California Energy Efficiency Coordinating Committee (CAEECC) Hosted Underserved Working Group (UWG)

Summary Memo – for transmittal to California public utilities commission (CPUC)

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CAEECC

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# Section 1: Introduction & Overview

## 1.1 Background

The California Energy Efficiency Coordinating Committee (CAEECC) convened an Underserved Working Group (WG) between July 2020 and July 2021, culminating in this Report. As outlined in the Prospectus,[[1]](#footnote-1) the goal of this WG was “To investigate what groups of customers are currently underserved by energy efficiency programs (i.e., because they face significant barriers to doing so), and to then devise (with CAEECC members and other stakeholders) the appropriate strategies and forums to address these problems.”

It is important to note that the CPUC authorizes two main categories of energy efficiency programs: (1) those that require income-eligibility through the Energy Savings Assistance Program (ESAP) in A.19-11-003 et al. and (2) those that are open to the general public via R.13-11-005. This exercise was focused solely on the latter.

The Full WG met five times between July 2020 and July 2021. In addition, three sub-working groups (sub-WGs) were formed to focus on small-medium business (SMB), residential, and public sectors, all of which met at least once in addition to the Full WG meetings.[[2]](#footnote-2) Each sub-WG was comprised of CAEECC members, interested stakeholders, as well as a dedicated research team comprised of university-level student and professor volunteers that were responsible for conducting the analyses with CAEECC member oversight (See Appendix A for participants). Between meetings, the research teams and smaller ad hoc work groups met to discuss data acquisition and metadata issues, refine the analytical approach, discuss emerging findings, and finalize the scope and implications of the analysis.

Furthermore, the Prospectus outlined a phased approach to addressing this investigation. Phase 1 was to identify the scope of the problem through data analysis and determine whether certain customers are not being fully served by the current portfolio of programs. This phase would conclude with recommendations regarding next steps, including which forum should be used to develop solutions. Should Phase 1 illuminate a clear gap in program delivery, the working group would recommend steps for a Phase 2.

The Prospectus outlines the following scope/approach for Phase 1:

1. “Identify the scope of the analysis including a) the metrics that will be used to evaluate whether certain groups of customers are being ‘adequately served’ relative to other groups; b) the reasons/barriers those groups face to participate, be that economic, non-native English speakers, geographically isolated, etc.; and c) who and how the data will be acquired and analyzed, and the timeline
2. Acquire the necessary data and analyze to what extent certain customers segments are not being ‘adequately served.’
3. For each type of documented underserved customer, identify the likely causes for being underserved—whether it’s the [hard-to-reach] HTR definition, or some other reason or reasons
4. Based on 1-3, develop (in consultation with CAEECC members, other stakeholders, and ED) next step recommendations including the forums and processes to develop appropriate strategy or strategies for addressing each underserved customer segment and the metrics to set goals and measure progress.”

The WG completed steps 1-3 noted above to the best of their abilities given the availability and granularity of energy efficiency program data. However, upon final analysis, the data did not yield clear and comprehensive conclusions about which types of customers are ‘inadequately served’ and why.

In addition, the Commission created an “equity segment” through D.21-05-031[[3]](#footnote-3) for programs that were intended to reach the demographics outlined in this process. In particular, such a segmentation could help address the concern identified in the prospectus that “The overall impact of the restrictions from the HTR definition (along with others, such as raising program cost-effectiveness to 1.25 for the IOUs, reduction of eligible EE measures, diminished potential as noted in the Goals and Potentials study, delayed rollout of new third party programs, etc.) has, in reality, greatly hampered the state goals of the doubling of energy efficiency savings in order to attain more aggressive GHG reductions.”

Therefore, the Full WG agreed to conclude with Phase 1 and not to pursue next steps as described in Step 4 of the Prospectus noted above.

The Prospectus problem statement identified the value in potentially providing a definition for “underserved”. Given the data availability and analytical constraints, that was not feasible in this WG, but may be addressed in the Equity Metrics WG.

## 1.2 Report Outline

This report outlines the findings of the WG and is organized as follows:

* High-Level Findings
* Sector Summaries
* Appendix A: UWG Member Organizations and Representatives

# Section 2: High-Level Findings

The following summarizes key takeaways for each of the three sectors. For more details, see the “Sector Summaries” section and the full reports (linked within each sector summary).

## 2.1 Residential Sector

* Lower participation rates were found within zip codes with the following characteristics: older housing stock, lower income residents, a higher proportion of renters, and a higher population of Native Americans.
* Socioeconomic indicators correlated with inequal distribution of benefits include: residents under the poverty line, older housing, a higher population with a disability, a higher population with no healthcare, a higher population of Native Americans, and a higher renting population

## 2.2 Public Sector

* Rurality is strongly correlated with lower participation rates, lower levels of energy efficiency investments, and smaller energy savings across local government programs, both at the county and city level.
* For local government programs analyzed at the city level, on-bill financing and non-resource programs are drivers of investment and savings.
* For local government programs analyzed at the county level, counties with larger population and greater tax revenue are associated with greater per capita energy efficiency investment.
* For K-12 schools, counties with lower household income, a lower proportion of Black or African American and Asian communities, and a greater proportion of the Native American community have lower participation rates. For participating schools, the following variables are associated with smaller energy efficiency investments: higher percentage of Title 1 schools, lower percentage of students eligible for a free and reduced meal plan, and greater disadvantaged community (DAC) shares in the county population.

## 2.3 SMB Sector

* Firm size, as measured by the number of employees, had the largest identifiable effect on participation, energy savings, and investment
* Communities with higher percentages of the population below the poverty line and more severe environmental issues had lower participation.
* Found higher rates of participation, investment, and savings for a few variables that originally were hypothesized to be associated with lower participation and benefits. Among these were: The presence of larger Asian and Hispanic communities, as well as business density.

In all cases, the summaries above showed statistically significant correlations between certain variables, but does not point to causal relationships.

# Section 3: Sector Summaries

The summaries below are large copy/pasted directly from each sector’s report. The final report for each of the three sectors (SMB, Residential, and Public sectors) can be found on the UWG landing page: <https://www.caeecc.org/underserved-working-group-2020>

## 3.1 Residential Sector

**Background**:

The analysis was led by Professor Alissa Kendal at the University of California-Davis (UCD) with the following students: Kristen Bush, Jessica Dunn, Sadia Gul, Mark Lozano, Leslie Nelson, and Tobiah Steckel. The report was completed and posted to the CAEECC website in January 2021.

The University of Southern California (USC) conducted a prior analysis, summarized in 2020[[4]](#footnote-4), which focused more on a simple statistical analysis (a t-test). The UCD team considerably expanded the scope of data acquisition statistical and analytical approach.

Carol Edwards, a WG member from SCE, provided feedback after the UCD report had been finalized. Accordingly, those comments are not included in the final report posted to the CAEECC website.[[5]](#footnote-5)

**Key Findings**:

* Overall, the statistical analyses (structured by zip code) demonstrate that populations underserved by energy efficiency programs are within zip codes that have this array of characteristics: older housing stock, lower income residents, a higher proportion of renters, and a higher population of Native Americans.
* Results differ depending on the response variable and the method of analysis. A host of response variables were used to capture participation, energy savings, and dollar savings, and demonstrate the challenge of defining what “being served” by a program means
  + The multivariate regression, for example, identified a few socioeconomic categories as useful indicators of populations being served (including: residents under the poverty line, older housing, a higher population with a disability, a higher population with no healthcare, a higher population of Native Americans, and a higher renting population).
  + The t-test results were statistically significant, indicating there is not an equal distribution of benefits among energy users in relation to their socioeconomic characteristics.

**Challenges Posed by Data Limitations and Recommendations**

* The CEDARS database provided the claims data and program information
* The claims data details information about program administrator spending and resulting savings, but does not capture or report any information about specific program participants except their location at the zip code level.
* In considering potential strategies to better analyze the types of participants in residential energy efficiency programs, one approach would be for program administrators to capture high level sociodemographic information and home energy usage information about program participants and report to CEDARS.
* The CEDARS database could be a stronger tool to support this analysis if it incorporated key indicators for populations the program is intended to target. For example, noting if a program is intended to target lower income participants or participants in older housing would be useful.

## 3.2 Public Sector

**Background**:

The analysis was led by Professor Ranjit Deshmukh at the University of California-Santa Barbara (UCSB) with the following students: Michelle Le, Audrey Meiman, Austin Covey, Atherv Gole, Measrainsey Meng, Nathaniel Villa, and Sydney Litvin. The analysis was completed and posted to the CAEECC website in July 2021.

**Key Findings**:

* For public sector energy efficiency programs targeted at local governments, rurality plays an important role in determining participation in energy efficiency programs and the level of energy efficiency investments and energy savings. Rurality was measured by the Index of Relative Rurality (IRR) for counties and rural-urban commuting area (RUCA) codes for cities. Program participation in more rural counties and cities tend to have smaller investments and lower energy savings. These differences or “gaps” between rural and urban counties and cities could be due to a lack of resources, assets, or exposure to energy efficiency programs within more rural communities.
* For local government programs analyzed at the city-level, utility support through on-bill financing and non-resource programs contribute to the drivers of investment and energy savings. For K-12 schools, school poverty proxy variables including the percentage of eligible students for a free and reduced meal plan and the percentage of Title 1 schools explain differences in investment and savings.
* Variables in the county data that were significantly different include the percentage of Asian community as well as population and tax revenue (only for per capita budget). Counties with greater per capita energy efficiency program investment are larger in population and have greater tax revenues.
* Differences in racial demographics were consistent between the two county-level program data -- county-level local government entities and K-12 schools -- but are opposite for the city-level program data. Exclusion of rural areas and the relative affluence of suburban areas classified as relatively rural in the city data may explain these differences. These discrepancies could also be a result of a lack of accurate information on city boundaries and demographics
* For K-12 schools, in addition to the degree of rurality, the mean household income is also significantly different between the counties in the top and bottom quartiles of program investments and energy savings, with the bottom quartile associated with a lower median household income for counties. The bottom quartile of counties also has a lower proportion of the Black or African American and Asian communities and a greater proportion of the Native American community, likely reflecting their relative proportions in urban versus rural areas of the state.

**Challenges Posed by Data Limitations**

* Data focuses on program years 2017-2019, due to structural changes in how public utilities reported energy efficiency program information in the past. Thus, the conclusions assume that past participation patterns are similar to those in 2017 - 2019.
* Some public sector entities have likely participated in programs classified as commercial instead of public sector. However, the research team was not able to identify those programs and separate information for public sector participants from the larger commercial programs. Therefore, commercial programs were not included and the scope was limited to programs that are strictly categorized as public sector
* To evaluate local government program participation at a finer spatial resolution, the research team analyzed the local government energy efficiency program data at the city-level. However, 244 out of 536 cities were omitted from the regression dataset due to a lack of demographic and tax revenue data, which likely affected the results of the city-level analysis.
* The analysis shows only the strength and character of the relationship between certain variables to investment and energy savings. Additional surveys and interviews of participants and stakeholders, especially in underserved areas must be included in future research to fully understand the barriers preventing participation.

## 3.3 SMB Sector

**Background**:

The analysis was a joint effort of Green Energy Economics Group, Inc. (GEEG) representing the Small Business Utility Advocate (SBUA) and the University of California at Irvine (UC Irvine). The research was led by Theo Love (GEEG) and Professor Ed Coulson (UC Irvine), with students Matteo Zamparini, Linda Tan and Carmen Liang. The analysis was completed and posted to the CAEECC website in August 2021.

The data set contained over 270,000 energy efficiency project rebate claims from 2017 through 2019 for 71 programs from four IOUs across California specifically identified as targeting small and medium sized businesses.[[6]](#footnote-6) By combining the EE claims data set with publicly available data on business characteristics, demographics, rurality, and environmental and social justice factors, the research team was able to examine who was and was not benefiting from these energy efficiency programs. They specifically examined participation rates, savings, and investment (both in program dollars and customer contributions) in energy-saving technology as functions of variables that the WG identified as typically being underserved.

**Key Findings**:

* **Firm Size and Other Factors Associated with Lower Utilization of EE Programs**
  + Firm size, as measured by the number of employees, had the largest identifiable effect on participation, energy savings, and investment
  + “Micro” firms that had less than 10 employees were associated with lower participation rates, saw less investment, and less savings, even after having controlled for multiple other variables. This finding is in line with the initial hypothesis for the existence of barriers to serving the smallest of business customers, including split incentives for landlords and tenants, difficulty paying up-front costs for undertaking energy efficiency investment, and the difficulty and cost associated with educating small businesses on EE opportunities.
  + Communities with higher percentages of the population below the poverty line and more severe environmental issues, as identified under the CalEnviroScreen 3.0 (CES3.0) score) had lower participation. While these effects were small, they were statistically significant and show that communities in which environmental issues exist may lead to less participation by SMBs.
  + SMBs in ZIP Codes with higher portions of Native American populations and foreign- born populations have some small, but ultimately not statistically robust evidence, that they are underserved by energy efficiency programs
* **Factors Associated with Greater EE Program Utilization**
  + A ZIP Code with a greater number of large businesses had larger program uptake rates across all micro, small, and medium businesses. This seems to imply a spillover effect from larger businesses to smaller ones. Even if larger businesses do not participate in EE programs, their presence may influence smaller businesses in the area to invest in building upgrades such as energy efficiency. It It also shows how communities of more exclusively small and micro business may be more insular and difficult to reach
  + Found higher rates of participation, investment, and savings for a few variables that originally were hypothesized to be associated with lower participation and benefits. Among these were: The presence of larger Asian and Hispanic communities, as well as business density. This probably indicates that the efforts of SMB program administrators to reach some underserved groups were successful. However, without the greater context of full non-residential investment and savings potential, it is difficult to say whether these groups are still underserved or not. Ultimately, it may be that these specific programs have been somewhat successful at reaching some underserved communities, but not that these communities are receiving the full benefits that are technically or economically possible
* **Variables without any Observable Impact on Underserved Status**
  + Some of the variables suggested by the WG to have negative consequences for SMB energy efficiency take up did not have any statistically significant impact. The most prominent of these were the percentage of the population that was African American, and any measure of the rurality or remoteness of the area, including the Index of Relative Rurality.

**Challenges Posed by Data Limitations**

* Claim data was not linked to rate class in any usable way. While a rate class field exists in the California Energy Data and Reporting System (CEDARS), it was not used by most IOUs, and if it was used, was not based on any specific rules that the research team was able to determine. While other data fields exist to identify residential customers, there was no way to separate out different types of non-residential participation data, and so the analysis was based on a data set of programs associated with SMB customers, and not specifically associated with participation of existing SMB rate classes in all EE programs.
* The research team was unable to obtain complete documentation for many of the fields in CEDARS. All inquiries to CAEECC members, and in data requests led back to a publicly available spreadsheet that provided a one or two sentence description, and another public document providing the list of possible values, but there was no documentation of the meaning behind possible values, and so often times the research team relied on educated guesses in order to interpret some of the CEDARS data.

# Appendix A: Underserved Work Group Member Organizations & Representatives

CAEECC Facilitators Dr. Scott McCreary and Meredith Cowart facilitated the first two WG meetings; Dr. Scott McCreary and Katie Abrams facilitated the final three full WG meetings and all sub-WG meetings and guided the interaction with the research teams leading to report completion.

This table is organized by first WG members, then Researchers.

|  |  |
| --- | --- |
| Organization | WG Member |
| 3C-REN | Jon Griesser |
| BayREN | Jennifer Berg |
| BayREN | Ann Kelly |
| California Public Utilities Commission | Jordan Christenson |
| CEC | Brian Samuelson |
| CEC | Kristy Chew |
| CodeCycle | Dan Suyeyasu |
| Community Action Partnerships of Orange County | Christine Baginski |
| County of Santa Barbara | Ashley Watkins |
| County of Ventura | Alejandra Tellez |
| CPUC | Chri Moore |
| CPUC | Jordan Christenson |
| CPUC | Kathleen Yip |
| Cybersecurity Youth Apprenticeship Initiative | Mark Ouellette |
| Don Arambula alternate | Frank Spasaro |
| Ecology Action | Lore James |
| Energy Infrastructure Partners | Renwick Paige |
| Enervee | Anne Arquit Niederberger |
| Enervee | Jon Gordon |
| Enpowered | Shea Dibble |
| Eureka City Schools | Lou Jacobson |
| Frontier Energy | Nancy Barba |
| Galawish Consulting & Associates | Elsia Galawish |
| Gemini Energy Solutions, LLC | Anthony Kinslow II, PhD |
| Greenbank Associates | Alice Sung |
| ICF | Renee Rainey |
| ICF | Brynn Holbrook |
| ICF | Lorelei Penera |
| Lincus, Inc. | Cody Coeckelenbergh |
| MCE | Alice Havenar-Daughton |
| Nexant | Kimberly Rodriguez |
| Nexant | Dan Sperber |
| NRDC | Mohit Chhabra |
| NRDC | Lara Ettenson |
| Outthink | Brian Barnacle |
| PG&E | Roopa Reddy |
| Public Advocates Office | Ashlyn Kong |
| Redwood Coast Energy Authority | Stephen Kullmann |
| Redwood Coast Energy Authority | Patrick Owen |
| Redwood Coast Energy Authority | Lou Jacobson |
| Redwood Coast Energy Authority | Aisha Cissna |
| Res-Intel | Hal Nelson |
| Resource Innovations | Corey Grace |
| Resource Innovations | Margie Gardner |
| Rising Sun Opportunities | Julia Hatton |
| SBUA | Ted Howard |
| SCE | Christopher Malotte |
| SCE | Brandon Sanders |
| SCE | Carol Edwards |
| SCE | Pei-Chi Chou |
| SDG&E | Doug White |
| Sierra Business Council | Kerri Timmer |
| Sierra Business Council | John Plaggmier |
| Silent Running | James Dodenhoff |
| SJVCEO | Courtney Kalashian |
| SoCalGas | Erin Brooks |
| SoCalGas | Benjamin Piiru |
| SoCalGas | Erin Brooks |
| SoCalREN | Lujuana Medina |
| State Treasurer's Office | Kaylee D'Amico |
| StatWizards | Caroline Chen |
| StopWaste | Candis Mary-Dauphin |
| Synergy Companies | David Shallenberger |
| The Energy Coalition | Laurel Rothschild |
| TRC | Sophia Hartkopf |
| TRC | Yamini Arab |
| USC Price School of Public Policy | Eunice Zordilla |
| USGBC-LA and EE PRG | Edmund Novy |
| Viridis Consulting | mabell garcia paine |
| Western Riverside Council of Governments | Anthony Segura |
| Willdan | Rosie Kang |
| Organization | **Researchers** |
| Green Energy Economics | Theo Love |
| UC Davis | Alissa Kendall |
| UC Davis | Kristen Bush |
| UC Davis | Jessica Dunn |
| UC Davis | Sadia Gul |
| UC Davis | Mark Lozano |
| UC Davis | Leslie Nelson |
| UC Davis | Tobiah Steckel |
| UC Irvine | Ed Coulson |
| UC Irvine | Linda Tan |
| UC Irvine | Carmen Liang |
| UCSB | Ranjit Deshmukh |
| UCSB | Michelle Le |
| UCSB | Measrainsey Meng |
| UCSB | Audrey Meiman |
| UCSB | Austin Covey |
| UCSB | Atherv Gole |
| UCSB | Sydney Litvin |
| UCSB | Nathaniel Villa |
| USC | Monina Letargo |
| USC | Elizabeth Pereda |
| USC | Nicholas Cain |
| USC | Dairou Wang |
| USC | Tianfang Guo |

1. Prospectus is available at <https://www.caeecc.org/underserved-working-group-2020> [↑](#footnote-ref-1)
2. More information can be found at: <https://www.caeecc.org/underserved-working-group-2020> [↑](#footnote-ref-2)
3. D.21-05-031, p.14. The decision defines equity programs as: “programs with a primary purpose of providing energy efficiency to hard-to-reach or underserved customers and disadvantaged communities in advancement of the Commission’s Environmental and Social Justice (ESJ) Action Plan. Improving access to energy efficiency for ESJ communities, as defined in the ESJ Action Plan, may provide corollary benefits such as increased comfort and safety, improved air quality, and more affordable utility bills, consistent with Goals 1, 2, and 5 in the ESJ Action Plan.” [↑](#footnote-ref-3)
4. USC report is available at https://www.caeecc.org/7-30-20-underserved-wg [↑](#footnote-ref-4)
5. C. Edwards’ concerns can be summarized as follows:

   (1) The 2 core research objectives identified in the research plan were not directly addressed. *1. Are there gaps in program delivery by geographic areas? 2. Do residential energy efficiency programs reach or not reach certain socio-demographic groups?*

   (2) Relevant existing CA EE Research available via California’s Measurement and Advisory Council (CALMAC.org) wasn’t part of the literature review.

   (3) Some of the information included was incorrect.

   (4) Disagree with the students’ interpretation of the results and final conclusion. [↑](#footnote-ref-5)
6. Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, and Southern California Gas Company. [↑](#footnote-ref-6)