

Code Readiness Subprogram ~~2016-2024-2029~~ Implementation Plan

Summary:

1. Program and/or Sub-Program Name: PG&E Codes and Standards Code Readiness Subprogram
2. Sub-Program ID number: PGE21056
3. Sub-program Budget Table:

~~2016-2024-2029~~ Subprogram Budget

Program Name	Administrative Costs	Marketing and Outreach	Direct Implementation	Total 2016-2024-2029 Budget
Code Readiness	\$100,000 <u>\$1,700,000</u>	\$0	\$1,258,000 <u>\$33,000,000</u>	\$1,358,000 <u>\$34,700,000</u>

4. Sub-program Gross Impacts Table: N/A
5. Sub-Program Cost Effectiveness (TRC): N/A
6. Sub-Program Cost Effectiveness (PAC): N/A
7. Type of Sub-Program Implementer (Core, third party or Partnership): Core3rd Party Implemented
8. Market Sector (including multi-family, low income, etc): Residential (including single- and multi-family), commercial, industrial, agriculture, and publicState facilities
9. Sub-program Type (Non-resource, resource acquisition, market transformation): C&SNon-resource, market transformation
10. Intervention Strategies (Upstream, downstream, midstream, direct install, non-resource, finance, etc.): Non-resource

Program Description:

PG&E's Codes and Standards Program (C&S) has identified a need to collect data and support market adoption of measures before including them in code. As a result, the ~~C&S-Program has designed a local~~ Code Readiness Subprogram (CRS) is designed with the goal of achieving improved code compliance and advocacy support. The C&S team believes these two objectives can be realized through targeted data collection, customer inducements, and knowledge transfer.

The ~~new subprogram-CRS~~ will implement project-level activities to produce information that enhances advocacy and increases the feasibility of more comprehensive climate change mitigation through knowledge transfer to builders and others. In general, code readiness activities will be aimed at future regulations and will supplement existing advocacy efforts, such as research and development of code enhancement proposals, in order to accelerate climate change mitigation activity.

The measures that will be included in CRS will be measures that are not suitable for incentive programs due to cost effectiveness, level of support required, or other issues. Those measures that are unsuitable for incentive programs are key to achieving the C&S

program goals. However, they require the effort provided by this subprogram to be included in building codes or appliance standards. The data collected and the increased market adoption will support rulemakings (e.g., CA Title 20, CA Title 24, US Department of Energy Appliance Standards, and others) since the market will already be adopting the higher standards. Higher market adoption reduces the opposition to rulemakings.

Each measure included in CRS will have a customized strategy that will determine the current market barriers for the measure, data collection needs, potential markets, and targeted education plan. These efforts will be different for each measure and will be updated throughout the process to ensure they continue to effectively address market barriers. This coordinated effort ~~is new for C&S and will~~ supports market transformation and improved advocacy efforts. Some of the activities currently exist in the C&S Program, however the integrated plan with the customer inducements and increased data collection will provide ~~greater market transformation and~~ improved savings for the program.

Program Delivery and Customer Services:

CRS is a non-resource subprogram that will perform the following activities:

- Data collection
- Customer and contractor inducements
- Knowledge transfer
- Marketing activities

Data Collection. The program will collect data from customer demonstration sites to understand the energy savings potential, load shapes, installation best practices, key indicators for optimal energy savings, measure targeting information, and measure cost data. This information is key for the C&S advocacy efforts and for the market to overcome market barriers.

Customer and Contractor Inducements. The program will provide customers and/or contractors a financial inducement to install the targeted measures. Inducements can include, but are not limited to, financial payments or technical assistance. Since each demonstration site will require extensive data collection, access to the site, occupant interviews and contractor interviews, a financial inducement will be necessary for customers to participate in the effort. It is assumed that the inducements will be offered for a limited number of sites to ensure that data is being collected at a reasonable sample of sites to ensure the data is representative of the targeted customer population.

Knowledge Transfer. Once the data has been collected from a sample of demonstration sites, it will be compiled into a learning module. PG&E will determine the biggest barriers to market adoption for each measure and determine the target audience(s) to overcome these market barriers. PG&E will create learning models for each targeted audience to provide the needed information to the market. These learning modules may include installation best practices, customer targeting, calculating energy savings, or measure payback information. The learning modules may also include calculation tools or other materials to support market adoption.

Program Design and Best Practices:

C&S advocates for higher standards and has been noted by California Energy Commission staff that additional data collection efforts are necessary for the advocacy efforts to support the rulemakings. CRS will produce information that enhances advocacy and increases the feasibility of more comprehensive climate change mitigation by educating builders and the new construction market. Code readiness activities will be aimed at future regulations and will supplement existing research and development of code enhancement proposals.

CRS intends to target innovators and early adopters in order to accelerate changes to regulations early in the product life cycle, and to support implementation of these accelerated codes and standards activities. Measures will be selected based on their potential contributions to the residential or commercial ZNE goals. Participants will be selected based upon the CRS measures. As an example, for a CO₂ heat pump ~~hot~~-water heater, the program would select licensed plumbers and HVAC contractors to participate. These contractors would work with their existing customers to find appropriate participants for CRS. The customers and the contractors would receive inducements for their participation to cover the time and cost of installing the measure.

CRS measures will be those that are not suitable for incentive programs due to cost effectiveness, level of support required, or other constraints, as those measures are often key to achieving the C&S program goals. A customized strategy will be developed for each CRS measure, accounting for market barriers, data collection needs, potential markets, and a targeted education plan. These efforts will be different for each measure and will be updated throughout the process to ensure they continue to address market barriers.

The CRS program is a non-resource program and focused on data collection and advocacy support and does not include metrics to support these activities. ~~Once the Statewide Market Transformation Authority is selected the CRS program will review its pipeline of technologies to determine if there are viable Market Transformation Initiatives that could be developed that include market intervention strategies and metrics to measure success.~~

~~While information transfer exists in the C&S Compliance Improvement subprogram, this coordinated effort with customer inducements and increased data collection is new for the Program and will support market transformation, improved advocacy efforts, and increased savings for the program.~~

Innovation

CRS will identify opportunities to work with builders, designers, and manufacturers to install cutting edge efficiency measures that can be monitored to collect data for use in the development of future codes and standards. CRS will engage statewide new construction programs to identify potential sites for field data collection, to reduce the cost burden associated with site recruitment. The data collected during CRS projects will assist other EE program areas with potential incentive programs that can be implemented prior to the adoption of new codes and standards.

Metrics

Not applicable

For Programs claiming to-code savings

Not applicable

Pilots

Not applicable

Workforce Education and Training

Not applicable

Workforce Standards

Not applicable

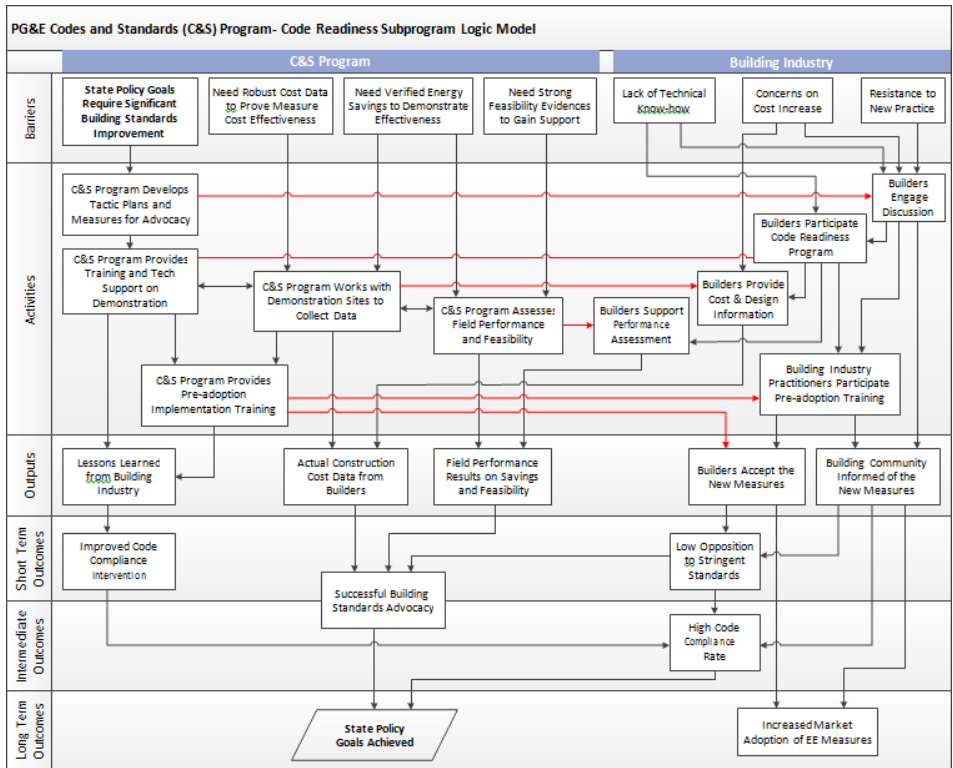
Disadvantaged Worker Plan

Not applicable

Supporting Documents:

Program Theory and Program Logic Model:

The Code Readiness Subprogram seeks to enhance PG&E's efforts to achieve state policy goals by implementing project level activities that enhance C&S advocacy and increase market feasibility of the subprogram measures through targeted data collection, customer inducements, and knowledge transfer to builders and other market actors.



Process Flow Chart:

Not applicable

Incentive Tables, Workpapers, Software Tools:

Not applicable

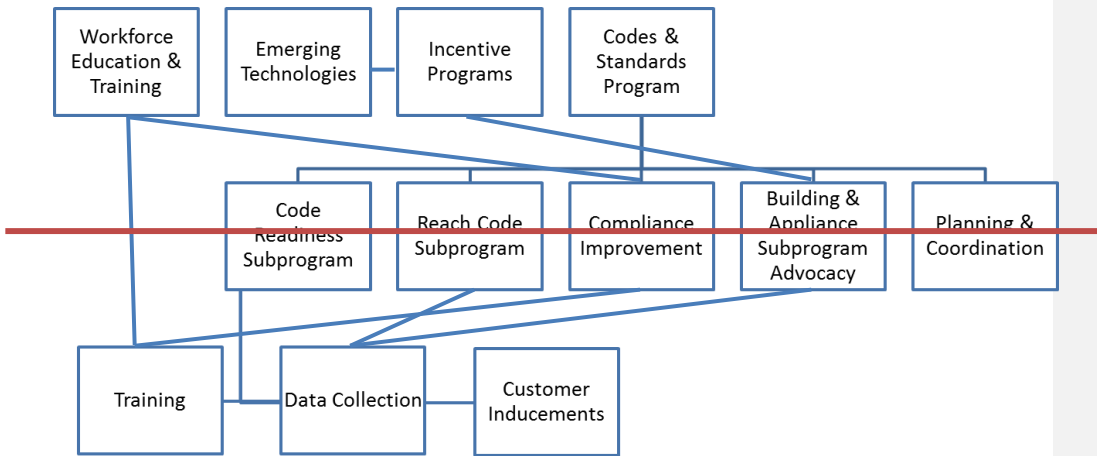
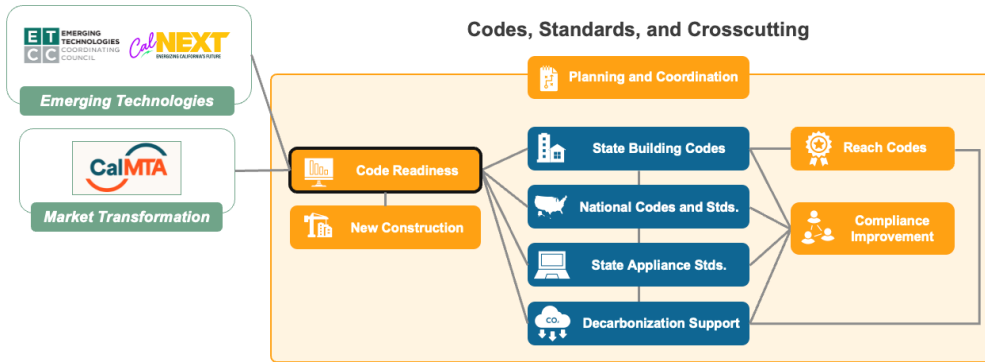
Quantitative Program Targets:

The baseline study conducted at the onset of the program's implementation will collect the relevant baseline metrics to evaluate the program.

It is expected that the subprogram will complete ~~two measure market transformation plans in 2016~~ five research projects to support C&S advocacy in 2025, each of which will provide detailed targets. These will be reviewed by the CPUC staff and their consultants. Specific performance metrics for this subprogram will be developed in conjunction with CPUC guidance in D.15-10-028 and PG&E's approved Business Plans.

Diagram of Program:

Please see the linkages between the subprogram below.



Evaluation, Measurement, & Verification (EM&V):

The Code Readiness Subprogram is intended to be a non-resource, market transformation program. PG&E will support the CPUC's evaluation of the C&S Program, including this new subprogram. PG&E considers a dynamic baseline evaluation the best evaluation method for a market transformation subprogram and would welcome working with CPUC's evaluation team at the beginning of the program to ensure that the necessary

data is collected to evaluate the success of the program.

Traditionally, a market transformation program adheres to the following principles:

A baseline study that provides an initial analysis of the market before the market intervention begins. This includes a market assessment and market size estimate before intervention.

Integrated market and customer data collection to inform the evaluation.

Clear program indicators of success with data driven indicators to ensure reliable and credible evaluation findings.

The subprogram will conduct a baseline study to understand the market for the measures selected for the Code Readiness Subprogram as soon as the program receives approval.

The program will begin concurrently with the baseline study. PG&E will work collaboratively with the CPUC to define the program data collection plan, market exit metrics, and market exit strategy, to ensure the data collected meets the CPUC's evaluation needs

PG&E plans to work with the CPUC to conduct an annual or bi-annual market characterization study to determine the impact of the intervention and success of the program.

Not applicable

Normalized Metered Energy Consumption (NMEC):

Not applicable

For Market Transformation Programs Only:

In an effort to meet program goals, including zero net energy goals, key measures will be selected to improve efficiency in California. These will be measures necessary to reduce energy such as water heating or heat recovery to dramatically reduce energy consumption. CRS will transform the market for specific measures to facilitate adoption into future codes.

Quantitative Baseline and Market Transformation Information: A baseline study will be completed by Q2 2016 based upon on the initial measures selected for this subprogram.

Market Transformation Strategy: Each measure selected to be a part of this program will have a specific market transformation strategy set up to ensure that the market barriers for that specific technology are addressed. Generally, the subprogram will determine any data collection requirements for the specific technology to ensure that the program understands the energy savings potential, load shape, measure cost and installation best practices. The subprogram will work with customers and contractors to get the measure installed and data collected. Once the data has been collected the data and best practices will be compiled. The program will work with potential contractors and customers to educate them on the potential savings, installation best practices. The program will assess additional market barriers after the initial education effort to determine the program next steps. Additional efforts may include marketing campaigns, moving to an incentive program, additional education efforts, and contractor training.

Attachment 1 – Code Readiness Activities to Support Future Title 24 & 20 Building and Appliance Codes

Building Type/ Measure	Code Readiness Activity Goal/Description	Formatted: Indent: Left: 0.22", Space Before: 3.8 pt, After: 0 pt
Title 24 Building Codes		
Single Family Residential		
CO2 HPWH Field Studies	Two demonstration projects to install CO2 HPWH, with information about design and installation, and performance.	Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt, Line spacing: single
Building Pre-Cooling as a Demand-Response Strategy	Ten demonstration projects that use building pre-cooling strategy with the goals of identifying design considerations, occupant acceptance, and energy impacts.	Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt
Verified Delivered HVAC System-Performance	Evaluate HVAC performance in one-hundred new and verifying modeled v. actual performance to improve model. Inducements provided to allow access to site and data.	Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt, Line spacing: single
Multi-family Residential		
MF Indoor Air Quality (IAQ):	Engage industry stakeholders to develop infiltration rate perform field diagnosis of infiltration rate affected by code.	Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt, Line spacing: single
MF Domestic Hot Water (DHW) System	Demonstration projects to validate high-efficiency MF high efficiency DHW system designs will include strategies high efficiency water heaters, and optimize integration (DWHR) technologies. The project will include working transfer knowledge about effective design solutions.	Formatted
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include evaluation of:

- Opportunities to for further plug load control require offices to reduce active and passive energy use when
- Space type dependent requirements on number of
- Effectiveness of various controls, such as occupan scheduled.
- Opportunities to integrate with alarm code systems for un-occupied shut off when building is alarmed.
- Necessary commissioning for individual time clock or building wide management systems.

The effort will include effort to disseminate results to b design solution into newly designed high efficiency off

Demonstration projects to investigate impact of natura conjunction with thermal mass in existing buildings. Th natural ventilation and night purge in conjuncture with use in California climates, EnergyPlus testing of how r simulated in a mixed mode scenario (with active coolin with research either being conducted at nationally rece GBE, or in partnership.

Natural Ventilation & Night Purge

State Buildings

NR Appliances, Plug Load and MEL Data Collection

Primary data collection (e.g., metering studies; intervio site surveys to identify the types appliances, plug load, building types) to explore appliance, plug load, MEL of

Drain water Heat Recovery Field Study in State-Owned Buildings

Demonstration projects to evaluate design and installa savings opportunities for DHR systems in NR occupan California with focus on state-owned buildings with cor continuous hot water demand (dorms, commercial kits includes DHR systems in residential occupancies (pris

NR HVAC Cross-cutting

Hybrid RTU-Evaporative Pre-Cooled condensers / indirect cooling

Demonstration projects to evaluate the effectiveness o with evaporative pre-cooled condensers or indirect eva climate zones. Study to include verification of the for Hybrid RTUs.

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<p>Radiant Heating and Cooling Thermally Activated Slabs</p>	<p>Field study and research to identify cost effective system systems. Study the required design criteria for in slab ra systems to achieve a ZNE goal for commercial buildings mandated if designed to holistically reduce energy use, effectiveness, tube depth, control of DOAS air handler, integration with waterside economizing and other defining performance metrics. Validate field data with the Energy Plus/CBECC com radiant module and develop proof of concept model.</p> <p>Evaluate the feasibility and cost effectiveness of these s buildings best suited to this system.</p>	<p>Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt</p>
<p>NR Lighting Cross-cutting</p>		<p>Formatted: Normal, Indent: Left: 0.22", Right: 0", Space Before: 3.8 pt</p>
<p>Daylight Dimming Plus OFF Demonstration Projects and Surveys</p>	<p>Demonstration projects to illustrate opportunities for day variety of building occupancies. Energy savings and illu measured over time. Building occupants and operators on occupant and operator satisfaction. Results will be sl design strategies can be deployed in newly constructed</p>	<p>Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt</p> <p>Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt</p>
<p>Outdoor Lighting Controls</p>	<p>Demonstration projects to identify opportunities for lighti feet tall. Studies of LED outdoor lighting designs and co and other hardscaped surfaces will be used to investiga and perceived or real impacts on security and amenity. study will evaluate detection distance and whether dete code required equipment specification. Amonity issues and shielding on perceptions of visual trespass, quality of lighting and quality of the lit spaces.</p>	<p>Formatted: Normal, Indent: Left: 0.22", Right: 0", Space Before: 3.8 pt, Line spacing: single</p> <p>Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt</p> <p>Formatted: Normal, Indent: Left: 0.22", Right: 0", Space Before: 3.8 pt</p> <p>Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt, Tab stops: Not at 0.3" + 6.8"</p>
<p>National & Title 20 Appliance Standards</p>		<p>Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt</p>
<p>Single Family Residential</p>		<p>Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt, Line spacing: single</p>
<p>Retail Appliance Accelerator Program</p>	<p>Two Goals for following RAA measure suppo regional appliance sales data through inducer underperforming appliance product specificat</p>	<p>Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt</p>
<p>Retail Appliance Accelerator Measures</p>	<p>April 1, 2021 — March 31, 2022</p>	<p>Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt</p>
<p>Room Air Conditioners</p>	<p>Basic Data Collection</p>	<p>Formatted: Normal, Indent: Left: 0.22", Right: 0", Space Before: 3.8 pt, Line spacing: single</p>
<p>Room Air Conditioners</p>	<p>Advanced Data Collection & Product Promotion</p>	<p>Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt</p>
<p>Clothes Washers</p>	<p>Advanced Data Collection</p>	<p>Formatted: Normal, Indent: Left: 0.22", Space Before: 3.8 pt</p>
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Clothes Dryers	Basic	Data Collection
Clothes Dryers	Advanced	Data Collection & Product Promotion
Refrigerators	Basic	Data Collection
Refrigerators	Advanced	Data Collection & Product Promotion
Room Air Cleaners	Basic	Data Collection
Induction Cooktops	Basic	Data Collection & Product Promotion

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