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Memorandum

To: California Public Utilities Commission

From: Opinion Dynamics

Date: March 19, 2026

Re: BUILD Draft Report

Introduction

The Building Initiative for Low-Emissions Development (BUILD) Program encourages the design and construction of all-electric, energy-efficient buildings by providing incentives for the construction of all-electric, low-income residential housing and offering technical assistance to support project planning and educate new construction professionals, including builders, developers, architects, and engineers, about electric technologies and all-electric building design. The program's primary goal is to engage with new construction market actors to raise awareness of building decarbonization technologies and encourage all-electric residential housing design, development, and construction.

The BUILD Program provides incentives for the construction of all-electric, new residential housing using near-zero emission building technologies to significantly reduce GHG emissions beyond what would be expected to result from a code-compliant mixed-fuel building. Eligible applicants must demonstrate that their project will result in at least a five percent reduction of residents' utility bills compared to mixed-fuel homes. The BUILD Program also offers technical assistance to support project planning and educate developers, architects, builders, contractors, and other stakeholders about new technologies and all-electric building design.

The BUILD Program, along with the Technology and Equipment for Clean Heating (TECH) Initiative, was authorized under Senate Bill (SB) 1477 (Stern, 2018). SB 1477 required the California Public Utilities Commission (CPUC) to develop and supervise the administration of the BUILD Program. Subsequently, in CPUC D. 20-03-027, the CPUC ordered the California Energy Commission (CEC) to serve as the administrator of the BUILD Program and authorized the CEC, at its discretion, to solicit a third-party contractor to provide technical assistance or to implement any part of the BUILD Program. In May 2021, following a competitive bidding process, the CEC selected the Association for Energy Affordability (AEA), supported by a team of subcontractors, to serve as the Technical Assistance Provider (TAP).[1]

Opinion Dynamics served as the Independent Evaluator of the BUILD Program. This memorandum summarizes the reports and other deliverables produced over the course of the BUILD Program evaluation. This memo reflects the views and opinions of Opinion Dynamics. It does not reflect the opinions or views of the California Public Utilities Commission (CPUC) and will be revised based on stakeholder feedback.

[1] The TAP team led by AEA includes TRC, The California Housing Partnership, Highlands, Celery, SmithGroup, Integral, David Baker Architects, and Mithun.

BUILD Baseline Market Assessment

January 19, 2023

The primary objectives of this study were to assess existing market conditions and establish a baseline for the BUILD Program based on primary and secondary research. Data in forming this report were garnered from a variety of sources including a survey of market actors active in the California residential new construction market and a review of secondary data resources. This report provides an overview of market size, summarizes market perceptions of all-electric design and electrification equipment, and characterizes the key cost, technical assistance, and training considerations related to the future of low-emission residential new construction in California.

The key findings of this study include:

- The market for all-electric new construction was still relatively nascent in California with few single family and multifamily homes being all-electric;
- Affordable housing stakeholders reported having more experience building all-electric buildings compared to market rate stakeholders. While most stakeholders reported being at least moderately knowledgeable about all-electric design and construction, less than half reported attending formal training in all-electric design;
- Multifamily stakeholders were generally familiar with high efficiency all-electric design and technologies and saw limited technical barriers to their installation, however few recommended installing these technologies in their projects. Respondents in the multifamily sector who indicated high efficiency all-electric design and technologies were impractical today generally cited concerns about the ability of the electric grid to support additional load, the high upfront costs to build all-electric (including equipment and installation costs), the impracticality of electric water heating systems in multifamily buildings, and increased tenant utility bills;
- The majority of stakeholders surveyed felt building high-efficiency all-electric housing was more expensive than building dual-fuel housing, but the incidence of this sentiment was lower among stakeholders with experience building all-electric. This indicates there are opportunities for decarbonization programs to provide technical assistance such as comparative cost analysis of all-electric equipment as well as sharing information on additional potential funding sources;
- Few respondents had received training on all-electric or reach codes, and respondents expressed interest in technical assistance focused on code compliance and permitting; and
- Stakeholders were overwhelmingly interested in receiving technical assistance, although a significant portion were only interested if the technical assistance is free.

The full report is available here:
https://www.calmac.org/publications/BUILD_Baseline_Market_Assessment_FINAL.pdf

BUILD Program Interim Process Report

February 22, 2024

In this interim process report, we provided an update on and presented the results of the process evaluation of the BUILD Program. Process research continued into 2024, and we prepared a second iteration of this report near the end

of 2024. This interim process evaluation report is based on program staff interviews, program materials review, periodic status calls, participant interviews, and a tracking data analysis. The evaluation team contacted 14 individual companies that had achieved a Design or Construction reservation through the BUILD Program. These companies were among the first applicants of the BUILD Program and applied between February 2022 and May 2023. In total, we interviewed nine developers representing ten projects in total. The evaluation team offers the following findings and recommendations based on the results of the interim process evaluation.

The key findings of this study include:

- Most projects did not change their design significantly in response to BUILD incentives or technical assistance.
- All respondents reported their projects rely on multiple sources of public funding, including affordable housing tax credits, state and county funds, local government funds, and conventional loans in addition to BUILD funding. Further, many respondents stated their other funding sources imposed overlapping requirements with BUILD Program requirements.
- Some projects mentioned that they were unaware of all of the services that the TAP team provided and mentioned that communicating the suite of services provided by the TAP team would have been helpful. Additionally, an earlier review of their project plans would have been helpful in maximizing the efficiency of the building design.
- The New Adopter Design award has seen limited uptake by program participants.
- Some respondents reported that the kicker incentives were too small relative to their incremental cost to influence the adoption of kicker technologies. Although most projects did include at least one kicker technology, interview results found minimal impact of the BUILD Program on the adoption of kicker technologies outside of JA-13 compliant HPWHs.
- The TAP provided valuable application and project-specific support to BUILD applicants, including education about all-electric new construction best practices, potentially creating spillover effects, and was actively adapting to applicant needs and feedback.
- BUILD incentive applicants were satisfied with program processes and communication, but opportunities existed for improvement.

The full report is available here:
https://www.calmac.org/publications/EM&V_BUILD_Interim_Process_Report_FINAL.pdf

BUILD Time 1 Market Study

February 5, 2025

The primary objectives of this study, the Time 1 Market Study, were to assess existing market conditions and update the established baseline for the BUILD Program based on primary and secondary research, where available. Data in forming this report were garnered from a variety of sources, including a survey of market actors active in the California residential new construction market and a review of the secondary data resources that were updated after the baseline assessment.

The key findings of this study include:

- Finding: Stakeholder experience working in all-electric design had increased since 2022.

- Recommendation: The CEC should consider expanding the New Adopter Design Award to single family affordable housing.

- Finding: Stakeholder knowledge of all-electric design and technologies had increased since 2022.
  - Recommendation: The CEC should continue to provide technical assistance and resources to stakeholders regarding all-electric design and technologies to continue to increase stakeholder knowledge on those topics.
- Finding: Many stakeholders considered all-electric construction practical, but cost concerns remain prevalent. Respondents working in market rate housing who indicated high-efficiency all-electric design and technologies were impractical today generally cited concerns about the higher upfront cost relative to a dual-fuel home, concern regarding the electrical grid's ability to handle the increased load and the impact on tenants' bills. Furthermore, most stakeholders surveyed felt building high-efficiency all-electric housing was more expensive than building dual-fuel housing; however, the incidence of this sentiment was lower among stakeholders with experience building all-electric.
  - Recommendation: The CEC should continue to ensure that cost concerns and ways to offset costs are addressed during technical assistance.
- Finding: There was an opportunity to increase stakeholder training on all-electric building design. Half of the respondents never received training on all-electric building design but showed a preference for receiving this type of technical assistance. Furthermore, stakeholders were overwhelmingly interested in receiving technical assistance, although a significant portion indicated they were only interested if the technical assistance was free or that their interest was dependent on the cost. The lack of awareness of where to access technical assistance was the largest barrier to stakeholders taking advantage of such resources.
  - Recommendation: The CEC should continue to leverage relationships with utilities and incentivized equipment manufacturers as well as consider deploying co-sponsorship training opportunities or technical assistance programs. BUILD's education and outreach should focus on increasing stakeholder awareness of the availability of free or low-cost technical assistance to help increase participation.
- Finding: More than half of the surveyed stakeholders were unaware of the BUILD Program, while almost half were interested in participating.
- Finding: The feasibility of measuring the market transforming effects of the BUILD Program was limited due to the rate at which full market characterization studies are updated. Four of the eight studies used to assess the market conditions and update the baseline had not been updated since 2021. This limited the ability to measure the transformation a new construction decarbonization program is having on the market.

The full report is available here:
https://www.calmac.org/publications/BUILD_Time_1_Market_Study_Report_FINAL.pdf

BUILD Program Process Report

June 27, 2025

This process evaluation report is based on program staff interviews, program materials review, periodic status calls, participant interviews, and a program tracking data analysis. In total, we interviewed 22 developers representing 32 projects that were applicants for the BUILD Program between June 2022 to November 2023; three interviewees representing four projects were interviewed to discuss their reasoning behind exiting the BUILD Program, and one

interviewee was a third-party energy advisor working with multiple developers applying for a reservation through the BUILD Program.

The key findings of this study include:

- The BUILD program did not appear to be influencing participants to build all-electric residential housing. When asked what they would have done in the absence of the BUILD program, most respondents would have built all-electric projects regardless of BUILD participation. Only ten of the 88 approved applicant projects were new adopters, three of whom are respondents covered in this report. All three of these respondents stated they would have built all-electric projects regardless of participation.
- The BUILD Program did appear to be influencing projects to become more efficient than they would have been in the absence of the program. Over one-third of respondents reported BUILD influenced their projects to be more energy-efficient or produce lower GHG emissions. In addition, the majority of respondents said their designs would have been less efficient in the absence of the BUILD program. Six stated their projects would have been designed to be slightly above code, while six would have only met baseline code compliance.
- Respondents reported using an average of four funding sources per project in addition to BUILD funding. These included county, state, and local government funds and loans; federal, state, and city tax credits; California Department of HCD funds; and private grants. While most non-BUILD funding sources had different requirements than BUILD, respondents noted their applications were more competitive when applying to non-BUILD funding sources when projects demonstrated higher energy efficiencies.
- Respondents expressed high satisfaction with the Technical Assistance Provider (TAP) team. All 14 respondents with material interactions with the TAP recommended TAP to other applicants. Respondents appreciated support in technical understanding, incentive maximization, and best practices for all-electric residential building design.
- Respondents consistently reported that the BUILD application was the most challenging aspect of participation. Nearly all respondents highlighted the application correction process as time-consuming and documentation-heavy, and most respondents reported some difficulty completing the BUILD incentive application. Respondents stated the application required significant administrative costs and time to complete the application.
- Three respondents did not continue their BUILD participation because program requirements were not clearly communicated until their projects were too far along in the construction phase to adjust their plans. The specific requirements were photovoltaic (PV) allocation requirements for tenants and prevailing wage requirements were not disclosed early enough for developers to adjust plans accordingly.
- Almost half of the projects entered the program during the construction phase, when major design changes are difficult or impossible to implement cost-effectively.

The full report is available here: https://www.calmac.org/publications/EM&V_BUILD_Process_Report_FINAL.pdf

BUILD Program Impact Analysis Report

September 2, 2025

This report summarizes the methods and results of the BUILD Impact Evaluation. The evaluation included desk reviews and on-site verification of all three BUILD projects completed at the time of the evaluation (Q4 2024). The primary objectives of this study were to estimate GHG reductions in BUILD Program projects compared to a mixed fuel baseline, recommend how ex ante GHG and bill impact estimation protocols, processes, and tools could be improved to increase

accuracy, and calculate cost per metric ton of avoided GHG. Based on our research, we offered several key findings and recommendations to ensure the BUILD Program can effectively improve on past, current, and future projects.

The key findings of this study include:

- Finding: Relative to a deemed code-compliant mixed fuel baseline, the three reviewed projects are estimated to have collectively reduced lifetime GHG emissions over the course of an assumed 30-year measure life by approximately five thousand metric tons of carbon dioxide equivalent (MT CO2e). Based on a review of project costs, this reduction was achieved at a cost per MT similar to that of the US EPAs social cost of carbon.
- Finding: Equipment alignment between the project files and on-site. All HVAC and water heating equipment counts, types, sizes, and efficiencies were consistent between project files, invoices, energy models, and the on-site verification visits.
- Finding: Applicants were not able to complete the process themselves, and a third party was needed specifically to aid applicants through the application process. We had initial trouble interpreting results from the CPT, as well.
  - Recommendation: Improve the application by adding definitions for each section of the CPT. Consider including an example completed application.
- Finding: Two of the three sites we visited had HPWHs operating in the High Demand mode, the least energy-efficient mode. Recommendation: Discuss with sites why they are operating in this mode and assess if there's a way to transition to Heat Pump mode. Investigate the energy implications of operating in High Demand mode instead of Heat Pump mode and adjust energy and GHG calculations accordingly. Alternatively, BUILD (or other future new construction decarbonization programs) could require participants who receive program incentives for the installation of HPWH to operate them in heat pump mode.
- Finding: We found that all three sites installed HPWHs which are only JA-13 compliant when installed with thermostatic mixing valves (TMVs) as they do not conform to UL 60730-1, ASSE 1082, or ASSE 1084.3 Two of the three sites have HPWHs installed without TMVs, representing 177 of 212 HPWHs, and as such are not JA13 compliant and should not have received a kicker incentive.
  - Recommendation: Ensure installation of HPWH equipment intended to qualify for equipment kickers meets all necessary JA13 requirements.
- Finding: We used the PV system plans and PTO forms to source verified PV kW generation values because these forms, in conjunction with the VNEM forms, represent the most up-to-date PV generation capacity (kWdc) that is available to tenants. Updating the CPT to rely on these values resulted in one of the three projects we evaluated having some buildings fail to meet the program's required minimum of 5% expected bill savings.
  - Recommendation: Ensure sufficient PV system capacities are installed and allocated to tenants through a VNEM agreement at the building-level to ensure program requirements are met.

The full report is available here: https://www.calmac.org/publications/BUILD_Program_Impact_Analysis_Report_FINAL.pdf

BUILD Participant Project Completion Survey Analysis Memo

February 13, 2026

This memo presents the evaluation approach, methods, and results of the BUILD project completion survey, which is a component of the overall BUILD process evaluation. The project completion survey was administered to all BUILD

participants who reached the third (and final) stage of program participation on an ongoing basis. While this memo focuses on the BUILD project completion survey, additional insights drawn from the broader BUILD process evaluation are integrated throughout as appropriate.

The key findings of this study include:

- Finding: Respondents overwhelmingly indicated they would recommend BUILD to other builders and developers, and the majority report applying what they have learned from BUILD technical assistance to other projects.
- Finding: Over two-thirds of respondents (10 of 14) reported that the BUILD Program influenced their project's design or construction. However, nearly half of these ten projects noted that the program had minimal impact on design decisions and did not affect their choice to pursue all-electric construction. Most respondents (13 of 14) received an incremental PV incentive, indicating they were required to install additional photovoltaic capacity beyond code requirements to meet BUILD's expectation of at least a five-percent reduction in tenant energy bills.
  - Recommendation: Encourage participation in BUILD technical assistance early in a project's design process. Technical support from the BUILD technical assistance provider is highly rated by respondents. By engaging in a project early in the design process, BUILD can influence the design as it is being developed and help more projects meet the tenant bill reduction requirement through increased building efficiency, rather than relying on additional PV. Alternatively, policymakers should consider if a bill reduction requirement is appropriate for a building decarbonization program if the end result is merely additional rooftop PV and a transfer of PV benefits from building operators to tenants.
- Finding: Respondents provided the lowest satisfaction ratings for the BUILD application process and payment processing components. Furthermore, respondents provided mixed feedback on the difficulty of meeting program requirements.
  - Recommendation: Provide clear guidance throughout the program by offering straightforward instructions and resources at every stage of the BUILD process. Improve coordination among staff, consultants, and administrators regarding application submissions. Respondents also suggested fixing the application portal issues, however we should note the BUILD program implementation team launched the BUILD Online claims process in late 2024, which represents a significant improvement over the initial processing platform. Given the timing of this survey, it is likely most respondents initially applied to BUILD under the prior application system.
- Finding: Respondents most often cited issues with the application review portal and slow review times for corrected applications as the primary reasons for their low satisfaction scores.
  - Recommendation: Fix application portal issues and bugs, shorten review times, and provide quick and complete feedback and corrections on the application to make the process more efficient and reduce the required administration hours of project teams.

The full report is available here:
https://www.calmac.org/publications/BUILD_Project_Completion_Survey_Results_Memo_FINAL.pdf