.**



Questions?

---



## Stretch Break (15 Minutes)

---





## Proposal 5: Direct Utilities to Conduct Pilot Studies of Low-Cost, Reliable Electrical Isolation Methods

---



# Low-Cost, Reliable Electrical Isolation Summary

---

## Background:

- Electrical isolation is necessary to prevent backfeed when providing backup power from distributed resources to customer loads.
- Electrical isolation allows formation of an intentional island.
- Transfer switch and island-capable smart inverter are examples.
- Upfront costs for equipment, installation, and reconfiguration of existing electrical panels may be a barrier.
- Most behind-the-meter PV systems in California have grid-interactive inverters and cannot provide power during outages.



# Low-Cost, Reliable Electrical Isolation Summary

---

## Background:

- Increased interest in discharging electric vehicles to provide backup power (vehicle-to-building and vehicle-to-home).
- In Track 1, Staff considered but did not recommend a proposal allowing use of smart meters for electrical isolation.
- Proposal received support from multiple parties.
- PG&E recommended future pilot scale assessment to expedite development of microgrids.
- Track 1 decision determined further attention warranted.



# Low-Cost, Reliable Electrical Isolation Summary

---

## Proposal:

- Require IOUs to develop a pilot program for low-cost methods to provide electrical isolation for backup power applications.
- Evaluate safety and reliability.
- Propose solutions for implementation and deployment issues.
- Develop program guidelines, project eligibility and scoring criterion, and program implementation process.
- Reduce cost of providing electrical isolation for purposes of intentional islanding at a single customer's premise.



# Low-Cost, Reliable Electrical Isolation Summary

---

## Proposal:

- Establish evaluation criteria to assess the safety and reliability.
- Establish technical and performance specifications that would allow for installation and operation.
- Recommendations for any changes or variances to IOU Electrical Rules necessary to allow for approval.



# Low-Cost, Reliable Electrical Isolation

---

## Objective and Goals:

- Determine feasibility of utilizing low-cost methods to safely and reliably provide electrical isolation at a single customer's premise.
- Reduce costs of providing electrical isolation to safely and reliably allow intentional islanding for provision of backup power during grid outages.



# Low-Cost, Reliable Electrical Isolation

---

## Technology performance criteria:

- Low-cost relative to an island-capable inverter or a transfer switch, including avoided labor or reconfiguration of existing equipment.
- Meet all necessary safety requirements, including ability to obtain Underwriters Laboratory listing when applicable.
- Meet any pre-deployment safety testing and acceptance criteria established by the IOUs.



# Low-Cost, Reliable Electrical Isolation

---

## Pilot program funding:

- Actual incurred costs, maximum of \$1 million per IOU.
- Funded by ratepayers from customer classes able to utilize these approaches.
  - Likely residential and small commercial.





# Low-Cost, Reliable Electrical Isolation Option 1

---

## Option 1:

- Direct utilities to focus pilot on using integral remote disconnect switch in smart meters to provide isolation at single customer premise.
- Does not allow connection of customer's equipment in parallel with macrogrid so doesn't require interconnection under Rule 21.
- When switch is open, customer's service entrance equipment and all downstream equipment, devices, and loads will be isolated and backfeed will not be possible.



# Low-Cost, Reliable Electrical Isolation Option 1

---

## Option 1:

- Because interconnection agreement not needed, greater degree of freedom for end-customer to provide and configure resources.
- Backup power sources only able to provide electricity during macrogrid outages.



# Low-Cost, Reliable Electrical Isolation Option 1

---

## Option 1 – Additional technology performance criteria:

- Avoid need for interconnection approval to further reduce complexity and cost.
- Only allow electrical continuity between backup power devices and the premises' electrical service during macrogrid outages.
  - Not allowed when utility power is present on the line side of smart meter.
- Upon restoration of power from the macrogrid, immediately break electrical continuity between any backup power devices and the premises' electrical service.



# Low-Cost, Reliable Electrical Isolation Option 1

---

## Option 1 – Rationale:

- Lower cost means of isolation would reduce cost of basic resiliency project for Public Safety Power Shutoff events.
- Avoids interconnection requirement by eliminating ability for connecting equipment in parallel with macrogrid.
- May enable pathway for existing, non-islandable PV to provide resiliency when combined with a grid-forming source.



# Low-Cost, Reliable Electrical Isolation Option 2

---

## Option 2:

- Direct utilities to develop pilot including Option 1 plus other approaches to disconnection of a single premises' entire electrical service.
- Whole premise backup power can be provided.
- Costs of reconfiguring existing electrical equipment eliminated or substantially reduced.
- Would require interconnection approval under Rule 21.
- May rely on a combination of equipment acting together to ensure only intentional islanding is allowed and backfeeding prevented.



# Low-Cost, Reliable Electrical Isolation Option 2

---

## Option 2 - Rationale:

- Inclusive of Option 1.
- Includes additional approaches that do not rely on the integral remote disconnect switch in smart meters.
- Can reduce the installation cost of backup power systems when generation is present.
- Could reduce the installation costs of adding battery storage to existing PV systems.



# Low-Cost, Reliable Electrical Isolation Recommendation

---

## **Recommendation:** Staff recommends Option 2

### **Rationale:**

- Includes a broader set of technology options in the proposed pilot program.
- Can increase flexibility for end-customers to provide and configure their own sources of backup power.
- Can reduce the costs of incorporating battery energy storage systems with new or existing solar PV systems.



Questions?

---





# Secondary Proposals – Public Utilities Code § 8371

---



## Secondary Proposals – Public Utilities Code § 8371(a)

---

**P.U.C. § 8371(a):** Develop microgrid service standards necessary to meet state and local permitting requirements.

- Fulfilled by Track 1 requirements ordering IOUs to develop template single-line diagrams for the interconnection application process.
- IOUs have submitted Tier 1 Advice Letters which are currently being reviewed by Energy Division.
- Local jurisdictions may incorporate these templates along with additional required information for their permitting processes.



## Secondary Proposals – Public Utilities Code § 8371(a)

---

**P.U.C. § 8371(a):** Develop microgrid service standards necessary to meet state and local permitting requirements.

Additional actions to be considered in Track 3:

- Leverage energy storage guidebook being developed by the California Energy Commission for microgrids that contain storage.
- Conduct permitting gap analysis for behind-the-meter and in-front-of-meter microgrids.
- Require IOUs to develop safety best practices guide for battery energy storage.



## Secondary Proposals – Public Utilities Code § 8371(a)

---

**P.U.C. § 8371(a):** Develop microgrid service standards necessary to meet state and local permitting requirements.

Additional actions to be considered in Track 3 (continued):

- Expand CPUC oversight of safety compliance of IOU owned or procured battery energy storage systems.
- New rulemaking on General Order 131-D to clarify treatment of DERs.
- Recommend the Office of Planning and Research standardize zoning ordinances and streamline CEQA for utility scale in-front-of-meter microgrids.



## Secondary Proposals – Public Utilities Code § 8371(c)

**P.U.C. § 8371(c):** Develop guidelines that determine what impact studies are required for microgrids to connect to the electrical corporation grid.

Tariff	Jurisdiction	Implementer	Types of Projects
Rule 21	CPUC	IOUs	Distribution – NEM, QFs sell all to IOU under PURPA, non-export
WDT/WDAT	FERC	IOUs	Distribution – sell all to CAISO wholesale market
CAISO	FERC	CAISO	Transmission – sell all to CAISO wholesale market or to IOU



## Secondary Proposals – Public Utilities Code § 8371(c)

---

**P.U.C. § 8371(c):** Develop guidelines that determine what impact studies are required for microgrids to connect to the electrical corporation grid.

- Each has fast track and detailed study process.
- Detailed study includes power flow, short circuit, and stability analyses.
- Maintain grid safety and reliability by identifying any necessary upgrades to:
  - Prevent thermal overloads and out of range voltages.
  - Address short circuit, stability, and reliability issues.



## Secondary Proposals – Public Utilities Code § 8371(c)

---

**P.U.C. § 8371(c):** Develop guidelines that determine what impact studies are required for microgrids to connect to the electrical corporation grid.

- Option 1: Support development of Rule 21 improvements that apply to microgrids.
- Rationale: R.17-07-007 interconnection rulemaking is venue for significant modifications to Rule 21.
- Option 2: Create workplan to identify and consider attributes of microgrids not adequately addressed by Rule 21 requirements.
- Rationale: Rule 21 should consider inclusion of minimum technical specifications and performance requirements for microgrid controllers.



## Secondary Proposals – Public Utilities Code § 8371(c)

---

**P.U.C. § 8371(c):** Develop guidelines that determine what impact studies are required for microgrids to connect to the electrical corporation grid.

- Option 3: Coordinate with IOUs and CAISO to ensure microgrids adequately addressed by WDT/WDAT and CAISO tariff.
- Rationale: CPUC does not have jurisdiction over these tariffs but can work with IOUs and CAISO to address microgrid issues.





## Secondary Proposals – Public Utilities Code § 8371(c)

---

**P.U.C. § 8371(c):** Develop guidelines that determine what impact studies are required for microgrids to connect to the electrical corporation grid.

Recommendation - Options 1, 2, and 3.

- Maintain consistency and technology neutrality by including microgrid issues in existing venues.
- No additional categories of studies necessary.
- Behind-the-meter microgrids – Existing processes sufficient.
- In-front-of-meter microgrids – Augment existing processes to account for different operating conditions during grid-connected and island modes.



## Secondary Proposals – Public Utilities Code § 8371(e)

---

**P.U.C. § 8371(e):** Form a working group to codify standards and protocols needed to meet California electrical corporation and Independent System Operator microgrid requirements.

- Staff not aware of any specific microgrid requirements from IOUs or CAISO.
- Establish Microgrids Working Group to further explore issues.
  - Develop draft charter.
  - Convene kickoff meeting.
  - Develop schedule and milestones for addressing each issue.



## Secondary Proposals – Public Utilities Code § 8371(e)

---

**P.U.C. § 8371(e):** Form a working group to codify standards and protocols needed to meet California electrical corporation and Independent System Operator microgrid requirements.

- Option 1: Direct utilities to hire a third-party facilitator for the WG.
- Option 2: Energy Division Staff will facilitate the WG.
- Option 3: Direct stakeholders to convene their own WG.
- Recommendation: Start with Option 2. Other options if appropriate.



## Secondary Proposals – Public Utilities Code § 8371(f)

---

**P.U.C. § 8371(f):** Develop a standard for direct current metering in the commission’s Electric Rule 21 to streamline the interconnection process and lower interconnection costs for direct current microgrid applications.

- Primary use case for DC metering was to ensure NEM integrity for DC-coupled storage.
- D.19-01-030 approved use of certified power control-based options for PV plus storage.
- D.19-03-013 ordered IOUs to “support development of direct current metering standards by participating in the EMerge Alliance initiative or equivalent as utility resources allow.”



## Secondary Proposals – Public Utilities Code § 8371(f)

---

**P.U.C. § 8371(f):** Develop a standard for direct current metering in the commission’s Electric Rule 21 to streamline the interconnection process and lower interconnection costs for direct current microgrid applications.

- Option 1: Approve power control-based options for all NEM-eligible, inverter-based generators for purposes of NEM integrity.
- Rationale: Power control-based options should be equally functional and reliable for all inverter-based generators, not just PV.



## Secondary Proposals – Public Utilities Code § 8371(f)

---

**P.U.C. § 8371(f):** Develop a standard for direct current metering in the commission’s Electric Rule 21 to streamline the interconnection process and lower interconnection costs for direct current microgrid applications.

- Option 2: Require IOUs to report on DC metering development activities. Determine if CPUC or IOU Staff participate in existing standards development processes for revenue-grade DC metering.
- Rationale: Standards may result in lower cost metering enabling further utilization of DC resources and loads in microgrids.
- Recommendation – Options 1 and 2.



Questions?

---



Questions?

---





## Closing Remarks and Next Steps

---