Pacific Gas and Electric developed Responses to Recommendations (RTR) contained in the evaluation studies of the 2013-2015 Energy Efficiency Program Cycle and beyond. This Appendix contains the Responses to Recommendations in the report:

RTR for the California Residential Fuel Substitution Workforce Readiness Study (ODC, Calmac ID # CPU0383.01)

The RTR reports demonstrate PG&E's plans and activities to incorporate EM&V evaluation recommendations into programs to improve performance and operations, where applicable. PG&E's approach is consistent with the CPUC Decision (D.) 07-09-043[1] and the Energy Division-Investor Owned Utility Energy Efficiency Evaluation, Measurement and Verification (EM&V) Plan[2] for 2013 and beyond.

Individual RTR reports consist of a spreadsheet for each evaluation study. Recommendations were copied verbatim from each evaluation's "Recommendations" section.[3] In cases where reports do not contain a section for recommendations, the PG&E attempted to identify recommendations contained within the evaluation. Responses to the recommendations were made on a statewide basis when possible, and when that was not appropriate (e.g., due to utility-specific recommendations), the PG&E's responded individually and clearly indicated the authorship of the response.

The Joint IOUs are proud of this opportunity to publicly demonstrate how programs are taking advantage of evaluation recommendations, while providing transparency to stakeholders on the "positive feedback loop" between program design, implementation, and evaluation. This feedback loop can also provide guidance to the evaluation community on the types and structure of recommendations that are most relevant and helpful to program managers. PG&E believes this feedback will help improve both programs and future evaluation reports.

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1 Attachment 7, page 4, "Within 60 days of public release, program administrators will respond in writing to the final report findings and recommendations indicating what action, if any, will be taken as a result of study findings as they relate to potential changes to the programs. Energy Division can choose to extend the 60 day limit if the administrator presents a compelling case that more time is needed and the delay will not cause any problems in the implementation schedule, and may shorten the time on a case-by-case basis if necessary to avoid delays in the schedule."

2 Page 336, "Within 60 days of public release of a final report, the program administrators will respond in writing to the final report findings and recommendations indicating what action, if any, will be taken as a result of study findings. The IOU responses will be posted on the public document website." The Plan is available at http://www.energydataweb.com/cpuc.

3 Recommendations may have also been made to the CPUC, the CEC, and evaluators. Responses to these recommendations will be made by Energy Division at a later time and posted separately.

Response to Recommendations (RTR) in Impact, Process, and Market Assessment Studies

Study Title: California Residential Fuel Substitution Workforce Readiness Study
Program(s):

Author: Opinion Dynamics (ODC)
Calmac ID: CPU0383.01
ED WO:
Link to Report: Report

MANAGEMENT APPROVAL AFTER REVIEWING ALL IOU RESPONSES		
Name		Date
PG&E	Claire Braico, Senior Manager	1/17/25

					PG&E (if applicable)	
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				If incorrect, please indicate and redirect in notes.	Choose: Accepted, Rejected, or Other	Examples: Describe specific program change, give reason for rejection, or indicate that it's under further review.
1	110	**Conclusion: We see a geographic disparity in the number of HVAC employees per contractor**, and the 2024 TECH Report found that, of businesses that were not sole proprietorships, larger (annual revenue of $3 million or more) HVAC contractors are hiring at least six installers annually while nearly half of contractors with lower revenue (of less than $250,000 annually) hire zero.59 From this, we assume that the relative dearth of employees in northern and eastern California and the relative abundance of employees in the Bay Area and central California may continue a self-reinforcing pattern that widens regional disparity absent intentional intervention. Northern and Eastern California Regions also tend to have higher proportions of contractor businesses that are sole proprietorships, which may further exacerbate the pattern. Notably, while still evident, this hiring dynamic was not found to be as pronounced within the HPWH market. While these patterns may track with population, the gap still exists for electric and HVAC employees (although not plumbers) when accounting for the number of employees per 1,000 households. An equitable transition to heat pumps requires a robust workforce sufficient to meet the adoption potential of every region.	**Recommendation**: In the short term, a solution to address this regional disparity in workforce availability may be to enable contractors from regions with more fully developed workforce to earn a premium by doing work in less-developed areas during the relatively slower shoulder seasons between the notoriously busy heating and cooling seasons. This may be an especially appealing prospect for contractors from the Bay Area and Sacramento area to travel to Northern California, where there is presumably a better business case for fuel switching due to a higher predominance of households heating with delivered fuels as well as more heating demand due to the number of heating degree days in California's northern regions.60 This is a short-term recommendation, with a longer-term objective of developing the local workforce. If daily travel between regions is overly burdensome, stakeholders may look to the example of utility storm recovery work, where crews travel for an extended period of time to affected areas. In this case, for heat pump workforce development, the contractor crew would receive support to spend a month during a shoulder season in Northern California, both doing installs and training the local workforce via a shadowing program on those installs. This model may be optimized by pairing targeted technical assistance for small business establishments to enable Northern California contractors to get up and running. We recommend the Investor Owned Utilities consider this as a potential program moving forward, especially where pockets of robust workforce numbers and pockets of sparce representation exist within the same service territory.	All	Other	In the short term, PG&E will share this recommendation—of offering a premium for contractors to install fuel substitution equipment in less developed regions—to the third-party implementers of the programs within its portfolio that work directly with contractors to offer fuel substitution measures. PG&E notes that, in conformance with D.18-01-004 Ordering Paragraph 1, the majority of the IOUs Energy Efficiency Portfolios are comprised of "third-party" programs that meet the "third party" definition from D.16-08-019 Ordering Paragraph 10, and therefore are "proposed, designed, implemented, and delivered by non-utility personnel under contract to a utility program administrator." IOUs can share this recommendation with their current program Implementers as a suggestion for consideration, along with these market study findings. Additionally, in recognition of the myriad barriers to fuel substitution adoption in addition to contractor availability, PG&E notes that its program implementers will need to consider how and when to best deploy (and potentially prioritize) program resources to address as many barriers as possible to effect higher fuel substitution adoption rates. Focusing on one barrier in isolation could potentially lead to a depletion of program resources without a material increase in overall fuel substitution adoption, therefore this recommendation will need to be considered within the context of a given program design. In the longer term, during the 2024-2027 EE portfolio period, PG&E anticipates having a disadvantaged worker training program that trains and places disadvantaged workers in energy efficiency and decarbonization jobs. Specifically, PG&E is in the process of soliciting for a new Career and Workforce Readiness (CWR) program, which will seek program ideas from bidders to serve this market and foster the trained energy workforce in California.
2	111	**Conclusion: The study team observed a longer delay in decision-making by customers converting to an HPWH upon malfunction of their existing equipment**. No customers were performing a like-for-like replacement, meaning no surveyed customers previously had a HPWH. The study team hypothesizes that the fact that more customers with functioning water heaters than those with failing or broken equipment made an equipment decision in just one day may be due to a high proportion of "early adopters" and customers who otherwise already	**Recommendation**: Utilities may benefit from providing plumbers with customer sales tools such as case studies, customer testimonials and directing them to the Switch Is On website62 to more quickly guide customers through the fuel substitution or fuel switching process as the water heating market moves beyond early adopters, which it must do to achieve California's climate goals.	All	Other	PG&E will share this recommendation—of providing plumbers or other appropriate market actors with customer sales tools to more quickly guide customers through the fuel substitution process—to the third-party implementers of the programs within its portfolio that offer fuel substitution measures. PG&E notes that, in conformance with D.18-01-004 Ordering Paragraph 1, the majority of the IOUs Energy Efficiency Portfolios are comprised of "third-party" programs that meet the "third party" definition from D.16-08-019 Ordering Paragraph 10, and therefore are "proposed, designed, implemented, and delivered by non-utility personnel under contract to a utility program administrator." IOUs

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		knew they wanted an HPWH and, therefore, did not require much time to consider their options. Conversely, customers with malfunctioning equipment may not have already been aware of HPWH technology and may have required time to consider switching to heat pump technology.				can share this recommendation with their current program Implementers as a suggestion for consideration, along with these market study findings. Additionally, in recognition of the myriad barriers to fuel substitution adoption in addition to lack of customer familiarity with HPWH technology, PG&E notes that its program implementers will need to consider how and when to best deploy (and potentially prioritize) program resources to address as many barriers as possible to effect higher fuel substitution adoption rates. Focusing on one barrier in isolation could potentially lead to a depletion of program resources without a material increase in overall fuel substitution adoption, therefore this recommendation will need to be considered within the context of a given program design.
3	111	**Conclusion: We found that one of the consistently longest steps reported in HVAC heat pump and HPWH replacements was the wait for an inspector or HERS rater to review the project.** This may indicate a workforce shortage but does not fall into the trades analyzed in this study.	**Recommendation**: Given the observed delay in project inspection and HERS rater availability in this study, regions that are "on track" or better in achieving the required workforce across the trades included in this study and that have an anticipated high demand for heat pumps may be well-served by California Home Energy Efficiency Rating Services (CHEERS)63 focusing on increasing training and certification opportunities for HERS raters in these regions.	All	Other	PG&E will investigate how its WE&T programs can potentially support HERS rater training. It's possible that PG&E may determine that HERS rater training is not an effective program activity at this time. PG&E will share this recommendation to consider HERS certification as a potential workforce standard to the third-party implementers of the programs within its portfolio that offer fuel substitution measures, to increase demand for this certification and training needs. PG&E notes that, in conformance with D.18-01-004 Ordering Paragraph 1, the majority of the IOUs' EE Portfolios are comprised of "third-party" programs that meet the "third party" definition from D.16-08-019 Ordering Paragraph 10, and therefore are "proposed, designed, implemented, and delivered by non-utility personnel under contract to a utility program administrator." IOUs can share this recommendation with their current program Implementers as a suggestion for consideration, along with these market study findings.
4	111	**Conclusion: Madera features a mix of attributes that make workforce development opportunities compelling.** Specifically, we observe a relatively high proportion of homes that heat with oil or propane, a relatively high proportion of homes built between 2000 and 2009, a moderately high proportion of the population of 15 to 24 years old, relatively low HVAC apprenticeship numbers, and only moderate participation in utility energy efficiency programs. Madera may be a prime location for a concentrated workforce development effort. With so much of the population about to enter or newly entered the workforce and theoretically a high proportion of homes that are at or nearing the end of life for their mechanical equipment, at least a proportion of which is likely to currently be served by delivered fuels, the conditions are favorable for an expansion of the electrification workforce. However, current apprenticeship numbers indicate that additional support may be required to facilitate this shift.	**Recommendation**: Records show that Madera County issued 6,826 single-family building permits in the years 2003 to 2009. In 2003, the total stock of single-family housing units was 21,905, meaning that in those years, the County increased single-family housing unit stock by a significant percentage per year. Meanwhile, the Madera County 2016-2024 Housing Element Update names several (as of that time) planned subdivisions alongside mentions of previously established subdivisions.64 Given that subdivisions tend to be developed rapidly and with similar mechanical systems, if subdivisions of the appropriate vintage exist, they may be facing a large-scale need to replace HVAC and water heating systems. Our recommendation is to support community-level electrification of subdivisions where optimal preconditions exist and to scaffold an apprenticeship program or other training program around such community-level targeting. If successful, this model may serve as a template for other counties and regions facing similar dynamics. Given the fact that Madera County sits within PG&E territory and PG&E has a zonal electrification goal within its 2022 Climate Strategy Report,65 we recommend that PG&E collaborate with County officials and review the feasibility of this approach. While not explicitly a non-pipes-alternative recommendation and therefore likely not eligible (without modification) for PG&E's Zonal Electrification Pilot,66 our recommendation for community-level electrification of subdivisions may have the effect of accelerating a community's departure from reliance on a natural gas line. Based upon the study team's understanding of PG&E's zonal electrification efforts, this recommendation differs in that targeting relies on information about natural cycles of gas equipment retirement on the customer side of the meter versus geographic filtering based instead upon anticipated gas line replacement or repair	All	Other	PG&E will consider the feasibility of supporting a training program around community-level electrification targeting for future electrification programs in its Energy Efficiency portfolio, or possibly outside its Energy Efficiency portfolio depending on the design and focus of future zonal decarbonization projects or programs. As the recommendation noted, the Madera County region is likely not an appropriate zonal electrification target for PG&E's upcoming Zonal Equitable Electrification Pilot program. PG&E notes that the upcoming Phase 4 of the Building Decarbonization rulemaking (R.) 19-01-011, described in the Assigned Commissioner's Amended Scoping Memo and Ruling filed on July 1, 2024, indicated that Track C of Phase 4 would consider policy regarding the development of a voluntary zonal decarbonization pilot program (program scope, administration, and implementation TBD). As Track C of this rulemaking progresses, PG&E will consider whether this market study recommendation, or other recommendations from this study, might be applicable.

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			needs (amongst a number of other factors).67 This recommendation aligns well with existing CPUC building decarbonization actions, and PG&E may begin coordination by sharing its internal Geospatial Electrification Tool under NDA with Madera County officials.68 Several other regions have a permutation of characteristics that may also lend themselves to intervention of this type. For instance, North Valley has a relatively high proportion of oil or propane heating, relatively low electric and plumbing apprenticeship numbers, and relatively low participation in energy efficiency programs. North Coast also has a relatively high proportion of oil or propane home heating as well as relatively low electric and HVAC apprenticeship numbers and relatively low participation in energy efficiency programs. While the region of Madera has 24 percent of building stock built between 2000 and 2009, North Valley has 13 percent and North Coast has 12 percent. Cross-referencing counties within these regions against data on subdivision approvals may surface areas of opportunity for community-level electrification.6			