PROPOSED PARTNERSHIP AREAS

POLICY+INNOVATION COORDINATION GROUP
CALIFORNIA EPIC PROGRAM

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BACKGROUND

In Decisions 18-01-008 and 18-10-052, the CPUC established the Policy + Innovation Coordination Group to increase the alignment of California's Electric Program Investment Charge (EPIC) investments and program execution with California Public Utilities Commission and California energy policy needs through increased coordination among program administrators and between program administrators and the CPUC.

The PICG is dedicated to (1) the technical, complex coordination task of identifying timely opportunities for substantive feedback and coordination among EPIC investments and California's energy innovation needs and goals, and (2) providing the support functions to allow this feedback and coordination to occur effectively. The PICG does not provide any formal direction or binding guidance to administrators regarding which projects they should fund. Further, this effort is aimed at coordination in the near term, where the CPUC has already approved most projects or project areas.

The PICG is made up of a) the Project Coordinator, b) one representative from each EPIC administrator at the program management/leadership level (i.e. Commissioner and/or Division Director/Deputy for the CEC; senior leadership level with oversight over EPIC and innovation projects for the IOUs), c) CPUC staff and Commissioners.

The Project Coordinator, The Accelerate Group, is primarily responsible for creating an environment for coordination between the CPUC's energy policy and planning needs, and the energy R&D supported by EPIC funding. As the dedicated entity that provides support for improved coordination, the Project Coordinator is organizing and facilitating PICG activities and produce deliverables and activities as described in this Workplan. This arrangement allows members of the group to focus on substantive input and creating meaningful dialogue.

POLICY+INNOVATION COORDINATION GROUP GOALS

PARTNERSHIP AREA IDENTIFICATION	TRANSPARENCY	ALIGNMENT	EQUITY
To identify Policy+ Innovation Partnership Areas.	To create transparency of EPIC Program results.	To ensure alignment between policy and projects.	To center equity in process and programs.

PARTNERSHIP AREA FRAMEWORK

WHAT IS A POLICY+INNOVATION PARTNERSHIP AREA?

3-5

Policy + Innovation Partnership Areas are "issue areas of common interest and substantive opportunity, around which the PICG will engage in targeted coordination." The PICG is undergoing a process in the first 6 months of 2020 to identify a set of 3-5 Partnership Areas where targeted coordination can be most effective. PICG members will provide input to this process, and the CPUC and its staff provide direction to the PICG and Project Coordinator.

HOW WILL THE CPUC SELECT POLICY+INNOVATION PARTNERSHIP AREAS?

The Project Coordinator is presenting an initial set of Possible Partnership Areas to the PICG in this document, identifying where there are significant opportunities for coordination among EPIC projects working on the same, similar, or related obstacles, and/or where input into California Public Utilities Commission proceedings or other energy policy issues would be timely and relevant

The PICG, including CPUC Commissioners and staff, CEC Commissioners and staff, and the utility EPIC Program Administrators will review the initial set of 5-10 possible Partnership Areas, and discuss which topics would be the most "ripe" and "timely" to engage on for the remainder of calendar year 2020. The recommendations from the PICG members will be provided to the CPUC Energy Division. Based on recommendations from the PICG members, CPUC Energy Division will select the final 3-5 Partnership Areas for 2020.

WHAT WILL POLICY+INNOVATION PARTNERSHIP AREA BE USED FOR?

Once the California Public Utilities Commission has selected the final set of 3-5 Partnership Areas, the PICG will kick-off a set of 3-5 corresponding workstreams for each of the Partnership Areas. The workstreams will be focused on gathering input and lessons learned from EPIC projects and other stakeholders on core policy challenges, encouraging enhanced coordination, supporting knowledge- and results-sharing, and convening public meetings on each topic.

As part of the effort to ensure members of disadvantaged communities and representatives of community-based organizations have a voice in the process, the PICG will work to actively recruit leaders from community organization to participate in the PIPA meetings, as well as present the distinct needs and challenges facing their communities.

The PICG will host an annual Policy + Innovation Forum, the first in November 2020, and a second one in September 2021. This Forum will be designed to allow for the PICG to present the work to date on Partnership Areas and database design to stakeholders and community members.

The PICG will work alongside its public stakeholder efforts to also support the enhancement of EPIC project data transparency, figuring out the best way to pull project lessons learned, data, and results from all project administrators into a single location. This will involve coordination with the California Energy Commission's existing Energy Innovation Showcase tool.

WHAT WAS IN THE PARTNERSHIP AREA FRAMEWORK REPORT?

The PICG Project Coordinator compiled an initial assessment of the obstacles and challenges to meeting the state's energy policy goals, gathering input from statutes, regulatory proceedings, executive orders, reports, workshops, studies, and interviews. The results of that assessment are organized into an outline of technology, market, and policy challenges to meeting the state's core policy goals. The Partnership Area Framework was a core tool used to help the PICG Project Coordinator outline and identify key policy goals, strategies, and obstacles, or combinations thereof, that would be ripe for identification of Partnership Areas.

The Partnership Area framework is intended to present a wholistic view of California's energy policy goals as well as the specific policy strategies which can impact those goals and the obstacles or challenges to the identified strategies. This visualization helpsthe Policy+Innovation Coordination Group more easily identify obstacles and strategies that are critical, timely, and results can be enhanced by improved coordination.

WILL THE CPUC UPDATE POLICY+INNOVATION PARTNERSHIP AREAS?

After launching the Policy+Innovation Partnership Areas in June 2020, and leading public engagement events around each of the topics, the California Public Utilities Commission will have a chance to consider alternative Partnership Areas for 2021 at an end-of-year forum to be held in late Fall 2020. Partnership Areas for 2021 may stay the same, be added, subtracted, or altered, at this time.

PARTNERSHIP AREA PRIORITIZATION

The Project Coordinator has put together the proposed Partnership Area Prioritization rubric, based on input from PICG members , CPUC Commissioners and staff, to help narrow and identify the possible universe of partnership areas into ones that are the most timely, critical, and where coordination can accelerate outcomes.

As described in the Partnership Area Framework, the Project Coordinator used this rubric as it reviewed the strategies, challenges, and obstacles in the Partnership Area Framework outline, consulted the background research and regulatory assessment, and incorporated feedback from the PICG member interviews. The Project Coordinator then mapped all the active EPIC-funded projects to the the obstacles and challenges to which they could provide insight, and evaluated where ongoing coordination could occur.

Common themes were grouped into a set of 12 preliminary Partnership Areas as described in this document, along with a corresponding set of guiding questions the Partnership Areas and public engagement can center around.

WHERE ARE TIMELY OPPORTUNITIES TO CONNECT RD&D TO POLICY?

These Partnership Areas will be identified as topics in which there is an opportunity for the CPUC to gain insights, lessons learned, and data from ongoing or completed EPIC projects or other RD&D efforts, as part of timely and critical policy-making discussions. For example, does the CPUC have an open proceeding where they are trying to come to a decision in the next year, but need specific data or information to inform the decision. Emphasis will be placed on areas where relevant R&D can feed into policy discussions, and where many research projects can be drawn from to inform policy.

- ★★☆ There are open proceedings or near-term policy decisions which need to be made
- ★★☆ There are challenges or obstacles which prohibit or drive future planning
- ★★☆ Prioritization on current EPIC projects

WHERE CAN ENHANCED COORDINATION ACCELERATE OUTCOMES?

These Partnership Areas will also be identified where there are opportunities for the EPIC program administrators, the California Public Utilities Commission, and other stakeholders to coordinate efforts among various RD&D projects to accelerate innovation or overcome identified obstacles to the state's policy goals. In many cases, projects that may not have obvious connections because of their subject matter may actually be working on overcoming similar obstacles to state energy policy.

★★☆ There are current ongoing efforts from at least one administrator (and possibly other stakeholders/researchers outside of EPIC)

★★☆ The coordination brings together stakeholders with different areas of focus and expertise

★★☆ Combined efforts create greater transparency

WHAT ARE THE MOST CRITICAL CHALLENGES?

Finally, the Partnership Areas will identify topics of critical concern to the CPUC in its policymaking, to signal to the broader research and technology community where challenges lie ahead in meeting state energy policy goals, and more information and innovation is needed.

★★☆ California has identified an energy policy goal and associated strategies

★★☆ California and CPUC do not currently have complete answers to ongoing policy questions

★★☆ The magnitude of impact of overcoming the challenge is significant

★★☆ Solutions to challenges are equitable with a focus on DACs and Low-Income residents

CRITICAL ISSUE AREAS

PROCESS

As part of the background research and regulatory assessment, the Project Coordinator conducted individual and group interviews with each of the EPIC Program administrator utilities, Commissioners and staff of the California Energy Commission, and Commissioners and staff of the California Public Utilities Commission.

These interviews were primarily used to identified the set of goals, strategies, and obstacles outlined in the Partnership Area Framework. An additional component of the interviews was an investigation into the topics or issues that respondents felt were the most critical areas that could be addressed through the Policy+Innovation Coordination Group process over the course of the next 1 - 2 years.

The responses were numerous, covering a wide range of subjects, and lacking in simple consensus. At the request of the members of the Policy+Innovation Coordination Group, to narrow in on a set of core subjects, the Project Coordinator mapped where the responses of interviewees overlapped, organized by organization. To simplify the visualization, the Project Coordinator organized a Venn diagram, illustrating overlapping topics between the CPUC, CEC, and the utilities.

As the Project Coordinator put togehter the preliminary Partnership Areas in this report, it took into consideration topic areas and core questions where more than one entity identified it as a critical area to gain insight on over the time period of this effort. In some cases, multiple interviewees of one group (for example, multiple commissioners or multiple utilities) may have raised a topic area as critical, and that was given similar weight as compared to areas where multiple groups had raised the topic.

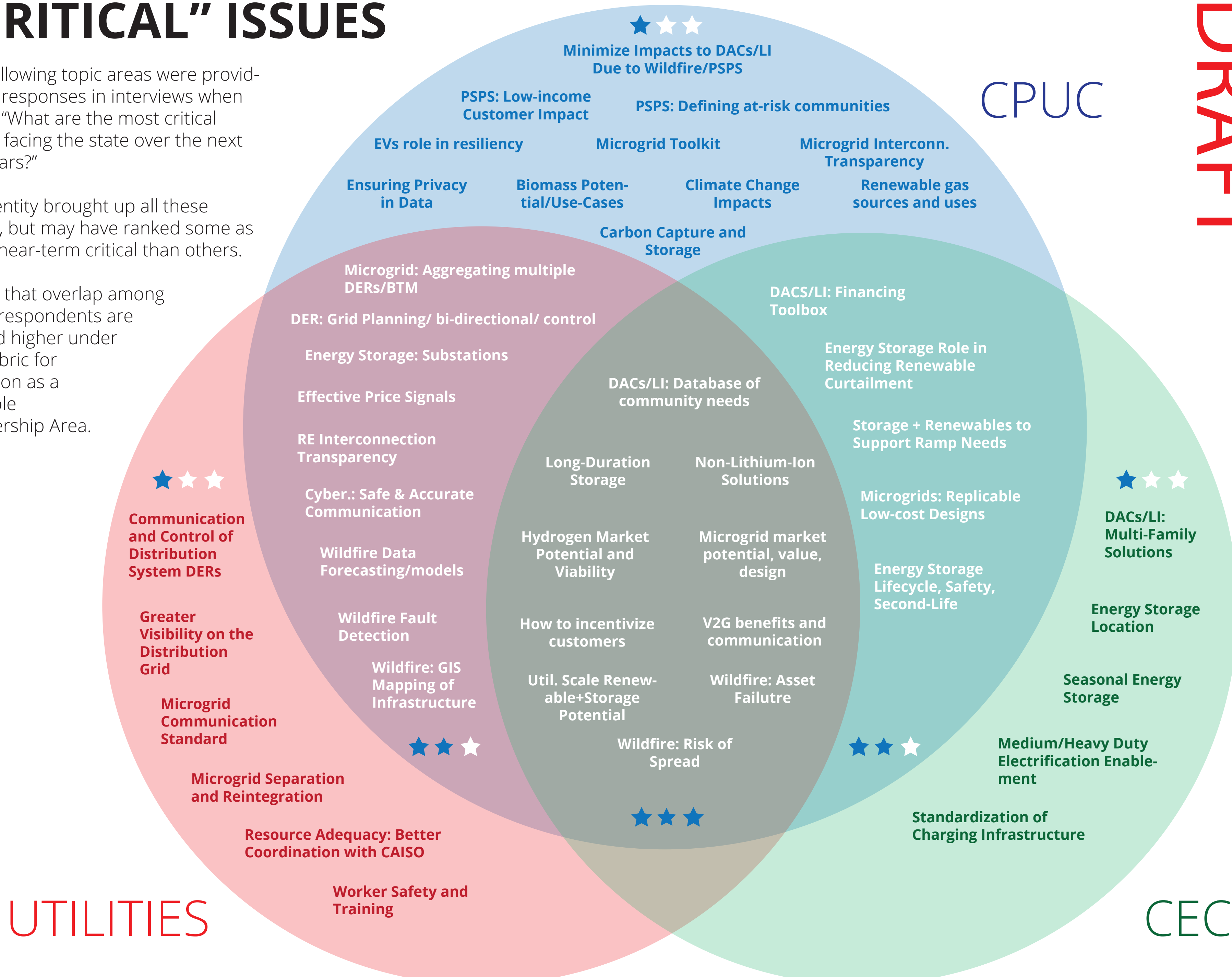
The following illustration is a qualitative (not quantitative) representation of the identification of critical issue areas by members of the Policy+Innovation Coordination Group that participated in individual and group interviews.

“CRITICAL” ISSUES

The following topic areas were provided via responses in interviews when asked “What are the most critical issues facing the state over the next 1-2 years?”

Each entity brought up all these issues, but may have ranked some as more near-term critical than others.

Issues that overlap among more respondents are ranked higher under the rubric for selection as a possible Partnership Area.



PROPOSED PARTNERSHIP AREAS

Using the input from the Policy+Innovation Coordination Group members on areas that were timely, critical, and where enhance coordination could accelerate outcomes, the Project Coordinator has compiled an initial list of 12 Draft Partnership Areas that cover a range of issues of energy policy and innovation. These Partnership Areas do not represent new policy pronouncements by either the California Public Utilities Commission or the California Energy Commission, or any of the utilities involved in the Poliby+Innovation Coordination Group, but rather reflect priorities identified in existing policies, proceedings and experiences.

The Partnership Areas are outlined to describe:

a) a core grand challenge question,
b) a summary of the issue, why it matters, and how innovation and R&D can help address it
c) a list of core questions for discussion within the Partnership Area
d) identification of the Critical Issues addressed by the topic
e) identification of the timeliness of the issues as it relates to policy developments and proceedings,
f) a list of the related obstacles and challenges from the Partnership Area Framework,
g) a list of active EPIC projects that may be able to share lessons learned, data, or insights on the topic, or may be able to participate in coordinated activities.

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1 HOW CAN WE ENSURE THE TRANSITION TO CLEAN ENERGY IS ALIGNED WITH AND ADDRESSES **DAC/LOW-INCOME CUSTOMER NEEDS**?

2 HOW DO WE DEPLOY **MICROGRIDS** QUICKLY?

3 HOW CAN CALIFORNIA ACCELERATE **LONG-DURATION ENERGY STORAGE** TO MEET THE MARKET NEED IN TIME?

4 HOW DO WE DEVELOP NEW TOOLS TO PRIORITIZE AND WEIGH **WILDFIRE MITIGATION** INVESTMENTS?

5 HOW DO WE PRIORITIZE INVESTMENTS TODAY TO MINIMIZE SOCIAL AND ECONOMIC DISRUPTION OF **PSPS** FOR THE MOST CRITICAL PUBLIC SERVICES AND MOST VULNERABLE?

6 HOW CAN WE ENSURE THE EMERGING **ELECTRIFICATION OF VEHICLES** SUPPORTS, AND DOESN'T HARM AND OVERWHELM, THE ELECTRIC GRID?

7 CAN WE **DECARBONIZE OUR BUILDING STOCK** WITHOUT STARTING FROM SCRATCH?

8 HOW CAN WE BRING TOGETHER ENERGY EFFICIENCY INVESTMENTS AND R&D EFFORTS TO MOVE THE NEEDLE ON **LOW-INCOME MULTIFAMILY RETROFITS**?

9 WHAT IS THE NEW ROLE OF **DISTRIBUTED ENERGY RESOURCES** AS WE RESHAPE THE GRID?

10 HOW CAN WE DEPLOY CONSISTENT, TECHNOLOGY-NEUTRAL **PRICE SIGNALS** TO UNLOCK AND OPTIMIZE THE CUSTOMER ROLE IN GRID SERVICES?

11 CAN WE DEPEND ON **GREEN ELECTROLYTIC HYDROGEN** TO SERVE OUR "LAST 20%" OF DECARBONIZATION NEEDS?

12 HOW CAN WE ENSURE THE INVESTMENTS WE ARE MAKING IN THE GRID TODAY PREPARE US FOR THE **CLIMATE REALITY OF TOMORROW**?

1 HOW CAN WE ENSURE THE TRANSITION TO CLEAN ENERGY IS ALIGNED WITH AND ADDRESSES DAC/ LOW-INCOME CUSTOMER NEEDS?

BACKGROUD AND DESCRIPTION

Members of the Policy and Innovation Coordination Group have continually expressed the importance of equity in the process of developing and implementing EPIC and other state-wide programs, but there is a general consensus that there is a lack of understanding of what disadvantaged and low-income communities actually need from a clean energy economy. The lack of understanding leads to difficulty in developing innovative research, development & demonstration projects that aren't just located in DACs and low-income communities, but actually work to overcome access and equity barriers in these communities. As our electric grid continues to transform and evolve, it is more critical than ever to consider the implications of new technologies and policies on disadvantaged communities.

The electric grid is complex and ever-changing, but so are community needs across California. It is imperative that we advance our energy economy in a way that is equitable and most effective for our diverse community needs. Inclusive energy program design will help us design the right energy programs and infrastructure for Californians while ensuring that low-income families are not left behind.

This partnership area seeks to bring stakeholders together to discuss and identify critical gaps for DACs/low-income communities within EPIC project design and develop a plan of action to increase transparency, community involvement and knowledge transfer. This initiative will also focus on bringing together all EPIC project participants who have worked with DACs/low-income communities to discuss areas for collaboration and present opportunities for inclusive program design to other program participants. This partnership area will aim to drastically improve the dialogue and leverage existing market research for understanding critical differences and similarities in our California communities and how to access them, and how to ensure community benefit.

DISADVANTAGED COMMUNITIES

CORE QUESTIONS FOR DISCUSSION

Q What are effective ways for researchers or program implementers to understand the specific needs and strengths of communities?

- What resources and technical assistance do community organizations need to engage?
- What technical assistance and support would be helpful?
- What should community outreach look like in this ever-changing energy landscape and environment?
- What aspects of an R&D project do community members and community-based organizations want to be involved in?

Q What technical and financial challenges are more significant in DACs or Low-Income communities?

- What are residential and business challenges?
- What are the intersections with public health and safety?
- What challenges are posed by renting and multi-family properties?
- How can we develop impactful financing programs for DACs/LI to access clean energy?

Q What initiatives have been successful in DACs or Low Income Communities?

- What aspects made them successful?
- What are the challenges that are still unresolved?
- What community structures can be leveraged more effectively?

Q Who may be missing from the discussion and what is the most effective way to bring them in? How do we ensure they feel heard?

CRITICAL AREAS ADDRESSED

DACs and Low Income: Database of community needs and impacts
DACs and Low Income: Financing Toolbox
PSPS: Low-income customer impact

DISADVANTAGED COMMUNITIES

OBSTACLES AND CHALLENGES IDENTIFIED

IC	F	Lack of data on benefits of projects with DACs
IC	G	Lack of understanding of DAC community needs
WB	A	Limited financing options
WB	H	Need for long-term commitment to community
WB	I	Those who can access incentives aren't those who need them the most
WB	J	Lack of data on electrification projects within DACs
PO	A	Outreach efforts aren't tracked
PO	B	Lack of outreach strategy for programs
PO	C	No data on outreach results
PO	D	Benefits to DACs/low-income are uncertain/unknown
PO	G	Community-based organizations have limited resources
PO	H	Language barriers
PO	I	New technology deployment requires ongoing engagement
PO	J	Lack of customer and market behavior studies
PO	K	Understanding community needs

EPIC PROJECTS ALIGNED

CEC-300-15-009
CEC-300-15-011
CEC-EPC-14-038
CEC-EPC-15-009
CEC-EPC-15-010
CEC-EPC-15-020
CEC-EPC-15-076
CEC-EPC-16-013
CEC-EPC-16-068
CEC-EPC-17-007
CEC-EPC-17-034
CEC-EPC-17-035
CEC-EPC-17-045
CEC-EPC-17-048
CEC-EPC-17-050

2 HOW DO WE DEPLOY MICROGRIDS QUICKLY?

BACKGROUD AND DESCRIPTION

Microgrids enable customers and electric utilities to separate sections or areas from the grid and operate autonomously. Microgrid technology can be leveraged to address many of the electric grid and PSPS challenges California is facing today, and can expect to face to a greater degree in the next few years. However, few affordable, 100% clean energy Microgrids have been deployed. Senate Bill 1339 requires the state and related agencies to "facilitate the commercialization of microgrids for distribution customers of large electrical corporations." This bill in tandem with Rulemaking R.19-09-009 outlines the need for microgrids to ensure reliability and resiliency on the grid while overcoming the barriers to designing and successfully implementing this technology.

With a higher penetration of renewables and the increase in wildfires and Public Safety Power Shutoffs, the need for reliability and resiliency solutions are needed now more than ever. Microgrids can empower customers within a high penetration renewables location to operate separately from the grid, or utilities can use microgrids as a solution to mitigate customer impacts due to wildfires and PSPS events. Yet, linking multiple sources of generation, load, and energy storage is a complex technological and regulatory challenge. Most microgrids that have been conceived and developed have been highly-customized, focused on a sophisticated market segment.Policy leaders are looking to identify cost effective solutions that can be deployed quickly and easily in the coming months to years.

This Partnership Area will bring together EPIC-funded stakeholders working across the microgrid space to facilitate shared learnings in past microgrid projects, and technology innovations today which can drive replicable design and unlock market potential. The goal of collaboration would be to identify simpler Microgrid Toolkits or standard designs that enable the quick deployment of Microgrids in priority areas. This Partnership Area will also bring together stakeholders to discuss regulatory and policy solutions, rate structures, and incentives which can facilitate low cost implementation.

MICROGRIDS

CORE QUESTIONS FOR DISCUSSION

Q What are the essential components to a microgrid design that could be easily replicated?

- What are some lessons or take-aways from previous microgrid projects?
- What are challenges in interconnecting microgrids today?
- How can we make microgrids affordable?
- What technologies are not available today which are needed to achieve replicable and affordable microgrids?
- How have microgrids been funded or financed?

Q What constitutes a good location for a microgrid?

- How can we leverage areas with existing and new behind-the-meter DERs to develop microgrids?
- How can we make microgrid accessible to DACs and low-income communities?

CRITICAL AREAS ADDRESSED

Microgrid: Market potential, value, and design
Microgrid: Aggregating multiple DERs and BTM
Microgrid: Replicable low-cost designs
Microgrid: Interconnection transparency
Microgrid: Toolkit for project design and funding sources
Microgrid: Communication standard
Microgrid: Separation and reintegration

TIMELINESS

- Rulemaking R1909009, and specifically Track 2 and 3

OBSTACLES AND CHALLENGES IDENTIFIED

MG	A	Unclear value to customer
MG	B	Unclear value to grid
MG	C	High up-front costs
MG	D	Interconnection Time and Cost
MG	E	High soft costs
MG	F	Long development time
MG	G	Primarily custom-designed, not modular or plug-and-play
MG	H	Microgrid solutions are complex / require sophistication
MG	I	Space constraints for generation
MG	J	Local permitting limitations
MG	K	No communication standard
MG	L	No standard for utility-customer microgrid communication and control
MG	M	System balancing within microgrids
MG	N	Lack of grid controls to island grid segments
MG	O	No acessible data on existing utility infrastructure
MG	P	Threat of shifting costs
MG	Q	Tariff and incentive misalignment
MG	R	Cost of ownership and O&M for special facilities
MG	S	Interconnection nameplate capacity limits
MG	V	No access to wholesale markets
MG	W	No mechanism to build remote grids as alternative to transmission
MG	X	Lack of support for hybrid microgrids
MG	Y	Insufficient utility staff to support microgrid development
MG	Z	Difficulting identifying priority microgrid locations
MG	AB	Fossil microgrids work against policy goals
MG	AC	SGIP funding eligibility
MG	AD	Equity impacts on customers not able to afford microgrids

MICROGRIDS

MG	AF	Regulatory uncertainty over shared DER
MG	AH	Highest priority microgrids often most costly
MG	AI	Lack of data on what designs even work
MG	AJ	Unclear equipment need at point of interconnection
MG	AK	Financing models and economics are unclear
MG	AL	Unknown lessons learned of projects that failed
MG	AM	Additional funding sources are unclear
MG	AN	What is common that worked?
MG	AO	What are best practices and models?
MG	AP	What are range of options (relationships/types)?
MG	AQ	DACs/Low-income communities could get left behind
MG	AR	Finding viable generation other than gas
MG	AS	PV+Storage is too expensive to be multi-day solution
MG	AT	Assessing capability of combined resources
MG	AU	Grid separation and re-integration
MG	AV	Lack of analysis for evaluating microgrids as best alternative

EPIC PROJECTS ALIGNED

CEC-EPC-15-086
CEC-EPC-15-090
CEC-EPC-16-026
CEC-EPC-16-036
CEC-EPC-16-054
CEC-EPC-16-062
CEC-EPC-16-068
CEC-EPC-17-002
CEC-EPC-17-004
CEC-EPC-17-007
CEC-EPC-17-035
CEC-EPC-17-038
CEC-EPC-17-045
CEC-EPC-17-049
CEC-EPC-17-052
CEC-EPC-17-053
CEC-EPC-17-054
CEC-EPC-17-055
CEC-EPC-18-001
CEC-EPC-19-001
PGE-E3-P11
SCE-E3-P13
SCE-E3-P4
SCE-E3-P5

3 HOW CAN CALIFORNIA ACCELERATE LONG-DURATION ENERGY STORAGE TO MEET THE MARKET NEED IN TIME?

BACKGROUD AND DESCRIPTION

Long duration storage allows for more than 4 hours of charging and discharge and can provide weekly or even seasonal solutions.

As the energy system transitions to one that relies on predominantly intermittent generation, day-to-day and season-to-season variability in renewable generation creates a growing mismatch with the load profile of electricity customers. Current energy storage technology is cost effective for providing the sub-hourly and hourly charge and discharge capability for daily and instantaneous balancing of the electric grid. However, as a greater daily and seasonal mismatch of generation and load emerges, significantly more cost-effective energy storage will be needed. Further, Public Safety Power Shutoffs can sometimes extend beyond just hours and go days and possibly even weeks. With climate change rapidly reshaping the energy and public safety landscape, new climate impacts could require additional power shutoffs for extended periods of time.

Current energy storage technology has been focused on power-dense lithium-ion, which can be charged and discharged rapidly, but can be cost-prohibitive as an option for long-duration energy needs. This potential future Partnership Area would bring together EPIC projects focused on long duration battery storage R&D to gather learnings on this technologies charge and discharge capabilities, potential solution to the intermittency of renewable assets, added grid reliability, and ways to overcome hurdles to interconnection. To date, there are no EPIC projects working on true long duration storage, and the projects that are identified as matched to the obstacles below are testing conventional battery technology that may have a longer charge and dispatch or larger scale.

LONG-DURATION ENERGY STORAGE

CORE QUESTIONS FOR DISCUSSION

Q What technologies are best for long duration storage? Are these technologies readily available?
- How do we reduce the upfront cost of long duration storage technologies?
- How much physical space do these long duration storage options take up?

Q How do we create a market for long duration storage?
- What permitting challenges may long duration storage face?
- What interconnection challenges may long duration storage face?
- Where should these technologies be located?
- Do these assets serve an individual customer need or a broader grid need?

Q What are the lifecycle impacts of long duration storage options, such as waste and other environmental impacts?

CRITICAL AREAS ADDRESSED

Energy Storage: Long Duration Storage
Energy Storage: Seasonal Storage
Energy Storage: Substation allocation

OBSTACLES AND CHALLENGES IDENTIFIED

ES	D	Interconnection and permitting
ES	A	Lack of long-duration storage options
ES	R	What is path to ensure long-duration storage is ready by 2030?

EPIC PROJECTS ALIGNED

CEC-EPC-16-068
CEC-EPC-16-070
CEC-EPC-17-005
CEC-EPC-18-018
CEC-EPC-18-024
CEC-EPC-19-001

4 HOW DO WE DEVELOP NEW TOOLS TO PRIORITIZE AND WEIGH WILDFIRE MITIGATION INVESTMENTS?

BACKGROUD AND DESCRIPTION

In recent years, California has faced dangers and devastation from catastrophic wildfires caused by electric utility infrastructure, as well as increased costs to ratepayers resulting from electric utilities' exposure to financial liability. Steps have been taken to establish a Wildfire Fund through a charge from ratepayers, to require utilities to establish Wildfire Mitigation Plans, to investigate processes around de-energization of power in fire-prone areas, to investigate cost recovery, and to prepare for future events.

The threat of wildfires is likely to expand as the impacts of climate change create a greater frequency of conditions for fire ignition and spread. The solutions to mitigate and prevent electric equipment from igniting fires are costly, and have unknown track records. As the Commission evaluates and implements Wildfire Mitigation plans, understanding the types, trends, and tradeoffs of solution sets are essential for prioritizing asset investments and understanding the costs-benefit of alternatives.

This Partnership Area will leverage the work being done by EPIC projects to gain better access to data and modeling to understand wildfire ignition risk and spread risk, to understanding the impact of climate change on that risk, and to understand the wide range of solutions that may be leveraged to most cost-effectively mitigate wildfires and related Public Safety Power Shutoff events.

WILDFIRE MITIGATION

CORE QUESTIONS FOR DISCUSSION

Q How can we create transparency in asset management schedules and asset management planning?
- What methods are used to calculate risk spend efficiency?
- How can point in time decision making around asset hardening and asset management be improved?
- How do we best model future grid topography?

Q What are emerging fire prevention technologies and what are the intended for?

Q What models and forecasting tools are not available today?

Q How are DACs and Low-Income communities incorporated into the wildfire prevention and asset management strategies?

Q How do we get from R&D to commercialization and incorporate into daily operations?

CRITICAL AREAS ADDRESSED

Wildfire: Asset failure
Wildfire: Risk of Spread
Wildfire: Data forecasting and models
Wildfire: Fault detection
Wildfire: GIS mapping of utility infrastructure
DACs and Low Income: Minimize impacts due to wildfire and PSPS

TIMELINESS

- R1810007, the Utility 2020 Wildfire Mitigation Plans were submitted on 2/7/2020 for a 3-year cycle
- There is an annual re-evaluation of the Utility Wildfire Maturity Model's ability to track progress against targeted maturity advancement

OBSTACLES AND CHALLENGES IDENTIFIED

WF	A	Risk of ignition
WF	B	Risk of spread
WF	C	Existing infrastructure failure
WF	D	Lack of situational awareness
WF	E	Inaccurate weather forecasting
WF	F	Climate change is increasing community resiliency needs
WF	G	Data and models are outdated and inaccurate
WF	I	Poor data quality for auditing and risk analysis
WF	J	No connection between predictions and system operations
WF	K	Stakeholder communication gaps
WF	L	Insufficient communication during events
WF	N	No consensus on fire risk index
WF	O	No fire spread modeling
WF	P	No data on cost-benefit of alternatives
WF	Q	Lack of data and software for independent analysis
WF	R	Lack of performance goals on grid and customer impacts
WF	S	Vegetation contact with electric facilities
WF	U	Community and environmental impacts of vegetation management
WF	W	Fuel risk and management
WF	X	New technology development is too slow
WF	Y	New technologies are untested
WF	Z	High cost of system hardening
WF	AA	Lack of system control and flexibility
WF	AB	Inability to sectionalize/re-route power
WF	AD	Lack of data on future needs
WF	AJ	Lack of tools to identify high threats of ignition
WF	AK	Utilities only incentivized to deploy more capital

WILDFIRE MITIGATION

WF	AL	Limited understanding of tradeoffs to wildfire prevention
WF	AM	Transmission lines serving communities pose fire risk
WF	AN	Optimizing asset risk management strategies
WF	AO	Future grid topology is unknown

EPIC PROJECTS ALIGNED

CEC-EPC-15-008	CEC-EPC-17-013	PGE-E3-P13
CEC-EPC-15-036	CEC-EPC-17-017	PGE-E3-P15
CEC-EPC-15-039	CEC-EPC-17-021	PGE-E3-P20
CEC-EPC-15-070	CEC-EPC-17-027	PGE-E3-P21
CEC-EPC-15-078	CEC-EPC-17-033	PGE-E3-P41
CEC-EPC-15-081	CEC-EPC-17-043	PGE-E3-P43
CEC-EPC-15-086	CEC-EPC-17-046	SCE-E3-P1
CEC-EPC-16-021	CEC-EPC-17-047	SCE-E3-P2
CEC-EPC-16-063	CEC-EPC-18-026	SD-E3-P3
CEC-EPC-17-006	PGE-E2-P34	SD-E3-P5

5 HOW DO WE PRIORITIZE INVESTMENTS TODAY TO MINIMIZE SOCIAL AND ECONOMIC DISRUPTION OF PSPS FOR THE MOST CRITICAL PUBLIC SERVICES AND MOST VULNERABLE?

BACKGROUD AND DESCRIPTION

As a result of Resolution ESRB-8, the electric utilities developed de-energization programs, referred to as "Public Safety Power Shutoff" as a preventative measure of last resort if the utility reasonably believes that there is an imminent and significant risk that strong winds may topple power lines or cause major vegetation-related issues leading to increased risk of fire. These power shutoff events cause significant disruption to residents, businesses, and critical services, particularly in more remote areas that are served by transmission infrastructure that runs through high-fire risk areas.

While utilities are submitting wildfire mitigation plans, and are accountable for de-energization programs, there is a lack in understanding of the comparative value to different approaches to mitigating impacts of Public-Safety Power Shutoffs and wildfires. There also is difficulty identifying critical local infrastructure and understanding the impacts of power shutoffs on critical public services and vulnerable populations. Further, it is unclear what traditional grid modernization investments have been made, or could be made, to prepare for a future of growing and more impactful wildfire and other public safety high-impact threats.

This Partnership Area seeks to leverage lessons learned from EPIC projects focused on grid hardening, sensors, monitoring, grid controls and distribution automation, and seek to bring together researchers and community stakeholders to identify solutions that can best be utilized to minimize or mitigate shutoffs, and to identify priority areas in communities where resiliency can be best supported.

PUBLIC SAFETY POWER SHUTOFFS

CORE QUESTIONS FOR DISCUSSION

Q What were the social and economic disruptions of prior PSPS events?

Q Which strategies have been tested for minimizing disruptions from PSPS events?

Q What sensors or situational awareness tools could be used to mitigate shutoffs?

Q What can traditional grid modernization strategies and technologies teach us about what works and what doesn't work?

Q What role does telecommunications play in resiliency needs?

Q What are best practices in stakeholder communication and engagement for emergency events?

Q How can we prioritize grid hardening or sectionalization to serve community resources needed the most?

Q How can more real-time information on shutoff events be shared with critical public service providers and communities.

CRITICAL AREAS ADDRESSED

PSPS: Low-income customer impact
PSPS: Defining at-risk communities

And significantly related to:
Wildfire: Asset Failure
Wildfire: Risk of Spread
Wildfire: Fault Detection:
Wildfire: Data forecasting/models

PUBLIC SAFETY POWER SHUTOFFS

OBSTACLES AND CHALLENGES IDENTIFIED

PS	A	Impacts on public safety services
PS	G	Limitations to monitoring conditions to minimize shut-offs
PS	H	Assessing conditions to be able to quickly restore power
PS	I	No identification of critical facilities
PS	J	Cost of substation and grid upgrades to minimize outages
PS	M	DACs/Low-income communities could get left behind
PS	O	Reliability means different things to different customers
PS	P	Understanding of community risks at different time thresholds
PS	Q	Mobile options are limited during widespread impacts
PS	R	Impacts on vulnerable populations
GM	C	Situational Awareness
GM	E	Lack of data on high-priority areas
GM	L	Reliability means different things to different customers
GM	M	DACs/Low-income communities could get left behind

EPIC PROJECTS ALIGNED

CEC-EPC-15-008	CEC-EPC-17-050	PGE-E3-P43	SD-E3-P7
CEC-EPC-17-028	CEC-EPC-18-018	SCE-E1-12	
CEC-EPC-17-043	PGE-E2-P34	SCE-E2-4	
CEC-EPC-17-046	PGE-E3-P13	SCE-E3-P11	
CEC-EPC-17-047	PGE-E3-P32	SD-E3-P3	
CEC-EPC-17-048	PGE-E3-P41	SD-E3-P5	

6 HOW CAN WE ENSURE THE EMERGING ELECTRIFICATION OF VEHICLES SUPPORTS, AND DOESN'T HARM AND OVERWHELM, THE ELECTRIC GRID?

BACKGROUD AND DESCRIPTION

Transportation electrification has been an area of emphasis for several years and California has ambitious goals for zero-emission vehicle adoption. California has worked to expand charging infrastructure and electrify light, medium, and heavy duty vehicles.

If done poorly, quick electrification of transportation can create new strains and costs on the electric grid, exacerbate peak demands, and inhibit the decarbonization of the power sector. If done well, transportation electrification can be a tool to help address the intermittency and imbalance issues that come with a high penetration of renewable energy, provide additional resiliency and reliability support on the grid, and drive down rates for all customers. In particular, medium- and heavy-duty vehicle charging infrastructure, supporting school buses, delivery and goods, and fleets, face particular challenges to integration, given the impacts of their high-density and high-capacity charging needs.

This Partnership Area will bring together RD&D efforts working on transportation electrification and vehicle-grid integration issue, as well as utility planning efforts, to accelerate innovation in the adoption, integration, and optimization of medium- and heavy- duty electric vehicle charging. This will focus on vehicle-grid communication and planning implementation, and ways to best mitigate the impact of clusters of medium- and heavy-duty vehicle charging on the distribution, particularly in areas that impact environmental justice communities.

CORE QUESTIONS FOR DISCUSSION

Q What challenges do fleets face in electrification?

- How do we incentivize large fleets to electrify?
- How do we electrify rideshare?
- How can we develop a consistent charging standard for medium-/heavy-duty vehicles?

Q How can we leverage and support the work of the interagency Vehicle-Grid Integration (VGI) Working Group?

- Where has VGI successfully been implemented?
- What are the lessons learned?
- How do we incentivize customers to participate in optimized charging?

Q How can we mitigate grid impacts from clusters of medium-/heavy-duty electric vehicles?

- What communities across the state are most impacted by medium-/heavy-duty emissions?

CRITICAL AREAS ADDRESSED

DAC's and Low-Income: Minimize impacts due to wildfire and PSPS
DAC's and Low-Income: Multi-family solutions
Rates and Rate Design: How to incentivize customer to make different choices?
Transportation Electrification: EVs role in resiliency
Transportation Electrification: Medium/Heavy duty potential
Transportation Electrification: Standardization of charging potential
Transportation Electrification: V2G benefits and communication methods

TIMELINESS

- Order Instituting Rulemaking to Continue the Development of Rates and Infrastructure for Vehicle Electrification (Review of staff Transportation Electrification Framework)

- Opening Comments on Equity, Rates, Cost Recovery, Alternative Financing, Partnerships, VGI, ME&O, and Emerging Trends (Sections 6, 9, 10, 11.1, 11.2, and 12) in August 2020

TRANSPORTATION ELECTRIFICATION

OBSTACLES AND CHALLENGES IDENTIFIED

EV	A	Slow deployment of light-duty charging infrastructure
EV	B	Lack of multifamily resident access to charging infrastructure
EV	D	Lack of medium-/heavy-duty charging infrastructure
EV	G	Customer awareness
EV	H	Customer Preferences
EV	J	Unknown value of integration technology
EV	K	Unclear role of vehicles in DR/Grid services
EV	L	Lack of vehicle-grid communication standard
EV	M	VGI technologies haven't been proven
EV	N	Unknown market / bus. model for vehicle-grid
EV	P	Charging rates and resale of energy
EV	Q	Ownership models of charging infrastructure
EV	X	Heavy-Duty requires large charging capacity
EV	AA	Lack of data on distant future market transformation
EV	AC	Challenges getting participation in optimized charging
EV	AF	How car company, chargers, customer, utility all work together
EV	AH	V2G not commercially available
EV	AI	When should charging be optimized for?
EV	AJ	A lot of uncoordinated private investment
EV	AL	How to educate fleet managers on opportunity to electrify
ES	G	Uncertain role of vehicles as energy storage
IC	C	Lack of charging infrastructure in DACs

EPIC PROJECTS ALIGNED

CEC-EPC-15-013
CEC-EPC-15-015
CEC-EPC-15-026
CEC-EPC-15-073
CEC-EPC-15-084
CEC-EPC-15-097
CEC-EPC-16-054
CEC-EPC-16-055
CEC-EPC-16-057
CEC-EPC-16-058
CEC-EPC-16-059
CEC-EPC-16-061
CEC-EPC-17-005
CEC-EPC-17-020
CEC-EPC-17-026
CEC-EPC-18-022
SCE-E3-P12
SCE-E3-P13
SCE-E3-P15
SCE-E3-P8
SD-E3-P7

7 CAN WE DECARBONIZE OUR BUILDING STOCK WITHOUT STARTING FROM SCRATCH?

BACKGROUD AND DESCRIPTION

One quarter of California's emission come from buildings. As part of the state's effort to decarbonize by 2045, addressing building heating, industrial processes, cooking, and other emitting sources will require a major shift in the energy source and function of building technology. SB 1477, passed in 2018, authorized building decarbonization pilot program funding and created the BUILD Program and TECH Initiative. These are both building decarbonization pilot programs which test technologies, program design and policy, and scalability of potential solutions.

The challenges in building decarbonization include a technology component – how to reduce the costs of space and water heating equipment, how to reduce the costs of electric industrial processes. They also include a finance and market component – that major equipment replacement is usually an emergency purchases, and not coordinated as a whole-building retrofit. As more buildings decarbonize, there are also issues that emerge on the policy side – what are the impacts to the existing gas distribution system, and the rate impact on customers who continue using gas.

This Partnership Area would be focused on bringing together pilot projects under the BUILD Program and TECH Initiative and EPIC projects working on building decarbonization, addressing affordability, finance and market obstacle to DAC and Low-Income community participation in decarbonization, and to gain lessons learned on rebuilding after disasters.

BUILDING DECARBONIZATION

CORE QUESTIONS FOR DISCUSSION

Q New buildings and rebuilding

- How do we ensure DACs and Low-Income customers benefit?
- What challenges may be faced in electrifying buildings?
- How can coordination accelerate market transformation?
- What customer preferences may influence the decision to electrify?
- How do we optimize building electrification strategies?
- What does a community-wide strategy look like?

Q Building Retrofits

- How do we ensure DACs and Low-Income customers benefit?
- What challenges may be faced in electrifying buildings?
- How can coordination accelerate market transformation?
- What customer preferences may influence the decision to electrify?
- How do we optimize building electrification strategies?
- What does a community-wide strategy look like?
- How can we more comprehensively understand existing capacity for electrification (e.g. panel size, electrical service size)?

Q What impact does building electrification have on the electricity grid?

- What do new load profiles look like?
- What are impacts on distribution system?
- How do we ensure there is no cost shifting?

CRITICAL AREAS ADDRESSED

DACs/LI: Multi-Family Solutions

TIMELINESS

- R.19-01-011, and specifically D.20-03-027, established Building Decarbonization Pilot Programs (BUILD and TECH) as part of its Phase 1 decision. This decision will lead to workshops on gas system data disclosure, and the layering of incentives across programs in 2020.
- Phase 2 of R.19-01-011 focuses on a wildfire and natural disaster rebuild incentive program, a proceeding that will take place over the course of 2020.
- Phase 3 of R.19-01-011 will be explored in 2021 and later.

OBSTACLES AND CHALLENGES IDENTIFIED

BE	A	Buildings account for 4/1 of statewide GHG
BE	B	Distribution grid not sized for electrification
BE	C	Building codes can be restrictive
BE	D	Some customers still use wood or propane
BE	E	Failure of aging gas infrastructure
BE	G	Existing gas pipe and hookups in buildings
BE	H	Industrial sector relies on gas for processes
BE	I	Unknown cost to replace gas infrastructure with electric
BE	J	High cost of electric heating equipment
BE	K	End of life replacement vs mid-life
BE	L	What to do with existing gas distribution system
BE	M	Split incentive with multi-family buildings
BE	N	Cultural preferences for gas for cooking
BE	O	Whole-home retrofits are not "off the shelf"
BE	P	Not coordinated with Energy Efficiency policy
BE	Q	Gas system burden put on low-income as well-off electrify
BE	R	May require panel upgrades
BE	S	High up-front cost
BE	T	Equipment fails at wrong time for system overhaul
BE	U	Trades are not prepared to sell electrification
BE	V	Codes/Standard attainment
BE	W	Building operations not aligned with clean generation

BUILDING DECARBONIZATION

BE	X	Difficulty permitting required infrastructure
BE	Y	Increasing gas consumption in buildings
PO	D	Benefits to DACs/low-income are uncertain/unknown
WB	J	Lack of data on electrification projects within DACs
PO	J	Lack of customer and market behavior studies
PO	K	Understanding community needs

EPIC PROJECTS ALIGNED

CEC-300-15-009	CEC-EPC-15-076	CEC-EPC-16-012	CEC-EPC-17-041
CEC-300-15-011	CEC-EPC-15-097	CEC-EPC-16-013	CEC-EPC-17-044
CEC-EPC-14-038	CEC-EPC-16-001	CEC-EPC-16-046	CEC-EPC-17-048
CEC-EPC-15-004	CEC-EPC-16-002	CEC-EPC-17-002	CEC-EPC-18-019
CEC-EPC-15-027	CEC-EPC-16-003	CEC-EPC-17-034	CEC-EPC-19-002
CEC-EPC-15-053	CEC-EPC-16-004	CEC-EPC-17-035	
CEC-EPC-15-057	CEC-EPC-16-007	CEC-EPC-17-040	

8 HOW CAN WE BRING TOGETHER ENERGY EFFICIENCY INVESTMENTS AND R&D EFFORTS TO MOVE THE NEEDLE ON LOW-INCOME MULTIFAMILY RETROFITS?

BACKGROUD AND DESCRIPTION

A significant quantity of California's low-income housing infrastructure is made up of multifamily buildings. Whole-building retrofits are a great way to improve energy efficiency, decrease energy demand, increase tenant satisfaction, improve indoor air quality and health, and save tenants money. However, low-income multifamily building retrofits have lagged far behind their potential.

Communities and residents that could benefit most from these benefits are not getting them. Most low-income multifamily buildings are older and are high energy users, with poor comfort and air quality. However, the multi-tenant and ownership structure of low-income multi-family buildings make it difficult to roll out new energy efficiency and electrification upgrades in a cost-effective and wholistic way.

This Partnership Area will focus on bringing together EPIC projects focused on R&D of new retrofit technologies, businesses in the commercialized retrofit space, low-income communities, and building owners. Today, EPIC R&D projects focused on low-income multifamily buildings have trouble getting implemented because R&D investments often must be coupled with existing efficiency and retrofit investments in order to be viable, but there lacks methods to do so. Stakeholders will work together to find ways to integrate and incentivize new R&D technologies and approaches into whole building retrofits. This Partnership Area will also explore the potential health and safety benefits of deploying commercialized full building upgrades along with R&D technologies.

LOW-INCOME MULTIFAMILY RETROFITS

CORE QUESTIONS FOR DISCUSSION

Q What challenges stand in the way to low-income multifamily retrofits?

- In older buildings, what permitting challenges may there be?
- How do you overcome retrofits that require tenants to evacuate the premises for an extended period of time?

Q Have there been successful projects integrating commercially available technologies with R&D technologies?

- Is it appropriate to deploy pre-commercial technologies in low-income homes? What additional customer protections are required?

Q Should building upgrades be driven by the tenant needs or the owners desires?

- What are the retrofits that owners want?
- What are the retrofits that tenants need?

Q How do you incentivize building owners and low-income tenants?

- Who should pay for up-front costs?
- How do you value health and safety improvements?

CRITICAL AREAS ADDRESSED

DACs/LI: Multi-Family Solutions

TIMELINESS

- A.19-11-003 - A final decision on the applications for approval of the ESA, CARE and FERA Programs and Budgets for program years 2021-2026 is expected by December 2020.

LOW-INCOME MULTIFAMILY RETROFITS

OBSTACLES AND CHALLENGES IDENTIFIED

IC	K	Multifamily and multi-tenant restrictions
IC	L	Lack of knowledge of technology and programs
BE	M	Split incentive with multi-family buildings
BE	C	Building codes can be restrictive
BE	X	Difficulty permitting required infrastructure
EE	F	Some buildings of multiple customers share central systems
EE	K	All low-hanging fruit has been harvested
EE	L	Lack of focus on health and safety in weatherization
EE	O	Lack of enforcement in building codes/standards
EE	P	Whole-home retrofits are not "off the shelf"
EE	Q	No connection between R&D and program rollout
EE	V	Difficulty reaching disadvantaged communities
EE	W	Hard-to-reach customers

EPIC PROJECTS ALIGNED

CEC-EPC-14-009
CEC-EPC-14-011
CEC-EPC-14-017
CEC-EPC-14-021
CEC-EPC-14-038
CEC-EPC-15-004
CEC-EPC-15-020
CEC-EPC-15-025
CEC-EPC-15-026
CEC-EPC-15-033
CEC-EPC-15-053
CEC-EPC-15-057
CEC-EPC-15-094
CEC-EPC-15-097
CEC-EPC-16-001
CEC-EPC-16-002
CEC-EPC-16-003
CEC-EPC-16-004
CEC-EPC-16-005
CEC-EPC-16-007
CEC-EPC-16-013
CEC-EPC-16-056
CEC-EPC-16-067
CEC-EPC-16-068
CEC-EPC-17-001
CEC-EPC-17-007
CEC-EPC-17-035
CEC-EPC-17-040
CEC-EPC-17-041
CEC-EPC-17-044
CEC-EPC-17-045
CEC-EPC-19-002

9 WHAT IS THE NEW ROLE OF DISTRIBUTED ENERGY RESOURCES AS WE RESHAPE THE GRID?

BACKGROUD AND DESCRIPTION

Since 2007, the CPUC has worked to integrated distributed energy resources into utilities' operations in a coherent and efficient manner. The goal has been to leverage the ability of demand-side technologies to provide grid services and support, and reduce load and grid inefficiencies. There has been extensive work done over the past decade to plan for and develop Distribution Resource Plans and Integrated Distributed Energy Resources efforts to calculate uniform benefits of distributed energy resources, and integrate distributed energy resources into grid planning.

As technology advances, and the stresses and opportunities on the electric grid evolve, so to do the expectations and opportunities for leveraging distributed energy resources to provide greater grid and load efficiency. Load impacts from transportation and building electrification create new challenges and opportunities for grid planning and operations. Changing reliability and resiliency needs from the state's response to wildfire and climate change pose new challenges for utilities to integrate customer-side resources. Utilities express concern over their inability to communicate and control a growing number of DERs, and raise flags about potential adverse impacts of independently-acting resources on the grid.

This Partnership Area will focus on providing the CPUC and policy-makers with a view to the future of the prospects of new DERs and other technology to unlock the ability of DERs to provide coordinated grid services and benefits for the future grid topology. It will bring EPIC and other researchers together to discuss new capabilities, as well as new grid needs, that can be supported by DER technology.

DISTRIBUTION RESOURCE PLANNING

CORE QUESTIONS FOR DISCUSSION

Q What is the future of hosting capacity and planning?
- What technology enables greater hosting capacity at least cost?
- What behind-the-meter technology can help support greater hosting capacity?

Q What have we learned from distribution deferral efforts?
- What are the obstacles to deferring the need for capital expenditures on traditional distribution infrastructure with distributed energy resources?

Q How should we be thinking about the next technologies that can provide grid services?
- What new technology capabilities of DER can support system reliability or other grid services?
- What technologies can provide grid services actively vs. passively?
- What new data or transactions are needed for DER to provide grid services?

Q What role does utility communication and control play?
- What role can third-party aggregators play?
- What role can distributed intelligence / transactions play?
- What are alternative approaches to using communicating and controlling existing DER?

CRITICAL AREAS ADDRESSED

Distribution Planning: Communication and control of the distribution system
Distribution Planning: Greater visibility to the distribution grid
DER Integration: Grid planning and bi-directional control of loads

TIMELINESS

- R.14-10-003 (Integrated Distributed Energy Resources Proceeding) remains open with a focus on:
  - Development of alternative sourcing mechanisms for distributed energy resources
  - Updated to the avoided cost calculator
  - The next major update of the Avoided Cost Calculator will begin with a staff-led workshop on August 1, 2021 in R.14-10-003 or a successor proceeding.
- R.14-08-013 (Distribution Resource Plans) – In D.20-03-005, the Commission adopted the Staff proposal on avoided cost and locational granularity of transmission and distribution deferral values.

DISTRIBUTION RESOURCE PLANNING

OBSTACLES AND CHALLENGES IDENTIFIED

DP	A	Lack of reliable communications with resources
DP	B	Identifying best locations for DERs
DP	C	How can we use DERs to make grid better?
DP	D	Reverse power flow
DP	E	Voltage management
DP	G	High penetration of renewables
DP	H	Adverse interactions between assets on the grid
DP	I	Lack of open communication between resources
DP	J	Managing frequency variations
DP	M	Future grid topology is unknown
DP	N	Flexibility of grid architecture with pop./clim./wild changes
DP	O	If rebuilding from scratch, what would grid look like?
GM	G	Local power quality impacts from electrification and DER
GM	I	Use of smart inverters to support power quality
GM	J	Frequency of data collection
GM	N	Voltage Optimization not cost effective on all circuits
GM	O	Networking in new resources to advanced distribution automation
GM	P	Coordinate cap. banks with DER for Volt/VAR support
GM	Q	How to incorporate advanced operations
RE	K	Integrating multiple solutions
RE	L	Lack of visibility on distribution grid
RE	M	Create voltage/var/frequency fluctuations
RE	N	New ramp needs
RE	P	Inverters are grid following
RE	R	Lack of reliable communications with resources
EV	K	Unclear role of vehicles in DR/Grid services
EV	AG	Charger communication with energy management systems
EV	AI	When should charging be optimized for?

OBSTACLES AND CHALLENGES IDENTIFIED

DM	B	DR has been utility or customer dispatch focused
DM	E	Unclear role of energy storage in DR
DM	F	Storage following customer signal can counteract grid need
DM	G	Transactive energy adoption and behavior unknown
DM	H	Lack of dynamic and granula data to enable load shift/shed
DM	I	Utility IT insufficient for granular settlement
DM	J	DR less successful than in other markets
DM	K	Getting whole building working together
DM	L	Customers don't understand benefits
DM	M	Customer preferences
SC	A	Opportunities and ability for storage to displace T&D upgrades
SC	B	Utility capital investment planning not connected to GIS database
SC	D	Despite approval, no non-wires implemented yet
SC	E	Can DER actually replace traditional assets
SC	F	Lack of data on performance of DERs as NWAs
CS	A	Ensure privacy and accuracy of distributed DER data
CS	B	Need to provide seemless access to data to 3rd parties
CS	D	Cybersecurity of DER communications
CS	E	Can't enable transactional energy without cybersecurity
CS	G	Threat from aggregation of compromised DER

DISTRIBUTION RESOURCE PLANNING

EPIC PROJECTS ALIGNED

- CEC-EPC-14-002
- CEC-EPC-14-008
- CEC-EPC-14-035
- CEC-EPC-14-036
- CEC-EPC-14-079
- CEC-EPC-15-008
- CEC-EPC-15-013
- CEC-EPC-15-015
- CEC-EPC-15-018
- CEC-EPC-15-031
- CEC-EPC-15-037
- CEC-EPC-15-044
- CEC-EPC-15-045
- CEC-EPC-15-047
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- CEC-EPC-16-003
- CEC-EPC-16-004
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- CEC-EPC-16-019
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- CEC-EPC-16-024
- CEC-EPC-16-026
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- CEC-EPC-16-031
- CEC-EPC-16-042
- CEC-EPC-16-045
- CEC-EPC-16-051
- CEC-EPC-16-054
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- CEC-EPC-16-062
- CEC-EPC-16-065
- CEC-EPC-16-077
- CEC-EPC-16-079
- CEC-EPC-17-002
- CEC-EPC-17-004
- CEC-EPC-17-005
- CEC-EPC-17-020
- CEC-EPC-17-024
- CEC-EPC-17-025
- CEC-EPC-17-033
- CEC-EPC-17-034
- CEC-EPC-17-038
- CEC-EPC-17-043
- CEC-EPC-17-045
- CEC-EPC-17-046
- CEC-EPC-17-047
- CEC-EPC-17-048
- CEC-EPC-18-022
- CEC-EPC-18-024
- CEC-EPC-18-026
- CEC-EPC-19-002
- CEC-EPC-19-004
- PGE-E2-P10
- PGE-E2-P13
- PGE-E2-P34
- PGE-E3-P11
- PGE-E3-P3
- PGE-E3-P4
- SCE-E1-12
- SCE-E3-P12
- SCE-E3-P13
- SCE-E3-P3
- SCE-E3-P4
- SCE-E3-P5
- SCE-E3-P7
- SCE-E3-P8
- SCE-E3-P9
- SD-E3-P3

10 HOW CAN WE DEPLOY CONSISTENT, TECHNOLOGY-NEUTRAL PRICE SIGNALS TO UNLOCK AND OPTIMIZE THE CUSTOMER ROLE IN GRID SERVICES?

BACKGROUD AND DESCRIPTION

Traditionally, rates and tariffs were based on the expectation that the utility provided power for the customer. As the grid moves to a more customer-based transactive model and consumers can install solutions behind their meter, and new clean energy power options are at their fingertips, the opportunity to optimize customer behaviors with rates, tariffs, incentives and pricing signals has changed.

The utility business model is changing, and customers can access new technology options to create their own power, shift load, store energy, charge their vehicles, and much more. These new investments in renewables, energy storage, transportation electrification, microgrids, demand response can provide services to support the future energy system, but many customers are not appropriately compensated for the value that can, or do, bring to the grid. This lack of valuation restricts adoption of consumer technology and can lead to a more costly energy system.

This Partnership Area will bring together EPIC projects working across various technologies to better understand the impacts and value these technologies create for the grid, and identify consistent technology-neutral price signals that could be evaluated. As well, the partnership area will gain input from EPIC projects that have focused on customer and consumer behaviors to gain lessons learned on how rate structures and pricing encourage uptake and deployment.

PRICE SIGNALS

CORE QUESTIONS FOR DISCUSSION

Q What price signals/ rate designs have worked and why?
- What specifically made them successful (technology, market, etc)
- What entices people to make different or new decisions?
- How do we ensure there is no cost shifting?

Q What is the suite of technologies that need better price signals?
- What technologies should be able to access wholesale markets?

Q What services can be provided and priced?
- How do you compensate for reliability?
- How do you incentivize optimized charging?
- How do you incentivize aggregation of several BTM DERs?

Q What do we need in order to enable transactions and pricing for services?
- What tools do we need?
- Who can participate?
- How can prices for services be derived?
- What enabling technology/platform is needed?
- How do we ensure accuracy and safety of customer data?

CRITICAL AREAS ADDRESSED

Rates and Rate Design: Effective price signals
Cybersecurity: Safe and accurate communication

TIMELINESS

- This Partnership Area would cover several timely topic areas and could inform many Decisions which are to be made in the next 12-18 months.

PRICE SIGNALS

OBSTACLES AND CHALLENGES IDENTIFIED

DM	G	Transactive energy adoption and behavior unknown
DM	H	Lack of dynamic and granula data to enable load shift/shed
RD	A	Lack of customer and market behavior studies
RD	B	Lack of marketing/outreach on rate structures
RD	C	Customer uncertainty of impacts of new rates
RD	D	How do we incentivize choices with rates and tariffs
RD	E	Utilities claim limited capacity to change billing systems/portal
MG	A	Unclear value to customer
MG	B	Unclear value to grid
MG	P	Threat of shifting costs
MG	Q	Tariff and incentive misalignment
MG	AE	Regulatory uncertainty over transactional energy
MG	V	No access to wholesale markets
ES	B	Lack of revenue options for storage
ES	T	Wholesale market participation for BTM storage unclear
ES	U	How to incentivize storage to do what is needed
ES	V	Difficulty stacking revenue
ES	W	Lack of locational value
EV	H	Customer Preferences
EV	G	Customer awareness
EV	K	Unclear role of vehicles in DR/Grid services
EV	J	Unknown value of integration technology
EV	P	Charging rates and resale of energy
EV	Y	Lack of price competitiveness
EV	Z	Customer education - Total Cost of Ownership
EV	AC	Challenges getting participation in optimized charging
EV	AE	How to avoid cost-shifting

PRICE SIGNALS

OBSTACLES AND CHALLENGES IDENTIFIED

EV	AI	When should charging be optimized for?
EV	AJ	A lot of uncoordinated private investment
CS	A	Ensure privacy and accuracy of distributed DER data
CS	D	Cybersecurity of DER communications
CS	E	Can't enable transactional energy without cybersecurity
DM	L	Customers don't understand benefits
DM	M	Customer preferences
PO	J	Lack of customer and market behavior studies

EPIC PROJECTS ALIGNED

CEC-300-15-009
CEC-300-15-011
CEC-EPC-14-035
CEC-EPC-14-038
CEC-EPC-15-013
CEC-EPC-15-018
CEC-EPC-15-026
CEC-EPC-15-031
CEC-EPC-15-045
CEC-EPC-15-047
CEC-EPC-15-048
CEC-EPC-15-053
CEC-EPC-15-054
CEC-EPC-15-057
CEC-EPC-15-073
CEC-EPC-15-074
CEC-EPC-15-075
CEC-EPC-15-076
CEC-EPC-15-083
CEC-EPC-15-084
CEC-EPC-15-086
CEC-EPC-15-090
CEC-EPC-15-097
CEC-EPC-16-026
CEC-EPC-16-027
CEC-EPC-16-028
CEC-EPC-16-031
CEC-EPC-16-045
CEC-EPC-16-051
CEC-EPC-16-054
CEC-EPC-16-055
CEC-EPC-16-057
CEC-EPC-16-058
CEC-EPC-16-059
CEC-EPC-16-061
CEC-EPC-16-062
CEC-EPC-16-068
CEC-EPC-16-070
CEC-EPC-16-077
CEC-EPC-16-079
CEC-EPC-17-004
CEC-EPC-17-005
CEC-EPC-17-007
CEC-EPC-17-020
CEC-EPC-17-025
CEC-EPC-17-026
CEC-EPC-17-034
CEC-EPC-17-035
CEC-EPC-17-045
CEC-EPC-17-048
CEC-EPC-17-053
CEC-EPC-17-055
CEC-EPC-18-022
PGE-E2-P13
PGE-E3-P11
PGE-E3-P4
SCE-E1-12
SCE-E3-P12
SCE-E3-P5
SCE-E3-P8
SD-E3-P7

11 CAN WE DEPEND ON GREEN ELECTROLYTIC HYDROGEN TO SERVE OUR "LAST 20%" OF DECARBONIZATION NEEDS?

BACKGROUD AND DESCRIPTION

Green electrolytic hydrogen is a term used to describe the production of hydrogen fuel wherein the energy used for the electrolysis process is sourced from renewable energy. This hydrogen fuel has been proposed as a means to provide low- or zero-carbon firm and ramp-able generation capacity on the electric system, provide an energy sink for excess renewable generation at times of low load, or supply end-users where electrification may be impractical. For example, many industrial processes, such as high-heat boilers, have traditionally relied on supplied gas, and electrification would be more costly and less-efficient process. used to create fuel cells.

There is increasing interest in using fuels cells and green electrolytic hydrogen as solutions for grid decarbonization, transportation alternatives, and solutions to industrial processes. Yet, the true prospects for the technology remain uncertain, cost projections remain high, and the reality of the viability of the solutions are untested. Planning processes today must take into account whether we can depend on green electrolytic hydrogen as a significant solution to the state's decarbonization goals.

There are not many active EPIC projects focused on hydrogen or green electrolytic hydrogen. This Partnership Area would be focused on how to coordinate future hydrogen-focused R&D projects to test the decentralization of production, use in energy storage, use cases in industrial processes, and feasibility in medium/high duty vehicles.

GREEN ELECTROLYTIC HYDROGEN

CORE QUESTIONS FOR DISCUSSION

Q What are the best and most likely use cases for electrolytic hydrogen?

- What industrial process are the least likely to electrify and should renewable hydrogen fuel be focused on?
- Is renewable hydrogen a solution for long duration storage?
- Can you use hydrogen or renewable gas in the existing gas infrastructure?

Q Can you safely transport and store hydrogen?

Q How do you decentralize production?

Q What are the cost impacts of renewable hydrogen, and what is the path to bring costs down?

Q Are there any unintended impacts to creating renewable hydrogen?

CRITICAL AREAS ADDRESSED

Hydrogen: Market potential and viability

OBSTACLES AND CHALLENGES IDENTIFIED

H	D	Lack of support for production and availability of renewable fuels
H	E	Distribution of hydrogen fuel
H	J	Cost to produce hydrogen
H	K	Uncertain whether Hydrogen will be viable
H	L	Uncertain when Hydrogen will be viable
H	M	Safety risks of infrastructure and fuel
H	O	Hydrogen production is centralized

EPIC PROJECTS ALIGNED

CEC-EPC-15-082

CEC-EPC-17-028

12 HOW CAN WE ENSURE THE INVESTMENTS WE ARE MAKING IN THE GRID TODAY PREPARE US FOR THE CLIMATE REALITY OF TOMORROW?

BACKGROUD AND DESCRIPTION

The climate is changing rapidly and point in time decisions must be made using forecasts and data that is changing just as quickly. Rulemaking 1804019 created five (5) topic areas to review the impacts of climate adaptation on the electricity and natural gas grid and facilitate creation of the necessary tools and resources to integrate climate adaptation into grid planning and risk analysis.

Grid planning and operational asset management requires accurate forecasting and modeling tools. The climate is changing rapidly and the resources, forecasting tools, and models used by the electric utilities must incorporate current and projected climate, weather, population, geographic, and topographic data and forecasts to help make grid decisions today and for the future.

This Partnership Area will bring together EPIC projects focused on climate impact and adaptation forecasting and modeling. The Partnership Area will help to coordinate efforts, create transparency, and facilitate faster development of the models necessary to make important grid decisions and discuss what resources, data, and models may be needed for the future.

CLIMATE ADAPTATION

CORE QUESTIONS FOR DISCUSSION

Q What tools do we have today to predict impacts on the grid tomorrow?

- Are these tools and data sources up-to-date and accurate?
- What do the models tell us today about the future of the grid?
- Which climate variables have the largest impact on the grid?
- What are the impacts of a changing climate on electricity generation (e.g. hydro production)?
- Will changing climate conditions impact the efficiency or ability for grid components to operate effectively?

Q Do we have accurate forecasts for climate change and weather patterns?

Q What is missing in climate forecasting and modeling which could impact grid decisions?

Q Which communities are most impacted by climate change?

Q How do we ensure Disadvantaged Communities and Low-Income Communities are not disproportionately impacted by climate change?

Q How do we minimize overall utility customer impacts to climate change?

CRITICAL AREAS ADDRESSED

Climate Adaptation: Impacts on the electric system

TIMELINESS

- Rulemaking R1804019, and specifically Topic 3, 4, and 5 , are expected to have a proposed decision that will be issued in 2020.

CLIMATE ADAPTATION

OBSTACLES AND CHALLENGES IDENTIFIED

CA	A	Gaps in climate impact modeling on energy system
CA	B	Impacts on infrastructure needs not factored in to investment
CA	C	Climate impact on workers health & safety
CA	D	Impacts on water resource / hydro availability
CA	E	Overnight heat could cause thermal overload
CA	F	Impacts on electrification load
CA	G	Indentifying impacts of population trends
CA	H	Flexibility of grid architecture with climate change impacts
DB	E	Inadequate forecasting tools
WF	E	Inaccurate weather forecasting
WF	G	Data and models are outdated and inaccurate
DP	N	Flexibility of grid architecture with pop./clim./wild changes
DP	M	Future grid topology is unknown

EPIC PROJECTS ALIGNED

CEC-300-15-004
CEC-300-15-005
CEC-300-15-006
CEC-EPC-14-061
CEC-EPC-14-071
CEC-EPC-15-008
CEC-EPC-15-036
CEC-EPC-15-039
CEC-EPC-15-059
CEC-EPC-15-070
CEC-EPC-15-078
CEC-EPC-15-081
CEC-EPC-16-002
CEC-EPC-16-007
CEC-EPC-16-021
CEC-EPC-16-047
CEC-EPC-16-063
CEC-EPC-16-079
CEC-EPC-17-003
CEC-EPC-17-006
CEC-EPC-17-027
CEC-EPC-17-028
CEC-EPC-17-029
CEC-EPC-17-033
CEC-EPC-17-035
CEC-EPC-17-043
CEC-EPC-17-045
CEC-EPC-17-046
CEC-EPC-17-047
CEC-EPC-17-048
CEC-EPC-17-050
CEC-EPC-18-026

PARTNERSHIP AREA FRAMEWORK

Inputs from the review of relevant legislation, regulatory proceedings, reports, workshops, participant interviews, as well as other source material, identified three dozen core strategies aligned with meeting California's Pollution Reduction, Affordability, safety, Reliability/Resiliency, and Equity goals.

Strategies were organized to be a top-level category of an issue, but may contain many more sub-categories of topics. For example, Renewable Energy Development itself would likely have sub-categories by technology type, as well as by type of issue related to significant deployment of renewable energy.

Some obstacles and challenges may be overcome by other strategies on the list, even if listed separately.

Granular or highly-specific technology or other approaches are generally classified as solutions, and will be mapped to the obstacle they are trying to overcome.

GOALS

STRATEGIES

EMISSIONS REDUCTION

- RE RENEWABLE ENERGY DEVELOPMENT
- EV TRANSPORTATION ELECTRIFICATION
- H HYDROGEN
- BE BUILDING ELECTRIFICATION
- EE ENERGY EFFICIENCY
- LC LOW-CARBON FUELS
- CO OTHER ZERO-EMISSION GENERATION

California has established an ambitious goal to achieve 100% decarbonization by the year 2045. Complementary to that broad goal, there exist several identified strategies or pathways to achieve that goal, including a Renewable Portfolio Standard, a Zero-Emission Vehicle goal, and several sector-specific targets.

AFFORDABILITY

- IP INTEGRATED RESOURCE PLANNING
- CM DEMAND-SIDE MANAGEMENT
- SC SYSTEM COST REDUCTION
- RD RATES AND RATE DESIGN
- ME METRICS
- UB UTILITY BUSINESS MODEL / INCENTIVES

The California Public Utilities Commission has an obligation to ensure that rates are just and reasonable. The Commission is currently working to cestablish a clearer definition of what is "affordable," particularly for essential utility service, as it may have different impacts to different customers.

PARTNERSHIP AREA FRAMEWORK

SAFETY

- WF WILDFIRE MITIGATION
- WT WORKER TRAINING
- PS PUBLIC SAFETY POWER SHUTOFFS
- CS CYBERSECURITY
- VM VEGETATION MANAGEMENT
- LC LIFECYCLE IMPACTS OF ELECTRICITY PRGS

Californians rely on utility services for full participation in society. The California Public Utilities Commission works to secure health and safety, with a goal of achieving zero accidents and injuries across its regulated entities, and works to prevent adverse public safety impacts that may arise from the electric system.

RELIABILITY/RESILIENCY

- MG MICROGRID DEVELOPMENT
- ES ENERGY STORAGE
- FR FAULT DETECTION AND RESTORATION
- RA RESOURCE ADEQUACY
- DB DAILY BALANCING
- GM GRID MODERNIZATION
- DP DISTRIBUTION RESOURCE PLANNING
- FB FOREST BIOMASS
- CA CLIMATE ADAPTATION

The California Public Utilities Commission works to assure an adequate supply of electricity, and assure the quality of electric service. Further, the California Public Utilities Commission works to assure that utility systems are resilient and capable of recovering from adverse events.

EQUITY

- IC INCLUSIVE ENERGY PROGRAM DESIGN
- WB WEALTH-BUILDING AND OWNERSHIP
- WD WORKFORCE DEVELOPMENT
- PO PUBLIC OUTREACH AND EDUCATION
- EA ENERGY BILL ASSISTANCE
- CI CLIMATE IMPACTS MITIGATION
- UC UTILITY CUSTOMER COMMUNICATION

California energy policy efforts in recent years have placed a larger focus on ensuring that all residents of California are able to benefit from the transition to a clean energy economy. That includes direct benefits, such as participation in incentive programs, as well as other benefits, such as employment, affordability, and improved health and environment *thank you*

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