Residential Customer Energy Orchestration Pilot

Implementation Plan

Program Administrator:

PACIFIC GAS AND ELECTRIC COMPANY

Program Implementer:

TRC Solutions, Inc.

DATED: **April 15, 2025**

VERSION: 1.0

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1 Program Overview

The Residential Customer Energy Orchestration ("ResCEO" or "Program" or "Pilot") is a pilot focused on identifying and demonstrating successful energy efficiency and load management strategies in residential single-family premises. The primary goal of ResCEO is to evaluate the effectiveness of various flexible residential single-family customer load orchestration approaches through combinations of energy efficiency measures, distributed energy resource interventions, customer engagement strategies, and time-of-use rates. The pilot will identify in residential single-family homes the magnitude of load management capacity that can be shifted, and the likelihood of persistence; the priority strategies that could scale beyond the pilot population; and the potential scaling this impact to a broader market. This will generate data and insights to help PG&E understand the use cases of emerging customer load management technologies and develop future measurement and compensation protocols for energy orchestration programs. Additionally, the Program will study the customer experience related to different orchestration approaches.

The Pilot will begin with market research and analysis phase to inform the selection of the most suitable single-family homes and technologies to target for pilot participation. TRC will finalize the program design following the market research period, and the Implementation Plan will be updated to specify the final customer eligibility requirements, M&V methodology, and other program design elements. Some forecasted performance details of the pilot are to be determined (TBD) until the pilot can complete market research. Once the pilot completes the market research, the pilot team will revise and update the Implementation Plan (IP).

This Program falls under PG&E's Market Support segment, which has the primary purpose of supporting the long-term success of the energy efficiency (EE) and building electrification markets by educating customers, training contractors, building partnerships, and/or moving beneficial technologies toward greater cost-effectiveness. The controllable and flexible load technologies and approaches will allow customers to shift their electric usage to take advantage of clean and less expensive energy. Grid signals include prices and emissions, and automation devices can include smart thermostats, advanced pool pump controls, smart electric vehicles (EV) chargers, home batteries, and advanced water heater controls. In a home, load flexibility will adjust appliance use with minimal intervention to keep occupants comfortable while also providing the grid with the relief needed to facilitate the rapid adoption of residential electrification with minimal impacts on existing grid infrastructure and demand needs. The pilot will coordinate with PG&E EE portfolio of programs to identify customers, and encourage them to adopt of these devices and approaches.

2 Program Budget and Savings

The following forecasted performance metrics are preliminarily listed as "TBD." TRC anticipates updates allowing custom impact profiles to quantify better the value of load shifting using the Cost Effectiveness Test (CET). Once the Pilot's market research and analysis phase is completed, TRC will finalize its M&V method and develop a CET forecast, as described in Section 3.1. TRC will update the forecast to the Pilot's TSB, energy savings, demand reductions, and cost-effectiveness performance metrics.

Table 1: ResCEO - Budget and Savings			
1	Program Name		Residential Customer Energy Orchestration Pilot
2	Program ID Number		PGE_Res_006
3	Program Implementer		TRC Companies
4	Portfolio Administrator		Pacific Gas & Electric (PG&E)
5	Program Implementer Type		Third-Party Delivered
6	Portfolio Segment		Market Support
7	Total Program Budget		$5,700,000
8	Program Budget by Year	2025	$979,263
		2026	$2,299,118
		2027	$2,057,682
		2028	$363,937
9	Program Duration		March 10, 2025 - April 30, 2028
10	Total System Benefit (TSB)	Total	TBD
		2025	TBD
		2026	TBD
		2027	TBD
		2028	TBD
11	CO_2 (Lifecycle, First Year, Net, Gross)		TBD
12	KW (First Year, Net, Gross)		TBD
13	KWh (Lifecycle, First Year, Net, Gross)		TBD
14	Therms (Lifecycle, First Year, Net, Gross)		TBD
15	Total Resource Cost (TRC) Ratio	Total	TBD
		2025	TBD
		2026	TBD
		2027	TBD
		2028	TBD
16	Program Administrator Cost (PAC) Ratio	Total	TBD
		2025	TBD
		2026	TBD
		2027	TBD
		2028	TBD
17	Market Sector(s)		Residential, Single Family
18	Program Type		Non-Resource
19	Delivery Type(s)		Downstream

Table 1: ResCEO - Budget and Savings			
20	Intervention Strategies		Incentive, Training, Education
21	M&V Methods		TBD

3 Implementation Plan Narrative

3.1 Program Description

The Residential Customer Energy Orchestration Pilot (ResCEO) investigates the effectiveness of various flexible load approaches through energy efficiency measures, distributed energy resource interventions, behavioral messaging, and time-of-use rates. The pilot will also generate data and insights to help PG&E develop future measurement and compensation protocols for energy orchestration programs, as well as strategies for targeting messaging to future participants. The program will be available to qualifying existing single-family customers in PG&E territory through 2028.

Throughout the pilot, TRC and its subcontractor, Mendota Group, will research the current state of energy efficiency and DER technologies to develop orchestration treatment specifications. The Pilot's research results will inform the most suitable energy efficiency measures and control technologies to target future program participation, allowing for the best customer experience while delivering peak load savings and a flexible grid resource.

3.2 Performance Tracking

Contractual targets are outlined below. Additional performance tracking metrics may be added, or the current metrics may be revised upon the completion of the market research and analysis phase of the pilot.

Table 2: Targets by Measure Type

Program Measures	2025	2026	2027	2028	Total
# of Customers	30	370	0	0	400
# of Different Participating Manufacturers/ DERM combinations	2	13	0	0	15

Table 3: Incentive Targets by Year

Program Measures	2025	2026	2027	2028	Total
Program Participation	$9,750	$120,250	$390,000	$0	$520,000
Customer Interviews	$3,000	$37,000	$40,000	$0	$80,000
Tech Stipends	$200,000	$600,000	$0	$0	$800,000
TOTAL	**$212,750**	**$757,250**	**$430,000**	**$0**	**$1,400,000**

3.3 Program Delivery and Customer Services

3.3.1 Customer Engagement Objectives

To encourage Pilot program participation and gather customer insights, TRC will implement a variety of engagement strategies (Figure 1) focused on motivating eligible customers to:

- Participate in the Pilot
- Release AMI data for program-tracking and EM&V purposes
- Install advanced control technologies
- Participate in surveys or interviews with program staff (during and following participation)
- Conduct energy efficiency upgrades as needed

3.3.2 Marketing & Promotion

TRC will leverage our expertise in energy program implementation and the cognitive science of motivation, attention, and persuasion to inform our approach to participant engagement. To begin, TRC will establish an identity for the Pilot and develop an online information hub for potential participants. TRC will develop tailored messaging that focuses on the benefits of energy orchestration to resonate with eligible customers in applicable regions and climate zones. TRC will use best practices from cognitive science to develop engaging content thereby maintaining customer interest and retention. Figure 1 outlines TRC's communication plan for enrolling participants and motivating them to take energy load management actions throughout the Pilot.

3.3.3 Participant Engagement

TRC shall identify and provide outreach to eligible customers to meet the target number of pilot participants. TRC will then provide an overview of the Pilot to interested customers, covering the program requirements, resources, participation process, and incentives to encourage customers to enroll in and successfully complete the Pilot. Throughout the customer's participation journey, TRC will be available via email, phone calls, and the Pilot website. TRC will also support customers with identifying licensed contractors and provide education and coaching on load-shifting behavior and technologies. As needed, TRC will provide interested customers with information on available programs, providing incentives for the installation of all-electric equipment necessary to participate.

TRC will work with PG&E to identify potential participants from past participation in other utility programs, including but not limited to, the California Energy-Smart Homes program, the California Advanced Homes Program, and Self Generation Incentive Program. TRC will use the data provided by PG&E to understand which homes and/or communities can be cost-effectively leveraged for Pilot participation. Where applicable and willing, Homeowner Associations will be utilized to spread awareness of the Pilot in these communities.

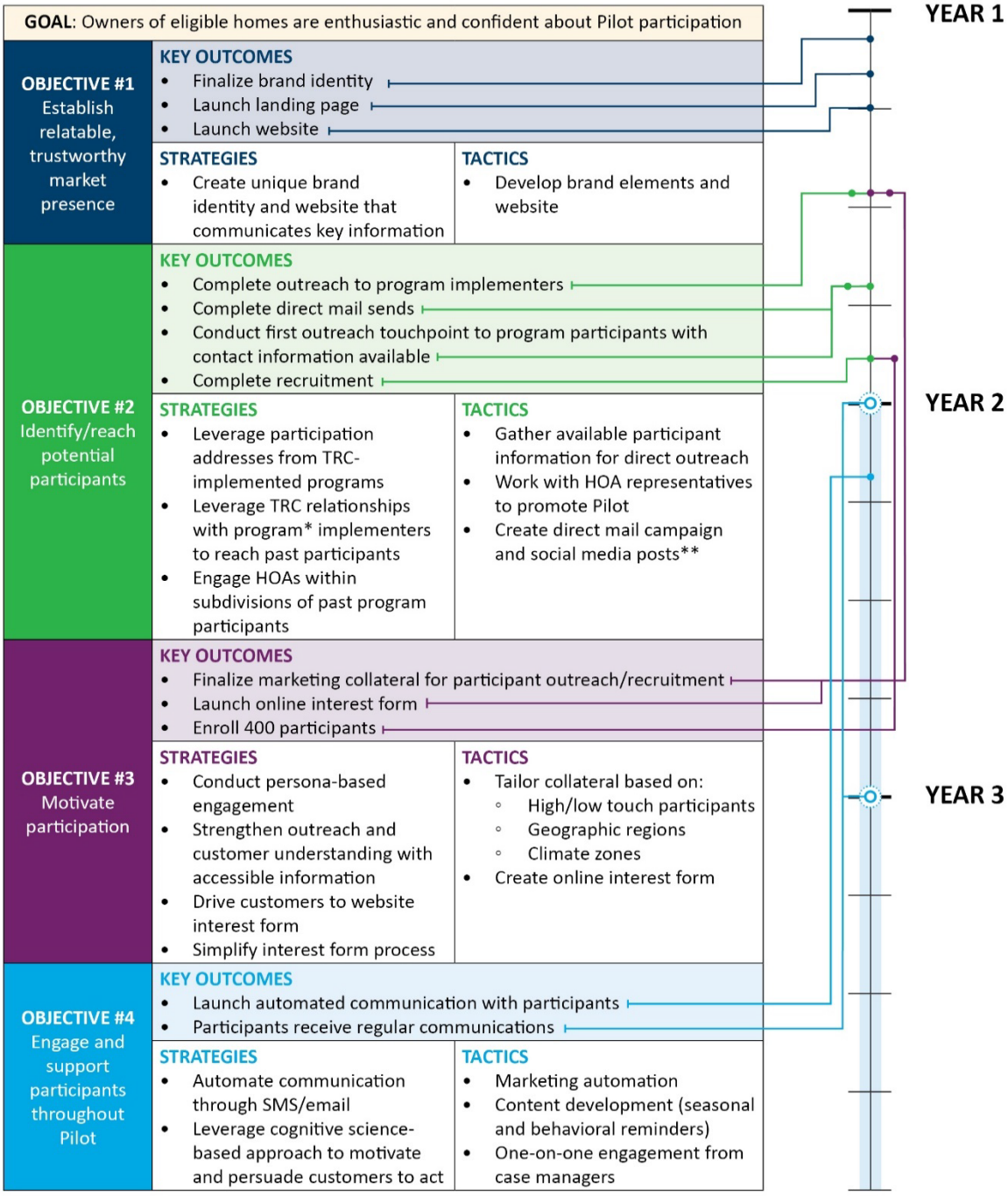
3.3.4 Educational Material & Behavioral Messaging

In addition to load management interventions, TRC will provide educational materials on proper use, scheduling, and maintenance of the home's DERs and how it impacts energy use, utility bills, and grid stability. TRC will assign case managers to each project to serve as the project's point of contact, usher participants through the program, and provide educational materials, including behavioral guidance and best practices that assures homeowners are aware of how their actions impact their homes' energy usage and bills.

3.3.5 Feedback Surveys

Customer satisfaction is key to Pilot success. As such, TRC will survey or interview all participants during and following participation. TRC will use responses to improve the Pilot in real time and inform future Pilot approaches and interventions that are effective and non-burdensome to participants.

Overall, TRC's targeted recruitment, incentive structure, and customer feedback opportunities assures that participating homeowners can enter the Pilot with little to no upfront costs of participation and have a positive program experience. By targeting this population and implementing these strategies, the Pilot will spend less on equipment and upgrade incentives and more on participation incentives and homeowner interactions, allowing the Pilot to better serve customers.



** Including but not limited to the Energy-Smart Homes, ESA Main, and California Electric Homes programs. TRC can provide a complete list of programs upon request.*
***PG&E Support Services proposed*

Figure 1: Customer Engagement Activities Summary

3.4 Program Design and Best Practices

TRC will design the Pilot to combine comprehensive demand-side residential customer solutions integrated with distributed energy resources (DERs). DERs are "distribution-connected distributed generation resources such as energy efficiency, demand response, customer generation (e.g., rooftop solar), energy storage, alternative fuel vehicles (e.g., electric vehicles), and water-energy conservation. [1]" that include energy efficiency, load management, distributed generation, electric vehicles, and energy storage measures and programs. The integrated program is expected to offer residential customers the ability to manage their household load as a flexible grid resource with a potential solution to address California's "duck curve" and electric distribution challenges while reducing customers' electric energy costs.

The Program's primary objective is to identify and pilot a new comprehensive customer load management program model to experiment with the integration of new EE/DER technology combinations, test the ability of various EE/DER orchestration approaches to deliver regular and consistent load reductions, collect data to inform the development of measurement and evaluation methodologies, and ultimately position EE interventions for long term success as a key participant/partner in future load management programs. The pilot will test and validate the following:

- Technical performance and effectiveness of utilizing various combinations of EE measures, time-of-use rates, and other DERs.
- Effectiveness of various energy orchestration strategies in achieving permanent load reductions in conjunction with various ongoing load management functions such as load shaping, load shifting, and strategic load growth within a non-event-based program structure.
- Limits within which energy orchestration strategies can accommodate the customer's comfort and productivity needs, keeping energy orchestration activities "invisible" to the customer.
- Drivers of what motivates customers to engage in a program, mitigate against "participation fatigue", and sustain their long-term participation.
- Approach to data collection to support the development of:
  - Measurement approaches that capture and validate the ability of a comprehensive load management program to provide regular and consistent load reductions.
  - A future program structure that will send automated orchestration signals and is customer-focused.

TRC and its subcontractor, Mendota Group, will investigate the research questions below during the market research and design phase. In investigating these research questions, the anticipated outcomes, also documented below, will inform the final program design and pilot implementation.

1. What combinations of behind-the-meter DERs combined with existing energy efficiency measures could be integrated optimally into a residential customer load flexibility orchestration program to drive energy and peak demand reductions and/or load shifting?

[1] https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management

2. What are the behind-the-meter DER technology controls, distributed energy resource Management (DERMs) platforms on the market, their potential market integration opportunities, and required program investments? Are these solutions scalable and flexible?
    I. **Outcome (Questions 1 and 2):** TRC will identify ideal PG&E customers and scalable approaches for pilot participation to incorporate readily available technologies and control capabilities to deliver sustained load shifts.
3. What type of customers characteristics should the pilot focus on first and why? What are the achievable outcomes (or various combinations of outcomes) that can be achieved within the given budget through this pilot? What is the best approach to achieve and track these outcomes?
    1. **Outcome:** One key outcome will be understanding the customer characteristics and neighborhoods to target, thereby optimizing the program design. TRC will also identify a key progress indicator to track and report the outcomes of the specified load management and customer orchestration strategies.
4. What are the most effective communication channels, message formats, and frequency for prompting pilot participants to take specific actions?
    2. **Outcome**: Based on the customer base, end-use technologies, and control strategies, TRC will identify the most effective communication approaches, frequencies, and customer participation workflows. TRC will design these workflows and protocols to increase the likelihood of customers taking action.

The program aims to determine the most effective methods, DER technologies, and customer messaging to influence homeowners to adopt customer load management technologies and sustain long-term load-shifting behavior. To accomplish this, the program will conduct a market analysis, identify suitable homes, energy efficiency measures, and controls for participation, develop participant cohorts to test reception to various technologies and messaging, emphasize the installation and proper use of DER measures, monitor changes in load shift, conduct participant interviews, and facilitate future opportunities for grid harmonization and active utility program participation.

The core objectives of this program are as follows:

- Identify and assess currently available load management technologies and solutions.
- Determine manufacturers that have scheduling and control capabilities.
- Identify the strategies of residential energy orchestration that deliver the best customer experience.
- Determine which energy orchestration strategies are most effective in shifting load.
- Determine customer motivations and messaging strategies to encourage long-term program participation.
- Educate homeowners with a continued focus on the benefits of participation, including the potential for energy cost savings, and their role in customer energy orchestration.

3.4.1 Program Design

The Pilot offers two approaches to orchestration: behavior-based and technology-enabled. Both approaches seek to utilize homes with existing energy efficiency measures to optimize energy orchestration and provide load management, load shaping, daily load shifting, strategic load growth (e.g., shifting loads to coincide with solar generation), peak load shedding, and customer bill savings.

These two approaches, when compared to the control group, will allow TRC to assess load-shifting potential and provide recommendations for future program designs that allow the participation of all homeowners, with or without advanced control technologies.

Approach #1- Behavior-Based: TRC will initiate automated, regular communication with customers to provide specific guidance for the equipment in their homes. Throughout the Pilot, TRC will use the customer support platform to keep customers engaged and solicit feedback.

Approach #2- Technology-Enabled: TRC will issue incentives to homeowners, or contractors if the homeowner signs their incentive over to them, to install controls on the existing heat pumps, advanced home energy management systems or smart panels that automate the scheduling and programming of the equipment to permanently shift load outside of peak period. TRC will deliver less frequent behavior education to these participants since much of the equipment operation is automated.

Both load management orchestration approaches will include various combinations of preconditioning heat pump space conditioning, pre-heating heat pump water heating, scheduling EV charging, and optimizing on-site storage charge and discharge cycles. TRC will launch these treatments across a range of energy efficient homes, allowing for robust analysis of various treatments and technologies.

3.4.2 Research & Treatment Specifications

Prior to a program participant being assigned to a cohort described by the approaches above, TRC will conduct a market analysis to identify technologies and controls on the market that are suitable for the Pilot. The technologies and behavioral messaging strategies identified in the market analysis will be applied to the participant cohorts over a minimum nine-month monitoring period to test a matrix of energy orchestration interventions for their effectiveness in shifting load and ease of customer implementation. The nine-month period will include heating and cooling periods (ideally the summer and part of the winter, or the summer and one shoulder season) to test the impacts of both heating and cooling effects.

As part of the Pilot launch, TRC will research and document the following:

- Currently available load management technologies
- Estimated cost of load management technologies
- Compatibility of load management technologies with energy efficient equipment
- Suitability of manufacturers/equipment for participation
- Manufacturers working in this space and willing to work with the Pilot

- Contractors capable of performing necessary upgrades and installing the technologies

In recruiting participants for the outlined cohorts, the targets identified in Section 3.3 assume that the Pilot will proceed with utilizing a meter-based approach for M&V. TRC will update these targets in agreement with PG&E's PM based on the final program design following completion of the market analysis.

TRC will investigate two different M&V approaches during the market research and design period: population-level NMEC analysis, and site-based analysis of the pre- and post-performance of a subset of homes. While population-based M&V is considered, the diversity of technologies and behavioral interventions (which may lead to a wide range in demand savings impacts) and the variation in residential load profiles in general may make population-based M&V unsuitable. Site-based M&V, in which each participant's savings are calculated individually and then summed for total program impacts, maybe more accurate. Even if population-based M&V is determined to be appropriate, the site-based M&V findings will further demonstrate the capability of multi-DER projects to deliver regular and consistent customer load reductions and evaluate the effectiveness of various program treatments. This analysis will compare the load profiles of participating homes before and during participation. TRC will compare different treatments across the program, community, and efficiency levels.

Given the Pilot's nature, TRC will assemble a Technical Advisory Group (TAG) of industry professionals and program stakeholders to guide and suggest future improvements to the program approach and home treatments. The TAG will meet as needed but no less than three times during launch and twice annually thereafter to support the Pilot's design, review, and assessment.

3.4.3 Best Practices

The methodology of two participant cohorts will provide insight into customer motivations, needs, and challenges that will be crucial in the design and recruitment of future DER programs. TRC shall collaborate with PG&E to create a lessons learned report that will also include best practices and options for successfully scaling a future energy orchestration program. The topics to be addressed in the report and format shall be reviewed and approved by PG&E PM in writing. This report will be disseminated to all Portfolio Administrators (PAs).

TRC shall collaborate with PG&E to hold a public stakeholder webinar (CAEECC or IOU Workshop), and present lessons learned and best practices.

Through participant interviews, TRC will also receive participant feedback on the challenges, resolutions, and best practices of implementing load-shifting technologies and behaviors. The program will use this feedback to assist future projects and develop new content for energy orchestration education and training resources.

3.5 Innovation

The Pilot offerings incorporate the following innovative program design elements.

Homes pre-screened for existing equipment and advanced EE measures

The pilot's approach to selecting and recruiting homes, along with the cost savings associated with targeting homes that participated in PG&E's residential new construction program, will allow for little to no additional EE upgrades or electric equipment installations to be required for participation. This approach not only allows more homes to participate with lower upfront costs and effort from the participants but also enables the selected homes to provide a robust matrix of EE levels and electric equipment specifications for analysis.

Evaluation of multiple approaches

The Pilot's strategy of offering both behavioral and technology-based cohorts, each with varying technology combinations and customer communication approaches, will provide a comparison of the two main cohorts to determine if one approach is more cost-effective and provides more sustainable results while also evaluating various technology combinations and communication approaches across both cohorts. This analysis and comparison of the two different approaches to achieve the same end goal can inform different future program approaches.

3.6 Pilots

The Residential Customer Energy Orchestration Program operates as a pilot. The research specifications and best practices are described in Section 3.1.

3.7 Workforce Education and Training

The Residential Energy Orchestration Pilot does not have a direct component for workforce education and training.

3.8 Workforce Standards

There are no applicable CPUC workforce standards for this Program.

3.9 Disadvantaged Worker Plan

This Program does not involve the installation, modification, repair, or maintenance of EE equipment.

3.10 Market Access Programs

Not applicable.

3.11 Additional Information

Not applicable.

4 Supporting Documents

4.1 Program Manual & Program Rules

The following sub-sections provide program detail as part of the initial program implementation plan. Full program rules will be part of the program manual, which will be developed following the completion of the market analysis stage of the Pilot.

4.1.1 Eligible Measures

The Residential Energy Orchestration Pilot offers incentives for eligible customers to participate in the program, feedback interviews, and to install control technologies. Preliminary measures are summarized in Section 4.4 and will be updated in the Final Implementation Plan following the completion of the Pilot's market analysis.

4.1.2 Customer Eligibility Requirements

To be eligible for program participation, customers must meet the following:

- Residential single-family homes receiving electric utility service from PG&E; and
- Residential customers on the E-ELEC or EV2-A time-of-use electric rate or have agreed to move to the E-ELEC or EV2-A rate; and
- Customers with program-approved EE load shift equipment already installed or who have agreed to install one or more program-approved EE load shift equipment; and
- The customer must pay the electric PPP charge; and
- Complete and sign a program participation agreement, including agreeing to the program Terms and Conditions; and
- Not receive incentives for the same measures or scope of work from other public purpose programs; and
- Adhere to all applicable federal, state, and local laws and codes; and
- Have baseline energy use data that meets a goodness of fit criteria to be specified by the program based on research and design findings.

4.1.3 Contractor Eligibility Requirements

Any contractor installing controls technologies incentivized by the Pilot will be required to meet the following requirements.

- Install all measures in accordance with all applicable federal, state, and local laws, building codes, manufacturer's specifications, and permitting requirements.
- If a contractor performs the installation or improvement, the contractor must hold the appropriate license for the work.
- A rebate or incentive can only be provided if the customer or contractor certifies that the improvement or installation has complied with any applicable permitting requirements, including the California Building Standards Code (Title 24 of the California Code of Regulations).

4.1.4 Participating Contractors, Manufacturers, Retailers, Distributors, and Partners

Not applicable

4.1.5 Additional Services

Additional services the Pilot may offer at the discretion of TRC include:

- Providing an online platform with a simplified application
- Interface with Statewide and local programs

4.1.6 Audits

The program does not require pre- or post-audits for participation or incentive eligibility.

4.1.7 Quality Assurance Provisions

TRC will conduct desktop reviews of all participating projects to confirm that participants meet the Pilot's minimum eligibility requirements. TRC will also conduct field verification of 15% of all participating projects for quality assurance (QA) prior to issuing final participation incentive payments. Field verification will confirm that enrolled projects meet all Pilot's eligibility requirements and follow the CPUC's *California Energy Efficiency Evaluation Protocols: Technical, Methodological, and Reporting Requirements for Evaluation Professionals* document.

TRC will facilitate the prompt remedy of all installation discrepancies that may arise. Upon completion of the field verification, TRC will record any discrepancies between the submitted equipment installation documentation and the field verification. TRC will resolve any discrepancies between the enrolled project specification, installation documentation, or field verification. Discrepancy resolution may take the form of adjusting the calculated incentives or rejecting incentives altogether.

To inform program improvements and promote customer satisfaction, TRC will obtain regular participant feedback, including the value they derive from participating in the Pilot. Additionally, TRC will address and resolve any participant issues gathered as part of the feedback interviews and review participant feedback interview results quarterly with PG&E.

4.1.8 Other Program Metrics

TRC will utilize internal platforms to track the following program data points:

- Budget spent
- Budget allocated
- Forecasted budget (monthly, quarterly, annually)
- Number of customers in each Status/phase of project (contacted, lead, enrolled, completed etc.)
- Number of load flexible technology combinations tested
- Forecasted enrollments and completions (quarterly, annually)

- Field verification fail count/rate
- Customer Satisfaction Results

4.2 Program Theory and Program Logic Model

The program aims to assess the effectiveness of various load shifting strategies in the residential sector. Figure 2 below illustrates the program's goals, outputs, and outcomes.

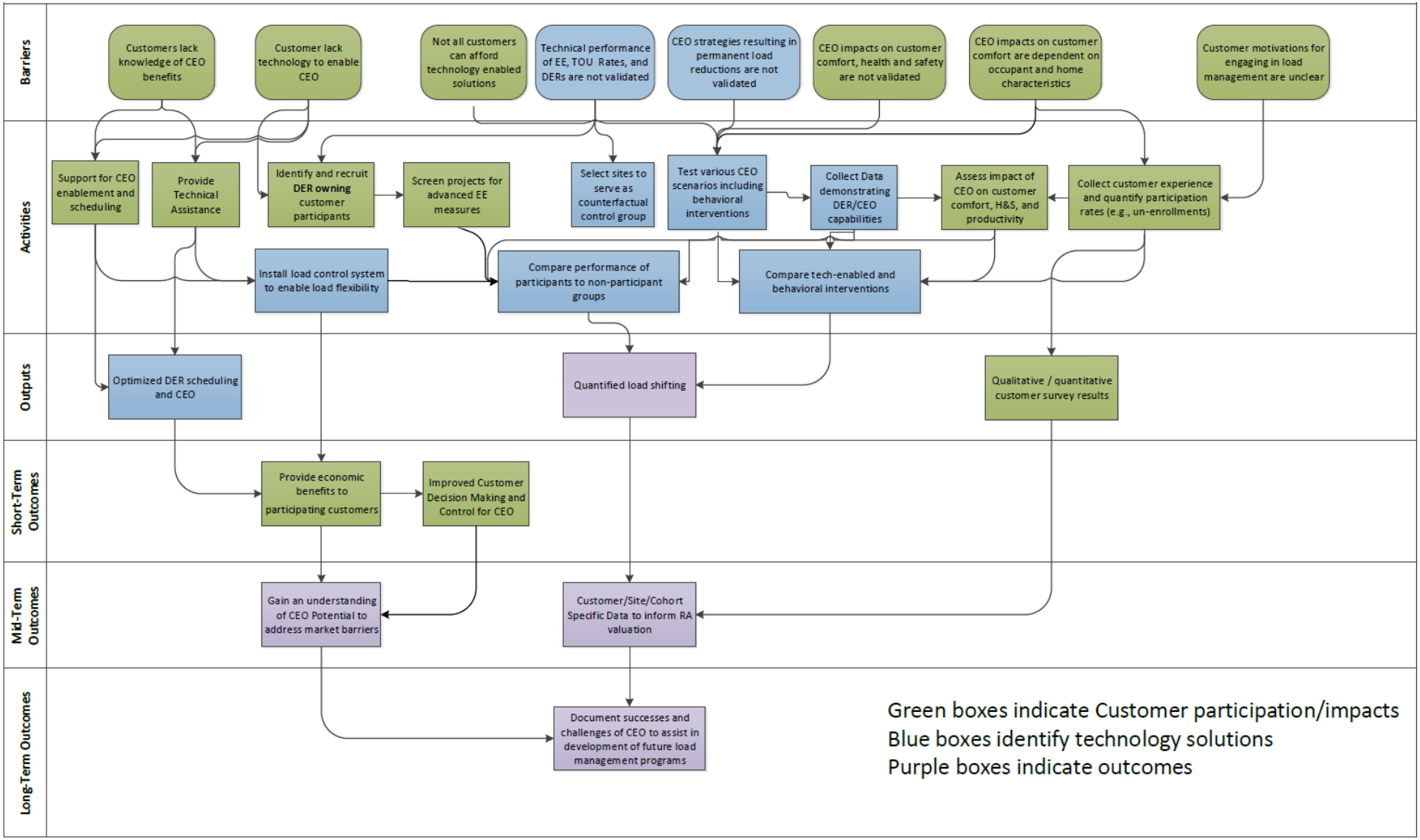


Figure 2: Program Logic Model

4.3 Program Process Flow Chart

A high-level overview of the customer journey is as follows:

- TRC conducts outreach via direct mail and engagement with homeowner associations.
- The customer indicates interest in the program by registering on the Program website, engaging in direct conversations, or emailing TRC.
- TRC contacts interested customers.
- TRC educates the customer on Pilot participation, resources, incentives, and benefits.
- Customer enrolls in the Pilot and receives an enrollment incentive.
- Where necessary, TRC supports customers through other programs for the installation of prerequisite all-electric equipment.
- Customer installs control technology and/or energy storage, and receives a technology incentive payment.
- TRC begins providing ongoing behavior prompts / equipment operation guidance.
- Survey #1 – customer receives a survey incentive payment.
- TRC conducts intervention assessment (multiple assessments/updates as necessary and time allows).
    - i) Assess the effectiveness of the current intervention; and
    - ii) Update ongoing behavior prompts / equipment operation guidance (as necessary).
- Customer completes participation – TRC ends ongoing behavior prompts / equipment guidance.
- Survey #2 - customer receives a survey incentive payment.
- Customer receives a participation incentive payment and a report.

Figure 3 below illustrates the paths that customer projects will take through the program.

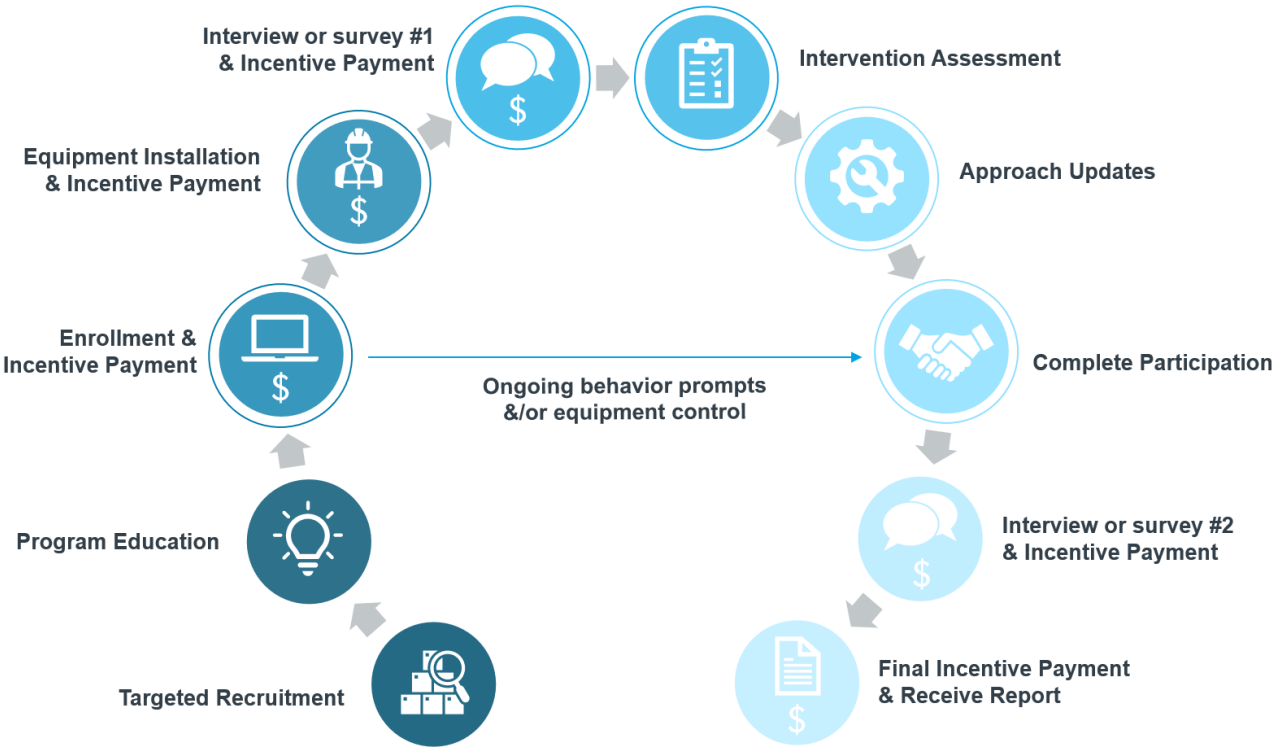


Figure 3: Program Process Flow

4.4 Measures and Incentives

Preliminary participation incentive types are outlined in Table 4 below. In addition, a non-comprehensive list of potential measures that could be incentivized is also provided below. A final list of measures and incentive amounts will be determined based on the pilot's final design from the pilot's design and research phase.

Table 4: Pilot Measures and Incentives

Participation Incentive Types	Incentive
Program Participation	$1,300
Surveys (2 per participant)	$100 ea.
Technology Stipend	Up to $5,000

The final list of technology stipend eligible equipment will be determined during Program Design. Possible technology stipend measures for which the program may offer incentives are:

- Insulation upgrades (attic, wall, crawl space)
- Air and/or duct sealing
- Window upgrades
- Equipment control technology

- Energy storage systems

4.5 Diagram of Program

Figure 4 below visually illustrates the program's linkages to other statewide or local marketing and outreach efforts, workforce and training programs, emerging technologies, codes and standards, as well as other demand side management programs.

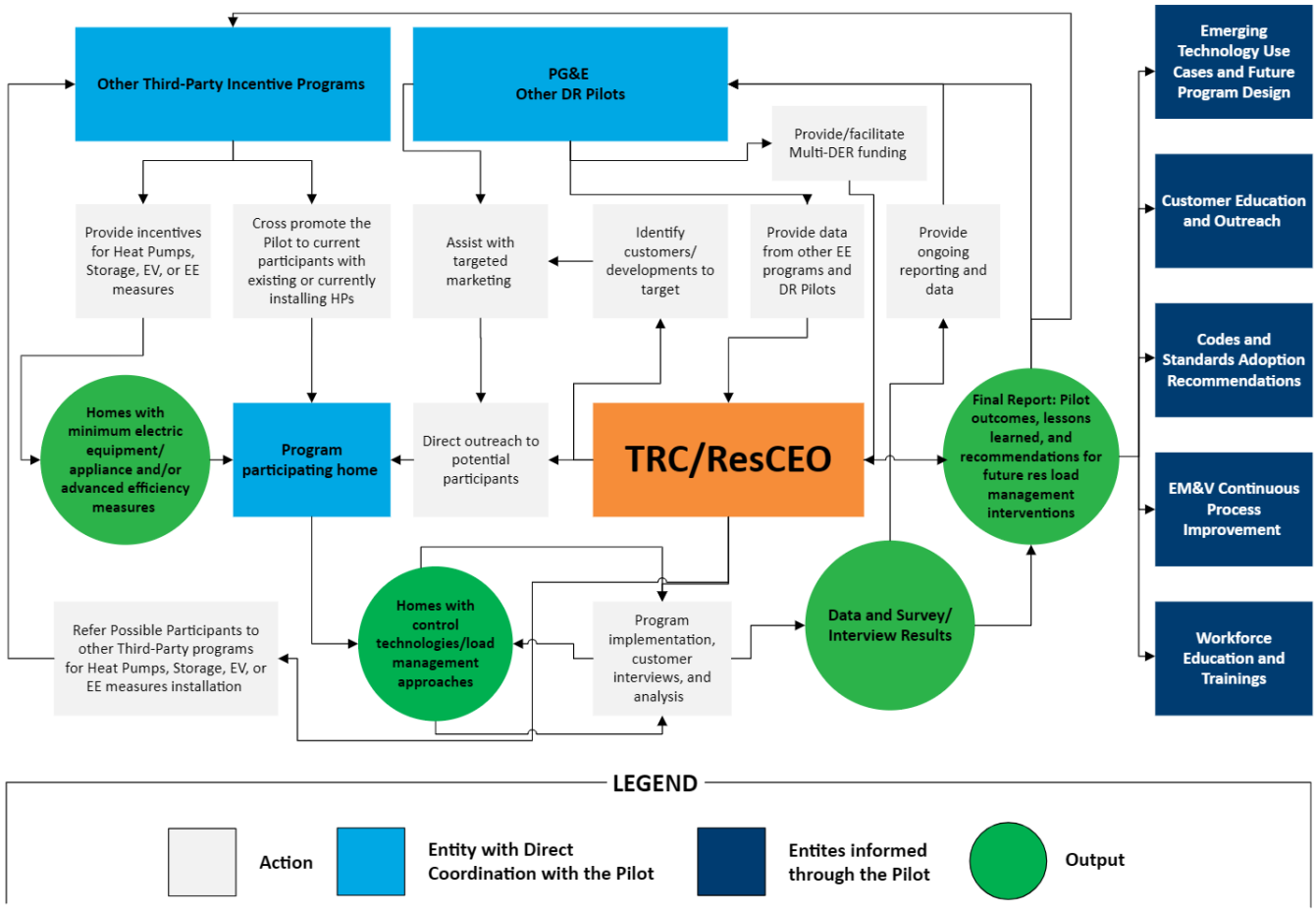


Figure 4: Diagram of Program

4.6 Program Measurement and Verification

TRC designed the program to build all EM&V-relevant activities into ongoing program operations using program implementation and administration funds. Throughout the program, TRC will monitor the quality and integrity of program data, and the efficacy of data collection and retention policies.

The Program's final M&V details will be determined as part of the market research and design period and documented in the Final Implementation Plan. The final M&V plan will focus on capturing and quantifying the meter-level effects of pilot participation across a cross-section of participating technology combinations and behavioral prompts. TRC will estimate these impacts using participants' metered energy consumption. TRC expects to use a meter-based approach for M&V purposes, but the

final M&V strategy will be determined during the market research and design period. The details of the M&V methodology will depend on the desired outcomes and key metrics determined through the market research and analysis period. Applicable approaches may include site-level analysis to detect changes in consumption during specified time periods to estimate impacts of individual customers, fixed-effects panel regression models that group customers to estimate group impacts, and potentially experimental or quasi-experimental designs to improve the validity of results. TRC will work with PG&E to ensure the M&V Plan meets CPUC's requirements.

4.7 Normalized Metered Energy Consumption (NMEC)

As noted above, while this program expects to use some type of NMEC analysis to measure energy and demand savings, the exact details of the M&V approach will be determined as part of the market research and design period. TRC may explore both site-level analysis and population-based NMEC (such as panel regression models based on grouping customers with key similarities, such as similar interventions). The participant surveys and interviews may be used to inform customer groupings for analysis. For example, customers with EV chargers may be grouped separately from those without EV chargers, since that technology (when it exists) significantly impacts the load profile.

Where possible, the analysis methods will comply with the CPUC NMEC Rulebook. While the CPUC NMEC Rulebook will be used for guiding principles, some aspects of that rulebook may not be possible, such as the need for 12-months of baseline data prior to intervention. Alternatively, the program may use the innovative approach of rapid M&V, which is being piloted through a CalNext project for controls projects.

4.8 Multi-DER IDSM Pilots Only

The Residential Customer Energy Orchestration Program operates as a pilot. The program description and research specifications are detailed in Section 3. The pilot is funded through energy efficiency funds intending to incorporate multiple residential load management technologies. The program will leverage funds from other programs as necessary to achieve objectives—following all CPUC policy on multi-DER pilot programs related to leveraging these funds and working with PG&E staff to ensure these other program funds are available if needed—but these additional funds are not considered essential to the pilot's success. Examples of these leveraged funds would be incentives for battery storage systems, electric vehicle charging infrastructure, and CTA-2045 controls.

This pilot will ensure evaluability by requiring that participants provide access to their AMI data, which includes meter-level energy usage data in 15-minute intervals, pre and post intervention. This will enable the pilot research team and (if the pilot is evaluated) an external evaluator can evaluate outcomes at the core to the program objectives: the effectiveness of the different residential load orchestration approaches, the magnitude of load management capacity, and (by looking at how load shifting changes over time) the persistence of these impacts.

4.9 SEM Programs Only

Not applicable.