FILED
07/31/23
08:00 AM
R1804018

ATTACHMENT A

California Public
Utilities Commission

R.18-04-018 Phase 2B Staff Proposal

CPUC ENERGY DIVISION STAFF

July 25, 2023

Acronyms & Abbreviations

AB	Assembly Bill
AL	Advice Letter
ALJ	Administrative Law Judge
Amps	Ampere
BUILD	Building Initiative for Low-Emissions Development
BVES	Bear Valley Electric Service
BTM	Behind-the-meter
CARB	California Air Resources Board
CARE	California Alternate Rates for Energy
CSGT	Community Solar Green Tariff
D.	Decision
DAC-GT	Disadvantaged Community Green Tariff
DAC-SASH	Disadvantaged Communities – Single-Family Solar Homes
DOE	Department of Energy
EBD	Equitable Building Decarbonization program
EISA	Energy Independence and Security Act of 2007
ESA	Energy Savings Assistance program
ESJ	Environmental and Social Justice
EV	Electric Vehicle
FERA	Family Electric Rate Assistance Program
FOI	Form of Intent
GHG	Greenhouse Gas
GRC	General Rate Case
HCD	California Department of Housing and Community Development
HEEHRA	High-Efficiency Electric Home Rebate
HOMES	Homeowner Managing Energy Savings
HPWH	Heat Pump Water Heater

HUD	U.S. Department of Housing and Urban Development
HUD Code	Federal Manufactured Home Construction and Safety Standards
HVAC	Heating, Ventilation, and Air Conditioning
IECC	International Energy Conservation Code
IOU	Investor-Owned Utility
IRA	Inflation Reduction Act
LAO	Legislative Analyst's Office
MHC	Manufactured Housing Community
MHP	Mobilehome Park
MH	Manufactured homes or mobilehomes
MHPA	Mobile Home Parks Act
MORE	Manufactured Housing Opportunity and Revitalization
NA	Not Applicable
NEC	National Electric Code
NFPA	National Fire Protection Association
PA	Pilot Administrator
PG&E	Pacific Gas and Electric
PPP	Public Purpose Program surcharge
POU	Public-Owned Utility
PV	Photovoltaic
R.	Rulemaking
RHA	Richard Heath & Associates
SAA	State Administrative Agency
SB	Senate Bill
SCE	Southern California Edison
SDG&E	San Diego Gas and Electric
SED	CPUC's Safety and Enforcement Division
SGIP	Self-Generation Incentive Program
SJV Program	San Joaquin Valley Affordable Energy Pilot Program
SMUD	Sacramento Municipal Utility District

SoCalGas	Southern California Gas
SWG	Southwest Gas
TECH	Technology and Equipment for Clean Housing
TSB	Total System Benefit
TTM	To-the-meter
U.S.	United States of America
VA	Volt-Amperes
WMA	Western Manufactured Housing Communities Association
ZERH	Zero Energy Ready Home

Tables & Figures

1. Executive Summary

On April 25, 2018, the California Public Utilities Commission (CPUC) established Rulemaking (R.) 18-04-018 to evaluate the Mobilehome Park Pilot Program (MHP Pilot) established in Decision (D.) 14-03-021 and to make modifications to establish it as a permanent mobilehome park (MHP) conversion program. Phase 1 of R.18-04-018 adopted D.20-04-004, establishing a 10-year Mobilehome Park Utility Conversion Program (MHP Program) from 2021 to 2030, with updated rules and conversion targets based on lessons learned from the initial MHP Pilot. Phase 2 of this proceeding commenced on December 23, 2020 with the issuance of the Assigned Commissioner's Phase 2 Scoping Memo and Ruling (Phase 2 Scoping Memo). The ruling establishes two parts to Phase 2. The first part, Phase 2A, concluded with the adoption of D.21-08-025 on August 19, 2021, and established consumer protections for residents living in MHPs converted through the MHP Program. The second part, Phase 2B, was initiated on July 20, 2021 with an Administrative Law Judge (ALJ) ruling asking parties for their input on developing an electrification-ready standard for the MHP Program. The Phase 2 Scoping Memo identifies four main issues to be considered in Phase 2B: (1) Whether the CPUC should adopt an electrification-ready standard for electrical service for the MHP Program; (2) What electrical service size standard is appropriate (e.g., 150-amp, 200-amp, etc.); (3) What cost categories, inputs, and assumptions should be used to evaluate the costs of electrification-ready standards for the MHP Program; and (4) What impact would adoption of such an electrification-ready standard have on environmental and social justice (ESJ) communities, especially in regards to fulfilling the nine goals of the CPUC's ESJ Action Plan. The Phase 2 Scoping Memo also left open the possibility of considering a potential full-electrification pilot program within the MHP Program.

This Staff Proposal addresses Phase 2B considerations, including recommending a full-home electrification initiative as part of the existing MHP Program. Participation in this program should result in net benefits to residents of converted MHPs and should aim to avoid adverse outcomes. As the state moves toward building and vehicle electrification, the MHP program should consider what measures are needed to enable program participants to be part of this transition. With this end goal in mind, Staff recommend that the MHP Program adopt a 200-amp electric service standard to enable future mobilehome electrification and electric vehicle (EV) charging. Staff believe adopting this standard will add minimal cost to the existing program and, importantly, will forestall the need for future electric service upgrades, removing a common yet potentially costly barrier (cost of retrenching) to residential building electrification in an important yet oft-ignored segment of the housing market. Staff also recommend establishing a full-home electrification

initiative program as part of the MHP Program, which would provide a valuable opportunity to collect data on electrification retrofit costs, changes in energy usage, and energy bill impacts as a result of switching from gas end-uses to full electrification. While data from the San Joaquin Valley Affordable Energy Pilot Program (SJV Program) (R.15-03-010) offer some insights into mobilehome electrification, the context of the SJV Program differs substantially from that of the MHP Program. An MHP-specific electrification initiative would provide the most accurate data on the feasibility and impacts of expanding these offerings as part of the broader MHP Program. Staff worked with the California Department of Housing and Community Development (HCD), the California Air Resources Board (CARB), and the California Energy Commission (CEC) in developing the recommendations in this Staff Proposal.

Staff recommend that the CPUC modify the MHP Program in the following ways:

1. Mandate installation of to-the-meter (TTM) infrastructure to accommodate 200-amp electrical service;
2. Mandate installation of behind-the-meter (BTM) infrastructure, up to the external junction box of each MHP coach, to accommodate 200-amp electrical service; and
3. Initiate a limited full-home electrification initiative for MHPs within the existing program, wherein all coaches are fully electrified at no cost to residents, no new gas infrastructure is installed, and existing gas infrastructure is permanently retired.

In adopting these recommendations, Staff believe that the CPUC would be leveraging an existing program to advance electrification opportunities in a segment of existing homes that is frequently overlooked. Removing barriers to MHP electrification will also ensure that residents, many of whom are low-income, live on fixed income, and/or live in disadvantaged communities, are not left behind as the state advances rapidly toward its goals of carbon neutrality by 2045.

2. Background

This "Background" section of the Staff Proposal describes the state of mobilehomes – formally referred to as "manufactured housing" – in California, specific details of the existing MHP Program, and building electrification efforts at the federal, state, and local levels. First, Staff discuss the history of manufactured housing, what role this type of housing plays in the state, and what regulations govern manufactured housing. Second, Staff summarize the procedural history of the MHP Program and its progress to date. Finally, Staff address the legislation, policies, and programs advancing building decarbonization efforts across California, as well as at the federal and local levels.

2.1 Manufactured Housing

Manufactured housing first appeared in California in the 1920s, which took the form of a "mobile" home set on a towable trailer on wheels that many used for traveling and vacationing.[1] The Great Depression era of the 1930s left many families without financial resources and forced individuals to turn to mobilehomes as a source of affordable, permanent housing. The demand for these units continued to grow throughout the next two decades, propelled by World War II and the need for inexpensive, abundant housing for workers staffing the nation's defense manufacturing plants. Demand for manufactured housing steadily rose following the war, peaking in the 1960s and 1970s, as these units were seen as affordable alternatives to conventional housing. It was during this era of exponential growth in factory-built housing production that the federal government recognized the need to standardize manufactured housing construction. In 1974, Congress passed the Manufactured Home Construction and Safety Standards Act, which authorized the U.S. Department of Housing and Urban Development (HUD) to adopt and enforce federal standards to assure the quality, safety, durability, and affordability of manufactured homes. As a result, HUD established its Manufactured Home Construction and Safety Standards, also known as the "HUD Code," which became effective on June 15, 1976. Current production of manufactured housing is well below the high demand of the late 1990s, but the market has seen steady growth since the 2008 recession.[2]

[1] Sullivan, Esther. *Manufactured Insecurity*. University of California, 2018 at 36-46.
[2] See: https://www.manufacturedhousing.org/wp-content/uploads/2020/05/6-UPDATED-Sitebuilt-vs.-MH-2014-2018-Updates.pdf.

Given that manufactured homes are generally more affordable than site-built homes, they serve as an important form of affordable housing for low-income households and are the largest source of unsubsidized affordable housing in the country.[3] This is especially true in states like California, where housing prices are 2.3 times the national average and monthly rent is approximately 50% higher than the U.S. average.[4,5]

The terms "manufactured home" and "mobilehome" refer to a house built on a permanent chassis, constructed in a manufacturing plant, and transported to an installation site. Although the two terms are sometimes used interchangeably, HUD defines manufactured homes as homes that were built after June 15, 1976, when HUD began enforcing the HUD Code that established federal guidelines for manufactured home construction.[6] All factory-produced homes built prior to this date are referred to as mobilehomes. For convenience, in this proposal we will use the term "manufactured home" (MH) to refer to both manufactured homes and mobilehomes, given that the homes considered in the CPUC's MHP Program comprise a mix of homes built before and after June 15, 1976. Manufactured homes are distinguished from recreational vehicles and park-model homes, which are classified as motor vehicles instead of housing.[7] Modular homes, which are also built in a factory, are distinct from manufactured homes in that they do not include a chassis and must be built on site, and are thus subject to local and state building codes of the install site, instead of the HUD Code.[8]

Although mobilehomes were historically built to be moved from place to place, modern manufactured homes are generally considered permanent structures (while it is feasible to transport these homes, it is very costly, ranging from $5,000-$13,000.)[9] While modern MHs are built on a chassis and still capable of being transported, once they are moved from a factory to an installation site, they are rarely moved again, in large part because of the high shipping costs.[10]

---

[3] See: https://www.huduser.gov/portal/periodicals/em/WinterSpring20/highlight1.html.
[4] Ibid.
[5] See https://lao.ca.gov/Publications/Report/4535.
[6] See: https://www.hud.gov/program_offices/housing/rmra/mhs/faqs.
[7] See: https://files.consumerfinance.gov/f/documents/cfpb_manufactured-housing-finance-new-insights-hmda_report_2021-05.pdf at 7.
[8] See: http://www.manufacturedhousing.org/wp-content/uploads/2017/10/Understanding-Manuactured-Housing.pdf at 3.
[9] See: https://www.forbes.com/home-improvement/moving-services/cost-to-move-mobile-home/.
[10] Forbes reports that nationally, moving costs average $9,000, and can range from $5,000 to $13,000. See: https://www.forbes.com/home-improvement/moving-services/cost-to-move-mobile-home/.

MHs fall into two categories: singlewide and multiwide homes. A singlewide consists of a single unit and must be at least 8 feet wide and 40 feet long, and have a minimum of 320 square feet of living area, according to the HUD Code.[11] A multiwide home consists of more than one unit joined together on site; a "doublewide" consists of two joined units and a "triplewide" consists of three joined units. Functionally, modern MHs are nearly identical to site-built homes, and run on appliances that use electricity and, often, gas (or propane if gas infrastructure is not available).

Federal and State Regulations Governing Manufactured Homes

HUD regulates the manufacturing, construction, installation, and maintenance of MHs, as codified in Title 24 of the Code of Federal Regulations, Parts 3280-3288.[12] The construction and safety standards for MHs are specifically outlined in the HUD Code (Title 24, Part 3280 in the Code of Federal Regulations.)[13] HUD last updated these standards on January 12, 2021 and started enforcing the changes on March 15, 2021.[14] HUD is also in the process of finalizing an even larger set of updates to the rule, which were released in July 2022, aimed at increasing the supply of MHs to address the Biden-Harris administration's goal of expanding affordable housing across the country.[15] All homes built after June 15, 1976 – when the HUD Code went into effect – receive a red certification label, indicating that the home has been built and inspected according to HUD guidelines.

Before the 2021 updates, the HUD Code's provisions related to building thermal envelope requirements had only been updated sporadically since its inception in 1974. Recognizing the need for more modern energy efficiency standards in addition to the newly updated construction and safety standards, Congress authorized the Department of Energy (DOE) to update MH energy efficiency standards through the Energy Independence and Security Act (EISA) of 2007. Additional delays ensued until the DOE finalized an updated rule on August 1, 2022, which adopts the widely recognized 2021 International Energy Conservation Code (IECC), with modifications.[16] HUD adopted the new energy efficiency standards, which were set to take effect on May 31, 2023. Fearing these new standards would raise manufacturing costs, some

[11] See: https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280.
[12] See: https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX.
[13] See: https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280.
[14] See: https://www.federalregister.gov/documents/2021/01/12/2020-28227/manufactured-home-construction-and-safety-standards.
[15] See: https://www.hud.gov/sites/dfiles/Housing/documents/HUD%20Code%20Proposed%20Updates%20Overview%20-%20Fact%20Sheet_071922.pdf.
[16] See: https://www.federalregister.gov/documents/2022/05/31/2022-10926/energy-conservation-program-energy-conservation-standards-for-manufactured-housing.

industry groups recently took legal action to delay and reject implementation of the rule.[17] The DOE has since extended the compliance date for these new standards: for singlewides, manufacturers have until 60 days after the DOE issues enforcement procedures for the new rule, and for multiwides, manufacturers now have until July 1, 2025.[18] Energy efficiency advocates also criticize the rule for not adopting more robust efficiency standards, claiming that the new rule would still represent only a modest improvement from the 1994 rule, and would still make MHs less efficient than site-built homes.[19]

In California, HCD is the primary state agency for enforcing the HUD Code for MHs and MHPs. Local agencies can request permission from HCD to assume regulatory authority over MHPs in their jurisdiction, and about 900 parks in California fall under local government control.[20] HCD is tasked with enforcing building standards for all MHs, both new and existing. For MHs built after June 15, 1976, HCD enforces the federal HUD Code and for MHs built before this date, the state enforces the Manufactured Housing Regulations as outlined in the Title 25, California Code of Regulations § 4000 "Standards for Parks and Recreation Areas."[21] HCD also has delegated federal authority to regulate MH manufacturers within California and enforces the construction and safety regulations via the State Administrative Agency (SAA) program. The SAA submits monthly reports to HUD that detail its oversight activities of MH manufacturers.[22] There are currently nine MH manufacturers in California.[23]

HCD also maintains responsibility for developing and enforcing all other regulations related to registering and modifying MHPs. In 1967, California established the Mobile Home Parks Act (MHPA), authorizing HCD (or local governments, if they request authority) to regulate MHPs to protect the health and safety of park residents.[24] As defined by the MHPA, an MHP is any tract of land that contains two more

---

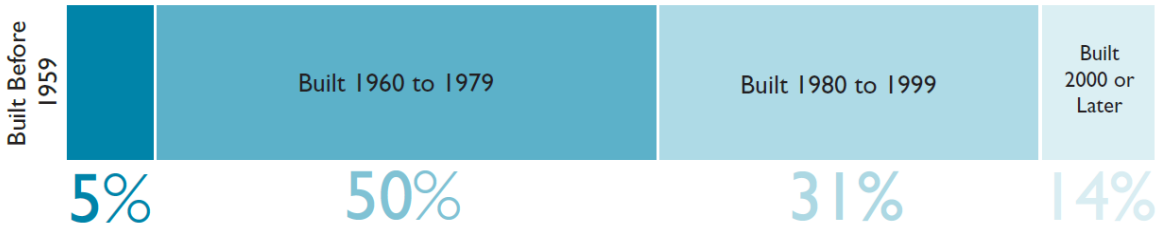
[17] See: https://www.einnews.com/pr_news/617419117/legal-action-filed-on-doe-s-manufactured-housing-energy-rule-per-manufactured-housing-association-for-regulatory-reform.
[18] See: https://www.federalregister.gov/documents/2023/05/30/2023-11043/energy-conservation-program-energy-conservation-standards-for-manufactured-housing-extension-of.
[19] See: https://www.aceee.org/press-release/2022/02/analysis-low-income-residents-would-save-if-doe-strengthened-manufactured and https://www.utilitydive.com/news/doe-manufactured-home-efficiency-rule-energy/624118/.
[20] See: https://insideclimatenews.org/news/02102022/mobile-affordable-housing-wildfires-california/.
[21] See: https://govt.westlaw.com/calregs/Browse/Home/California/CaliforniaCodeofRegulations?guid=I3EBEC0E04C8611ECB533000D3A7C4BC3&originationContext=documenttoc&transitionType=Default&contextData=(sc.Default).
[22] See: https://www.hcd.ca.gov/building-standards/manufactured-and-factory-built/state-administrative-agency.
[23] "2022 Manufactured Housing Facts: Industry Overview," Manufactured Housing Institute, 2022 at 3. See: http://www.manufacturedhousing.org/wp-content/uploads/2022/04/2022-MHI-Quick-Facts-updated-05-2022-2.pdf.
[24] See: https://leginfo.legislature.ca.gov/faces/codes_displayexpandedbranch.xhtml?tocCode=HSC&division=13.&title=&part=2.1.&chapter=&article=.

lots that are rented or leased for MHs, with a few exceptions made for employee housing, accessory dwelling units, and city/county-deemed alternate housing arrangements. MHPs may also be referred to as "manufactured housing communities" (MHCs); this proposal uses the term MHPs to refer to MHPs and MHCs collectively. The MHPA also establishes permits, fees, MHP operator responsibilities, and the role of enforcement agencies. The law authorizes HCD to adopt and enforce regulations for (1) plumbing, gas, and electric systems for MHPs, (2) other common MHP facilities like laundry and bathrooms, and (3) building standards for permanent structures (excluding MHs) in the park. HCD is required to conduct park inspections to ensure that parks comply with the health and safety requirements it establishes, with a minimum goal of inspecting five percent of the state's MHPs each year.

Characteristics of Manufactured Homes in California

HCD reports that 363,449 MH spaces and 4,543 MHPs are currently registered in California.[25] While the majority of MHPs fall under HCD's jurisdiction, local enforcement agencies may choose to assume responsibility for monitoring and enforcing regulations for MHPs in their jurisdiction. While new MHs continue to be built, the majority of MH stock in the state is at least a few decades old, with the majority of MH housing stock built before 1979. The Western Manufactured Housing Communities Association (WMA) reports that approximately 35% of the state's MHs were built before the establishment of the HUD Code.[26]

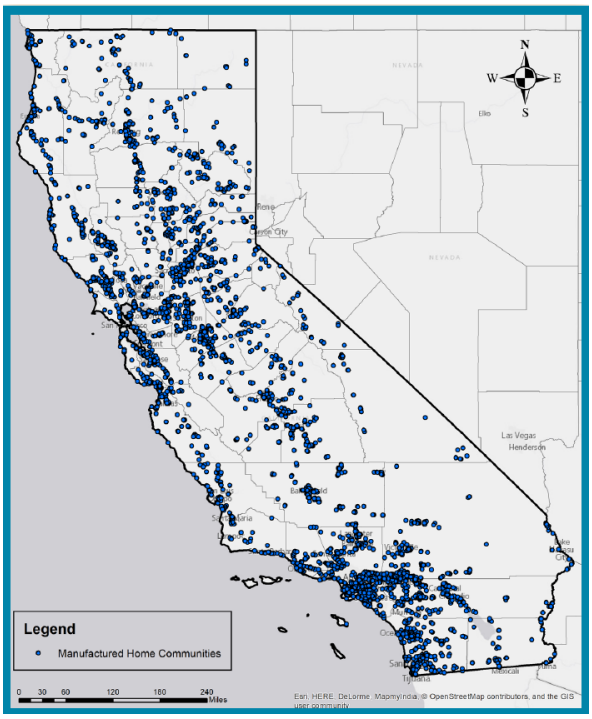
Figure 1: Age Distribution of Manufactured Homes in California[27]



California's MHPs are located disproportionately in the Central Valley, but are also found in large numbers throughout the coastal areas of both the Bay Area and Southern California where population density is highest.

[25] See: https://mhphoa.com/ca/mhp/statistics.
[26] WMA comments on April 2, 2019, at 9.
[27] See: https://prosperitynow.org/resources/california-policy-snapshot.

Figure 2: Distribution of MHPs across California (2017)[28]



As has been the case historically, new MHs are generally much more affordable than new single-family homes. As of October 2022, the average sales price for a new MH in the western U.S. was $86,200 for a singlewide and $167,300 for a doublewide.[29] In comparison, in October 2022, the median price of a single-family site-built home in the western U.S. was $567,400.[30] Construction costs for MHs are generally much lower on a per-square foot basis than for site-built homes, given the cost-efficiencies of producing MHs through a standardized process, and in bulk quantities. Despite the relative affordability of MH construction, this type of housing only made up a small number of new homes in the state: California saw shipments of 4,022 new MH units into the state in 2022, compared to 62,900 single-family home construction starts in the same year.[31]

[28] *Ibid.*
[29] The western U.S. comprises California, Nevada, Oregon, Washington, Idaho, Utah, Arizona, New Mexico, Colorado, Wyoming, Montana, Alaska, Guam, and Hawaii. Manufactured Housing Survey from the U.S. Census Bureau. See: https://www2.census.gov/programs-surveys/mhs/tables/time-series/mhstabavgsls.xlsx.
[30] See: https://fred.stlouisfed.org/series/MSPW.
[31] See: https://journal.firsttuesday.us/the-rising-trend-in-california-construction-starts/17939/ for single family construction starts and https://www2.census.gov/programs-surveys/mhs/tables/time-series/annual_shipmentstostates.xlsx for manufactured home shipments.

Manufactured Home Resident Demographics

Seniors and low-income households make up a large percentage of MH residents in California. The median income of MH residents is less than half of the median income of all homeowners in the state.[32] Seniors make up more than a third (38%) of all MH owners, compared to 29% of all homeowners across the state. Ownership rates are higher for MH residents, with 72% owning their homes compared to only 54% of residents in all other housing types. MH owners in California are white (53%), Asian (29%), Latino (4%), and Black (2%), with the remainder unspecified (13%).[33]

MH households also face a higher energy burden than individuals living in other housing types, meaning that they spend a larger percentage of their overall income on energy costs. Nationally, about 25% of MH households spent more than 10% of their income on energy costs, and 45% of MH households spent more than 6% of their income on these same costs.[34] In comparison, the median spending on energy costs of non-low-income households is around 2.3% of total household income.[35] Part of this may be attributable to the fact that MHs are less energy efficient than site-built homes, due to a variety of factors such as less stringent energy efficiency building standards, homes being generally older and in worse condition, and owners not having the financial resources to make necessary repairs or upgrades. A study by ACEEE found that MH residents on average pay twice as much for energy costs on a per-square foot basis than individuals living in site-built homes.[36]

MHP Distribution by Investor-Owned Utility Territory

MHPs across the state receive utility services through both investor-owned utilities (IOUs) and public-owned utilities (POUs).[37] Most MHPs receive both electric and gas service, although parks in rural areas may rely on propane if they do not have access to gas distribution infrastructure. The table below shows the distribution of MHPs served by IOUs. Pacific Gas and Electric Company (PG&E) and San Diego Gas and Electric Company (SDG&E) are the only two IOUs that offer both gas and electric services, although in some parks they may only offer only gas or electric service. Southern California Edison Company (SCE), PacifiCorp, Liberty Utilities (Liberty), and Bear Valley Electric Service (BVES) only offer electric services, while Southern California Gas Company (SoCalGas) and Southwest Gas Corporation

[32] "California – Affordable Housing Need & the Role of Manufactured Housing," Prosperity Now, 2017, at 2.
[33] *Ibid* at 3.
[34] See: https://www.aceee.org/research-report/u2006 at 38.
[35] *Ibid* at 5.
[36] See: https://www.aceee.org/research-report/a124 at 12.
[37] IOUs are regulated by the CPUC. POUs are regulated by local governments.

(SWG) only offer gas services. Some MHPs are served by a combination of these single-fuel utilities (e.g., a park may receive electric service from SCE and gas service from SoCalGas). PG&E, SDG&E, SCE, and SoCalGas are California's largest IOUs and provide the bulk of gas and electric services to MHPs. The table below depicts the approximate number of parks and spaces served by each utility.

Table 1: IOUs serving Master-Metered MHPs and MHP spaces[38]

	SCE	PG&E	SoCalGas	SDG&E	SWG	PacifiCorp	Liberty	BVES
Number of MHPs/MHCs -Electric Only	1,308	540		259		14	17	7
Number of MHPs/MHCs -Gas Only		213	1,425	114	57			
Number of MHPs/MHCs -Both Electric and Gas		630		321				
Total Number of MHPs/ MHCs	1,308	1,383	1,425	694	57	14	17	7
Total Number of Spaces per Utility	108,965*	105,318	120,017*	34,597	3,308	507	633	608

*SCE and SoCalGas updated the number of spaces in their respective territories after D.14-03-021 was published. Source: CPUC Safety and Enforcement Division (SED).

2.2 The MHP Program

In 2010, WMA petitioned the CPUC to review why more MHPs had not taken advantage of the path to utility conversion available through the Public Utilities (Pub. Util.) Code Sections (§§) 2791-2799. In response, the CPUC opened R.11-02-018 to "examine what the Commission can and should do to encourage the replacement by direct utility service of the master-meter/submeter systems that supply

[38] D.14-03-021 at 14, with the exception of SCE and SoCalGas, who updated their numbers after the publication of this decision.

electricity, natural gas, or both to mobilehome parks and manufactured housing communities located within the franchise areas of electric and/or natural gas corporations."

On March 14, 2014, the CPUC adopted D.14-03-021, establishing the MHP Pilot, which began in January 2015. The MHP Pilot authorized each of the eight California IOUs (SCE, PG&E, SDG&E, SoCalGas, SWG, BVES, Liberty, and PacifiCorp) participating in the program to convert to direct utility service 10 percent of master-metered gas and/or electric MHP spaces within its operating territory, which equates to approximately 3.33 percent per year. The MHP Pilot provided funding for both TTM and BTM construction, and it prioritized conversion of gas systems over electric-only conversions. The MHP Pilot also encouraged participation of utility providers other than CPUC-regulated gas and electric utilities (e.g., communication providers, POUs, etc.), in order to realize overall efficiencies through shared trenching activities and costs. D.14-03-021 allowed utilities to enter actual program costs in a balancing account, and to recover both TTM and BTM costs in General Rate Cases (GRCs).

A new proceeding, R.18-04-018, was initiated on April 26, 2018, in order "to undertake a comprehensive evaluation of the MHP Pilot and determine based upon that evaluation whether the program should be adopted as a permanent MHP Utility Program on a going forward basis and if so, under what provisions and guidelines." Staff evaluated the MHP Pilot in a June 19, 2018 Staff Report, and found that the MHP Pilot met its objectives and recommended its continuation based on the overarching goals for the MHP Pilot to improve safety and reliability of electric and gas utility service, the findings in Resolution E-4878 (which extended the MHP Pilot in 2017), and the IOUs' MHP Pilot annual reports. At the same time, staff proposed several refinements for a permanent program.[39] On April 16, 2020, the CPUC adopted D.20-04-004, which established a 10-year MHP Program beginning in 2021 that primarily relied on existing pilot program requirements and features, but also included some needed adjustments to expand eligibility and establish annual target conversion rates and cost targets.

MHP Program Details

The major components of the MHP Program, in order, are:

1. Outreach and education;
2. A standard application period of not more than 90 days and a waiting list for applications received beyond that period or that exceed the MHP Program's space conversion threshold;

[39] June 21, 2018 ALJ Ruling at 23-31. See: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M216/K738/216738181.PDF.

3. Submission by applicants of a standard, initial Form of Intent (FOI);
4. Prioritization of initial applications by SED, based on the risk assessment and prioritization factors developed by SED, and for electric systems, based on consultation with SED, HCD, or its local agency designee;
5. A standard, detailed application that requests the information necessary for engineering and planning by electric and gas corporations;
6. A standard conversion program agreement, executed by the MHP or manufactured housing community owner and the electric and/or gas corporation;
7. An engineering and planning phase;
8. A "to the meter" and "beyond the meter" construction phase, concurrent where possible; and
9. System cutover, following completion and inspection of the new distribution infrastructure.

MHPs with sub-metered gas and/or electrical systems are eligible for conversion to direct utility service through the MHP Program. For electrical system conversions, MHPs receive infrastructure upgrades to support 100-amp service; any costs exceeding service size must be borne by the MHP owner. The only instances in which an MHP receives a service above 100 amps is when an MHP previously received a higher standard (e.g., 200 amps); in these scenarios, the program will cover costs to maintain the same level of electric service.[40,41]

The work performed in the MHP Program is divided into two categories: TTM and BTM upgrades. For the electrical infrastructure in this program, TTM infrastructure includes all components of the distribution system within the MHP, including but not limited to transformers, distribution cables, conduit that houses these cables, splice boxes, and the electric meter that utilities use to measure a home's electric usage. Before conversion, the infrastructure is owned and maintained by the MHP owner. After conversion, the IOUs will own, operate, and maintain all TTM infrastructure while the MHP owner continues to own the BTM infrastructure. For the purposes of the MHP Program, BTM infrastructure comprises everything past the meter, including the electric pedestal where the meter is installed, conduit and cables from the pedestal leading to the home, and the junction box, which houses the connections between the upgraded cable from the pedestal and the old cable leading into the home.

[40] "HCD Mobilehome Park Utility Upgrade Program – Installation and Inspection Guidelines," at 7.
[41] Utilities specify 100-amp service standards, and that MHP owners must pay for upgrades for larger service, in their advice letters detailing program implementation specifics. PG&E: AL 3500-G/4466-E, p.44; SCE: AL 3088-E, p. 27; SDG&E: AL 2634-E/2314-G, p. 50; BVES: AL 287-E, p. 40; Liberty AL 37-E, p. 39; and PacifiCorp: AL 508-E, at 58.

Figure 3: Trench for TTM Infrastructure (left) and Pedestal in front of a MH (right)[42]

Per D.20-04-018, the IOUs are responsible for covering the costs of all TTM upgrades directly, including materials, labor, and engineering and planning work. The MHP owner is responsible for selecting a contractor to perform BTM work and must pay for these costs upfront. The utility will then reimburse the MHP owner for all BTM costs excluding any costs for permits (besides encroachment permits for trenching), MH modification or retrofits, services to common areas, service relocations, rearrangements, upgrades, or anything not included in the MHP agreement that is signed between the utility and the MHP prior to commencing work.

Risk Prioritization Criteria and Priority Lists

MHPs are prioritized for conversion based on the current state of each park's existing master-metered gas and/or electric distribution systems. The risk analysis considers each system's probability of failure as well as the consequences of such failures. The prioritization system considers the risks of gas systems and electric systems independently. Self-reported data is gathered from the MHP owner through the

[42] Photos courtesy of PG&E's MHP Program staff.

standard application document, called the Form of Intent (FOI). Additional data is gathered from: (1) MHP safety inspection records from the CPUC's Safety and Enforcement Division (SED), (2) MHP annual reports filed with SED regarding gas distribution systems, and (3) HCD's MHP registration database. The factors affecting risk include – but are not limited to – park size, park occupancy, gas pipe material, gas operating pressure, leak history, gas system and electric system installation dates, electric system capacity, and average summer temperatures. SED also considers any known incidents or natural disasters that may have affected the system, as well as any supplemental data that the MHP owner submits for consideration. The placement of an MHP on the conversion priority list can be appealed by the MHP owner or a participating utility. SED reviews all appeals, determines whether the risk of system failure has changed, and communicates any placement change to the MHP owner and participating utilities. Priority can also be changed if the MHP experiences system failure due to a natural disaster or other large-scale catastrophe.

SED maintains a list of all MHPs that have applied to the program, prioritized from highest risk to lowest risk using the above criteria. The highest risk parks that SED expects to convert in the first application cycle of the MHP program (which runs through December 31, 2024) are classified as Category 1 parks.[43] The remaining parks, which are not expected to be converted during the first application cycle of the program, are classified as Category 2 parks. SED provides each IOU with a ranked list of Category 1 and Category 2 parks in their respective territories; IOUs are then expected to use these lists to target outreach and conversion efforts, starting with the highest risk, Category 1 parks.

MHPs in the Program Queue

The table below shows the numbers of applicant parks and spaces in the territories of the IOUs:

[43] D.20-04-004 directs the CPUC's SED and Energy Division to conduct a MHP Program Evaluation after the first application cycle ends, beginning in 2025, to determine whether to continue or modify the program.

Table 2: Number of Gas and Electric Parks and Spaces by IOU

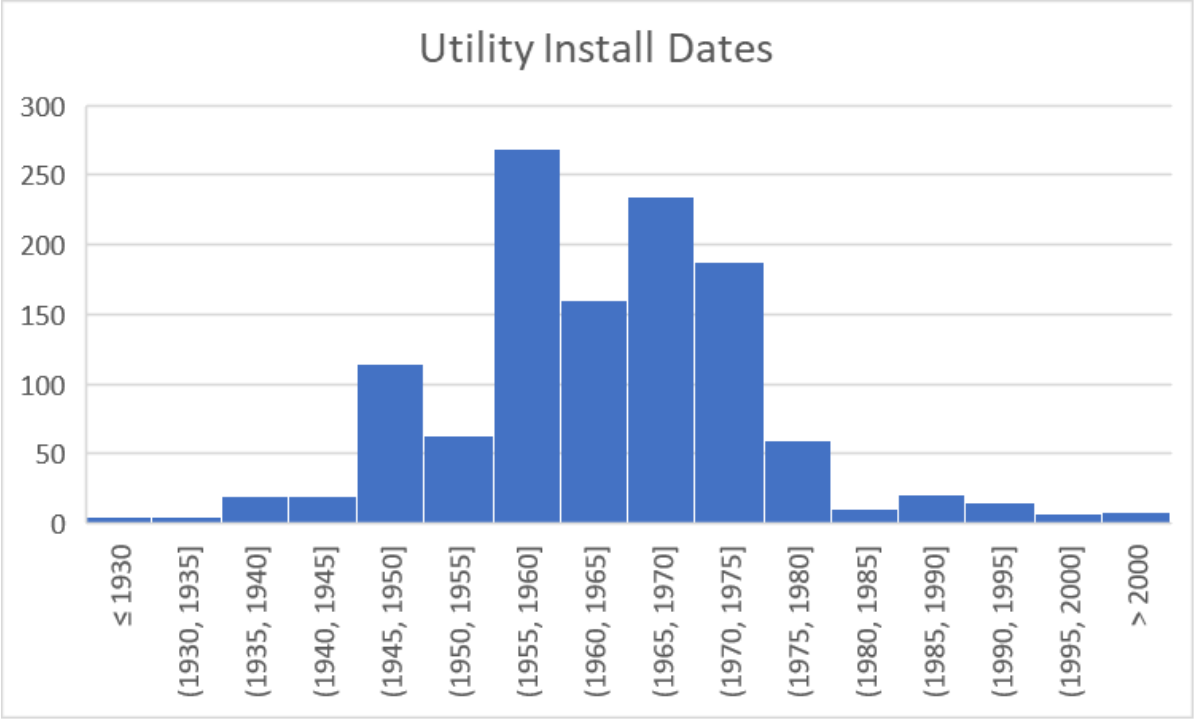
Utility	# of Parks with only Gas supplied by an IOU	# of Spaces with only Gas supplied by an IOU	# of Parks with only Electricity supplied by an IOU	# of Spaces with only Electricity supplied by an IOU	# of Parks with Gas and Electricity supplied by the same IOU	# of Spaces with Gas and Electricity supplied by the same IOU
BVES	-	-	5	288	-	-
Liberty	-	-	7	204	-	-
PacifiCorp	-	-	7	278	-	-
PG&E	75	8,060	192	12,819	382	46,081
SDG&E	2	306	27	2,228	113	14,552
SoCalGas	663	81,845	-	-	-	-
SCE	-	-	561	66,965	-	-
SWG	24	1,805	-	-	-	-

Of the 1,477 MHPs on the current list, 202 parks comprising 12,403 spaces are classified as "Electric Only," meaning that they are not served by a gas IOU. There are 183 parks comprising 22,408 spaces classified as "Gas Only," meaning they are not served by an electric IOU. "Electric Only" or "Gas Only" parks may, however, receive gas or electric service, respectively, from a POU that does not participate in the MHP Program, or they may be served by a propane system in lieu of gas service.

SED collects various risk data from the submitted MHP Program applications and through gas safety inspection data, including the install date of the utility systems. This data is an adequate approximation for the "build date" of an MHP, as most utility systems are installed while the park is being built. A total of 1,196 parks on the current list were able to provide an accurate utility system installation date. The histogram below shows the reported installation dates of the utility systems across MHPs. Figure

3 shows the number of MHPs across ranges of energy system installation dates, with the majority of systems installed between 1955-1975.

Figure 4: Gas and/or Electric System Installation Dates for MHPs in the MHP Program



Conversion Targets and Progress

The 10-year MHP Program aims for the largest IOUs (SCE, SDG&E, SoCalGas, and PG&E) to convert 50% of all eligible MHP spaces in their respective territories by 2030. The smaller utilities have a target of converting 100% of their spaces by 2030. These targets include any conversions that occurred during the three-year pilot that began in 2015. D.20-04-004 also sets annual conversion rate targets: 3.33% of all spaces in SCE, SDG&E, and SoCalGas service territory, and 2.5% for PG&E. The smaller utilities, PacifiCorp, BVES, and Liberty have a target of converting at least one MHP per year, and SWG has a target of 450 spaces per year.

The table below illustrates each of the large IOU's progress through the end of 2022. Among the smaller IOUs, Liberty has converted one park (61 spaces), PacifiCorp has converted four parks (171 spaces), and BVES has converted one park (250 spaces.)[44]

Table 3: Spaces and Parks Converted, MHP Program through end of 2022[45]

	PG&E		SDG&E		SCE		SoCalGas		SWG	
Total # Spaces Converted	12,991		7,521		17,648		22,534		1,597	
2030 Target (# spaces)	60,009		17,299		54,483		64,616		3,308	
% Target	22%		43%		32%		35%		48%	
Total # Parks Converted	158		65		268		303		25	
	# spaces	% total	# spaces	% total	# spaces	% total	# spaces	% total	# spaces	% total
In DAC	3,400	26%	0	0%	8,207	47%	10,036	45%	866	54%
CARE/FERA	4,130	32%	3,362	45%	8,279	47%	9,196	41%	528	33%
Medical Baseline	435	3%	373	5%	262	1%	75	0%	8	1%
Urban	10,326	79%	5,524	73%	17,350	98%	19,404	86%	1,525	95%
Rural	1,350	10%	0	0%	57	0%	0	0%	270	17%
Total Conversion Costs	$482,267,113		$216,794,143		$266,556,764		$206,472,539		$18,784,929	
Average Cost per space	$37,123		$28,825		$15,104		$9,163		$11,763	

According to the Annual Reports required by D.14-03-021 and D.20-04-004, between the beginning of the program and the end of 2022, the total conversions across all utilities are:

[44] Due to the voluntary nature of the MHP Program, utilities cannot compel MHPs to participate. These smaller utilities have fewer total parks in their service territories, and only a few of these parks have chosen to complete conversions through the MHP Program.

[45] These numbers include all conversions completed from the start of the MHP Pilot in 2015, and include all MHP Program conversions through the end of 2022. See: 2022 Annual reports from each IOU, Mobilehome Park Utility Conversion Program.

Table 4: Total Completed Spaces in the MHP Program, through the end of 2022

Gas To-The Meter	41,475
Gas Beyond-The Meter	36,514
Electric To-The Meter	38,696
Electric Beyond-The Meter	35,227

Budget and Cost Recovery

D.22-04-004 does not set a hard budget cap for the MHP Program, and instead uses conversion targets as proxies for limiting annual costs. However, the decision does outline annual soft targets for the large utilities at $183 million total, with caps for PG&E at $80 million, SDG&E at $34 million, SCE at $53 million, and SoCalGas at $42 million. The small utilities' caps are: SWG at $5.2 million, PacifiCorp at $0.8 million, Liberty at $1.4 million, and BVES at $2.1 million. These caps are meant to evaluate the reasonableness of utility expenditures in their GRCs. Both TTM and BTM costs are treated as capitalized expenses for the purposes of rate recovery approved in each IOU's respective GRC.

2.3 Building Decarbonization

California prioritizes building electrification as a major strategy to achieve its decarbonization and climate goals, with an emphasis on prioritizing vulnerable and under-resourced communities in this transition.[46] CARB reports that residential and commercial buildings combined contribute to 14% of the state's overall GHG emissions, the third largest source after the transportation (38%) and industrial sectors (23%).[47]

Policy direction toward building electrification has been forged by state legislation in the last five years. California accelerated its climate goals with the passage of Senate Bill (SB) 100 (de León, 2018), which set a goal of 100% zero-carbon electricity by 2045, and the signing of Executive Order B-55-18, in which

[46] California Energy Commission 2018 Integrated Energy Policy Report; Order Instituting Rulemaking for R.19-01-011; and California Air Resources Board 2022 Scoping Plan, Appendix F: Building Decarbonization.
[47] See: https://ww2.arb.ca.gov/ghg-inventory-data.

Governor Brown established a statewide goal of achieving carbon neutrality by 2045.[48,49] That same year, the state passed two bills related directly to building decarbonization: Assembly Bill (AB) 3232 (Friedman, 2018) and SB 1477 (Stern, 2018). AB 3232 directed the CEC to assess how to reduce GHG emissions from residential and commercial buildings by 40% of 1990 levels by 2030.[50] As a result, in 2021 the CEC released its *California Building Decarbonization Assessment*, outlining the pathways and barriers to achieving this goal. SB 1477 required the CPUC to work with the CEC to establish two programs for spurring building electrification adoption across the state: the Building Initiative for Low-Emissions Development (BUILD) Program and Technology and Equipment for Clean Housing (TECH) Initiative. The BUILD Program offers incentives for building decarbonization in new building construction, particularly for low-income housing, while the TECH Initiative seeks to encourage market transformation for building electrification technologies.[51] These two programs were funded using $200 million of gas IOU Cap-and-Trade allocated allowance auction proceeds (auction proceeds) over four years. In recognition of the barriers to building and vehicle electrification, the state also passed SB 68 (Becker, 2021), directing the CEC to develop resources to overcome barriers to electric service and panel upgrades and set aside funding for developing technology to reduce building electrification costs.[52] In its 2022-23 State Budget, California set aside up to $922 million of General Funds for the CEC to establish the Equitable Building Decarbonization (EBD) program, aimed at providing direct installations and rebates to electrify existing buildings.[53] Additionally, AB 179 amended the Budget Act of 2022 to authorize an additional $50 million of General Funds to go toward the existing TECH program. [54]

Existing CPUC Programs

The CPUC has established numerous programs dedicated to accelerating building electrification. Notably, the CPUC is exploring this topic in its primary building decarbonization proceeding (R.19-01-011), which approved the aforementioned BUILD Program and TECH Initiative in D.20-03-027. R.19-01-011 later established the Wildfire and Natural Disaster Resiliency Rebuild (WNDRR) Program, a 10-year, $50 million program aimed at incentivizing customers who lose their homes to natural disasters to rebuild all-

[48] See: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB100.
[49] See: https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf.
[50] See: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB3232.
[51] See: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB1477.
[52] See: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB68.
[53] See: https://www.energy.ca.gov/publications/2023/equitable-building-decarbonization-direct-install-program-draft-guidelines at 3.
[54] See: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB209.

electric homes. Most recently, proceeding R.19-01-011 passed D.22-09-026 which eliminated gas line extension allowances, refunds, and discounts in an effort to align CPUC policies with Title 24 Building Energy Efficiency Standards and Title 20 Appliance Efficiency Standards. Phase 4 of R.19-01-011 is scoped to establish a broad building decarbonization policy framework. Other building decarbonization-related decisions at the CPUC include, but are not limited to:

- **Wildfire Rebuild Programs:** The CPUC has approved a number of post-wildfire rebuild programs other than WNDRR that focus on rebuilding all-electric homes. This includes the Advanced Energy Rebuild program between PG&E and Sonoma Clean Power (AL 3928-G/5219-E) to incentivize new, energy-efficient and potentially all-electric homes Sonoma and Mendocino communities; the program was later extended (AL 4068-G/5479-E) to areas affected by the 2018 wildfires. The Clean Energy and Resiliency Rebuild program (AL 3993-E) approved a similar rebuild program in SCE service territory.
- **San Joaquin Valley (SJV) Affordable Energy Pilots** (D.18-12-015): These pilots seek to enroll households in disadvantaged communities who lack access to gas service into a pilot program that will fully electrify their homes at no direct cost. The $56 million pilot focuses on 11 SJV communities and will undergo a thorough impact evaluation and economic feasibility assessment to gauge the costs and benefits of such a program. The results will inform whether the CPUC will modify and/or expand the program to other SJV communities.
- **Heat Pump Water Heater (HPWH) incentives:** The CPUC has enabled wider deployment of HPWHs through increased incentives. In D.19-06-032, the CPUC officially recognized HPWHs as a type of thermal energy storage pursuant to Public Utilities Code Section 2835. A subsequent decision, D.19-09-027, added $4 million in Self-Generation Incentive Program (SGIP) equity incentives for HPWH deployment, followed by D.20-01-021, which provided $40.7 million in additional general market SGIP HPWH funds. Most recently, D.22-04-036 added another $40 million from gas Cap-and-Trade auction proceeds, $19 million of which are set aside for equity incentives, to the SGIP HPWH program, bringing the total budget to $84.7 million.
- **Fuel-Substitution Test** (D.19-08-009): This decision eliminated the "three-prong test," a now-retired set of three criteria that evaluated whether fuel switching technologies (e.g., from gas to electric) could qualify for energy efficiency funding. The decision replaces this test with a newer "fuel substitution test" that makes it easier to fund fuel switching programs, requiring that such projects save on overall energy and result in a smaller environmental impact. Removing this funding

barrier allows for more opportunities for adoption of building electrification technologies. Thus far, tens of millions of dollars have been approved through the energy efficiency portfolio for funding fuel substitution measures, including HPWH and heat pump space heating and cooling, in new construction and existing buildings.

- **Gas Infrastructure General Order** (D.22-12-021): This decision approves a new General Order (GO 177) that enables the Commission to closely review newly proposed gas projects. The decision requires utilities to prove the need for such projects, to disclose these projects' environmental impacts, and to detail engagement efforts with communities impacted by these projects. This new framework will allow better coordination between gas system planning and building decarbonization efforts and will ensure that new gas infrastructure investments are only built where and when necessary. This decision is part of an ongoing proceeding, R.20-01-007, which addresses long-term gas infrastructure planning, relevant questions about gas transmission and distribution infrastructure, and gas demand.[55]

Sister Agencies Also Prioritize Building Decarbonization and Equity

The CEC and CARB recognize building electrification as one of the most effective ways to reduce the carbon intensity of the state's existing building stock. To achieve the state's GHG reduction goals, the CEC recommends that the state install at least six million heat pumps in buildings across the state by 2030 to achieve a target of three million all-electric homes by 2030 and seven million by 2035. Notably, Governor Newsom adopted these exact goals in his July 22, 2022 letter to CARB Chair Liane Randolph, urging CARB to incorporate them into their final 2022 Scoping Plan.[56] The CEC also recommends that decarbonization efforts focus on existing buildings in low-income and disadvantaged communities, with an emphasis on maximizing health and affordability.[57] To this end, the CEC's EBD program will focus on direct-installation efforts and state incentive programs to retrofit existing buildings, with most funding reserved for low-income and under-resourced communities. The EBD program guidelines for its direct-install program specifically target MHs for installation measures, requiring that at least five percent of the program budget go toward MHs.[58] The CEC has also advanced building electrification priorities in its update to the California Energy Code (Title 24, Part 6), which sets standards for newly constructed buildings and retrofits.

---

[55] See: https://apps.cpuc.ca.gov/apex/f?p=401:56:::RP,57,RIR:P5_PROCEEDING_SELECT:R2001007.
[56] See: https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf.
[57] CEC's 2021 IEPR: Volume 1, at 180-181. See: https://efiling.energy.ca.gov/GetDocument.aspx?tn=241599.
[58] See CEC's Equitable Building Decarbonization program draft guidelines at 11: https://www.energy.ca.gov/publications/2023/equitable-building-decarbonization-direct-install-program-draft-guidelines.

The 2022 Energy Code, effective January 1, 2023, includes requirements for heat pump HVAC and water heaters, solar photovoltaic systems and battery storage, and electrification-readiness requirements.

CARB similarly identifies building decarbonization as a central strategy in its 2022 Scoping Plan, which lays out the state's plans for achieving carbon neutrality by 2045. The plan offers a broad analysis of existing barriers and broad-reaching strategies to decarbonize buildings. In line with the CEC's recommendations, CARB identifies the need to focus on existing homes, particularly "affordable and low-income household retrofits that improve habitability and reduce expenses…and pair decarbonization with other critically needed renovation efforts to ensure that buildings support human health and are climate- and weather-resistant."[59] To further this effort, in September 2022, CARB approved a proposed measure to develop and propose zero-emission standards for space and water heaters beginning in 2030.[60]

Federal Efforts

The Biden-Harris administration has centered electrification as part of its climate agenda. A centerpiece of these efforts was the passage of the 2022 Inflation Reduction Act (IRA), which authorized over $50 billion in funding toward clean energy technologies, of which $582 million will be allocated to California for building decarbonization incentives. The IRA created the Homeowner Managing Energy Savings (HOMES) rebate program and the High-Efficiency Electric Home Rebate (HEEHRA) program, focused on point-of-sale incentives. In December 2022, the Administration also released the first *Federal Buildings Performance* Standard, which sets a goal to electrify 30% of building space owned by the Federal government by 2030.[61]

Local Efforts

Local jurisdictions are pioneering ambitious building electrification policies that exceed state and federal standards. Over 60 jurisdictions have adopted "reach" standards as part of their building codes, which exceed the standards set in the California building code. In 2019, the City of Berkeley was the first to ban gas infrastructure in new buildings; since then, over 50 cities and counties have mandated similar

[59] 2022 CARB Scoping Plan, at 231. See: https://ww2.arb.ca.gov/sites/default/files/2022-12/2022-sp.pdf.
[60] For information on CARB's 2022 State Strategy for the State Implementation Plan at 102-103, see: https://ww2.arb.ca.gov/sites/default/files/2022-08/2022_State_SIP_Strategy.pdf. For information on CARB's adoption of this plan, see: https://ww2.arb.ca.gov/news/california-adopts-comprehensive-strategy-meet-federal-ozone-standard-over-next-15-years.
[61] See: https://www.whitehouse.gov/briefing-room/statements-releases/2022/12/07/fact-sheet-biden-harris-administration-announces-first-ever-federal-building-performance-standard-catalyzes-american-innovation-to-lower-energy-costs-save-taxpayer-dollars-and-cut-emissions/.

requirements.[62,63] Local programs add to this momentum through building electrification retrofit programs and incentives, including the Bay Area Regional Energy Network's offerings of multiple electric appliance rebates in the San Francisco Bay Area, and Sacramento Municipal Utility District's (SMUD) Home Performance Program that offers home electrification upgrade packages. On March 15, 2023, the Bay Area Air Quality Management District voted to adopt regulations to eliminate nitrogen oxide from residential and commercial buildings, effectively banning the sale of gas-fired water heaters and furnaces before 2030.[64] BAAQMD's updated regulations include gas-fired MH water heaters, but exclude gas-fired MH furnaces from the more stringent emissions requirements.[65]

[62] See: https://www.naturalgasintel.com/another-california-county-bans-natural-gas-hookups-beyond-state-code/.
[63] The City of Berkeley's "gas-ban" ordinance is currently being litigated. In April 2023, the Ninth U.S. Circuit Court of Appeals in San Francisco overturned the ordinance. The City of Berkeley has since filed a petition for rehearing to challenge the Court's April 2023 ruling. See: https://www.berkeleyside.org/2023/06/09/berkeley-gas-ban-city-seeks-rehearing.
[64] See: https://www.baaqmd.gov/rules-and-compliance/rule-development/building-appliances.
[65] For BAAQMD's regulations on gas-fired MH furnaces, see Regulation 9, Rule 4 at 3: https://www.baaqmd.gov/~/media/dotgov/files/rules/reg-9-rule-4-nitrogen-oxides-from-fan-type-residential-central-furnaces/2021-amendments/documents/20230315_rg0904-pdf.pdf?la=en.
For BAAQMD's regulations on gas-fired MH water heaters, see Regulation 9, Rule 6 at 4: https://www.baaqmd.gov/~/media/dotgov/files/rules/reg-9-rule-4-nitrogen-oxides-from-fan-type-residential-central-furnaces/2021-amendments/documents/20230315_rg0906-pdf.pdf?la=en.

3. Challenges

This "Challenges" section of the Staff Proposal addresses the barriers to full electrification of MHPs as they specifically relate to electric service size and costs for full remediation measures. First, Staff address how a 100-amp standard is inadequate for MH electrification and future EV charging. Second, Staff explain the potential added costs of adopting full, in-home electrification measures, including remediation, and installing new, all-electric appliances. Finally, Staff discuss the need to fund BTM electrification measures using non-ratepayer dollars, in order to avoid putting upward pressure on electric rates.

3.1 A 100-amp Electrical Service Standard May Be Insufficient

The MHP Program's current 100-amp electrical service standard presents a barrier to the full electrification and installation of in-home vehicle charging in MHs in the future.

An MH's "electrical service" refers to the conductors, cables, and other equipment that transfer power from the wider electrical grid to the home. The load capacity of an electrical service is the total amount of power that can be delivered to the home by the electrical service and is measured in amperes ("amps"), a measure of how much electric current flows through the electrical service. In the current MHP Program, the installed TTM and BTM infrastructure is designed to deliver 100-amp service to each MH lot. For reasons discussed below, a 200-amp service standard will better serve MHPs now and in the future because of higher expected electrical loads due to home electrification and electric vehicle charging. Future photovoltaic (PV) solar system installations may also trigger the need for 200-amp service.

It is important to note that electrical service capacity should be distinguished from electrical panel capacity. An electrical panel is a piece of equipment in a home that distributes the electricity delivered by a utility to different circuits in one's home, such as outlets, switches, and lights. An electric panel is rated to handle a certain level of current (measured in amps). While an electric panel's capacity often matches the electrical service capacity of a home, they are not always the same size. The amount of power supplied to a home is ultimately limited by the electrical service capacity (i.e., one cannot install a 200-amp electrical panel if the electrical service capacity can only accommodate 100 amps). A home can, however, have a larger

electrical service (e.g., 200 amps) but still have a smaller panel capacity (e.g., 100 amps). This section of the Staff Proposal focuses only on electrical service capacity, not electrical panel capacity.

Although 100-amp service may serve the needs of MHs now, future electrification efforts may require increased service capacity. Fully electrified homes rely solely on electric appliances and do not use any equipment that relies on alternative energy sources such as gas or propane. This means that appliances that rely on other fuels (typically gas) – such as furnaces, water heaters, stoves, ovens, and clothes dryers – are instead replaced with electric equivalents, ideally the most energy-efficient appliances, such as two-way heat pumps, heat pump water heaters, induction stoves, and heat pump clothes dryers. As a result, a fully electrified home will generally consume more electricity than a dual fuel home that uses both gas and electricity, thus increasing a home's overall electrical load.

To calculate the size of a home's electrical service necessary to serve all its appliances and lighting needs, electricians use a tool called an electrical load worksheet. This tool combines individual electrical loads and their use patterns to find out a home's total electrical load, which is measured in volt-amperes (VA) . Because the worksheet's purpose is to ensure the safety of a home's electrical system, the load calculations add in a safety margin when it comes to calculating a home's total electrical load. The National Fire Protection Association (NFPA) releases updates to the National Electric Code (NEC) every three years, which provides guidance on what calculations to use in an electrical load worksheet. The NEC is widely adopted by state and local jurisdictions; California is one of 28 states that has adopted the 2020 NEC code.[66] The NEC details these calculations in Article 220. HCD's Division of Codes and Standards also provides its own "Manufactured Home Electrical Load Worksheet" (see Appendix A), based off the NEC.

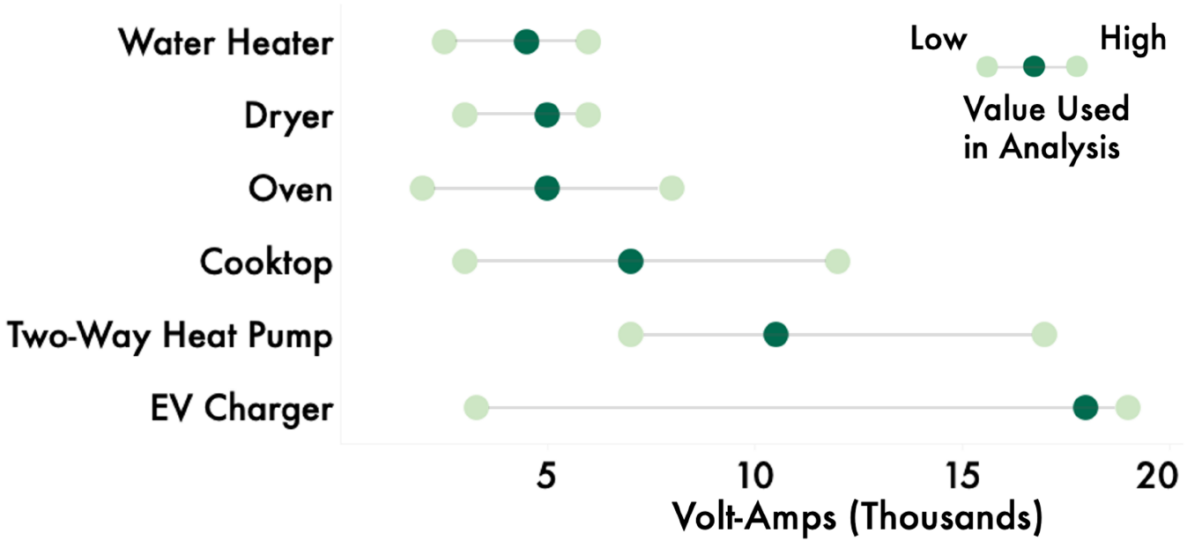
Notwithstanding PV solar, storage, and EV charging needs, the main factors affecting the calculated electrical load are the size of a home, the nameplate electrical load of an appliance, the number of electrical appliances, and the number of dedicated branch circuits (e.g., circuits serving small appliances like microwaves, and the outlets they are plugged into). Electrification would mean adding more electric appliances, which may have a wide range of nameplate capacities. California's recent ban on the sale of new gas-powered vehicles by 2035 and the state's general push for vehicle electrification will likely spur increased adoption of vehicle charging infrastructure.[67] Given that 80% of EV owners prefer to charge their cars at

[66] See: https://www.nfpa.org/NEC/NEC-adoption-and-use/NEC-adoption-maps for adoption of NEC versions across the U.S.
[67] See: https://ww2.arb.ca.gov/news/california-moves-accelerate-100-new-zero-emission-vehicle-sales-2035.

home, it is likely that EV charging will have a large impact on a home's load.[68] There are two types of EV chargers typically installed in homes: Level 1 and Level 2 chargers. Level 1 chargers plug into a normal 110-volt or 120-volt outlet and can typically charge about 5 miles per hour, whereas Level 2 chargers typically require 208- to 240-volt outlets and can charge 14 to 35 miles in an hour.[69] Level 2 chargers can operate at up to 80 amps, but most residential charging operate at a lower amperage, averaging around 30 amps. EV owners demonstrate a preference for Level 2 chargers for their faster rate of charging, with 68% of owners indicating that they have a Level 2 charger installed at home.[70]

The chart below shows the variability of nameplate loads for common electric appliances, including EV chargers, which demonstrate the highest variability in load:

Figure 5: Electric Load Ranges of Home Appliances[71]



In order to estimate a typical all-electric MH's load, the CPUC ordered the IOUs to submit sample load calculations in response to this proceeding's April 2022 "ALJ Ruling Seeking Information on Estimated Mobilehome Park Conversion and Upgrade Costs."[72] Using the NEC's Standard Method for load

[68] See: https://www.nrel.gov/docs/fy21osti/78540.pdf at 4.
[69] See: https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/electric-vehicle and https://calevip.org/electric-vehicle-charging-101
[70] See: https://www.jdpower.com/business/press-releases/2023-us-electric-vehicle-experience-evx-home-charging-study.
[71] Source: "Addressing an Electrification Roadblock: Residential Electric Panel Capacity," at 7, Pecan Street, August 2021. https://www.pecanstreet.org/publications/addressing-an-electrification-roadblock-residential-electric-panel-capacity/.
[72] See: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M469/K615/469615270.PDF.

calculations, PG&E and SCE assumed the following conditions. (See Appendix B and C for exact load calculations.)[73]

Table 5: Sample Load Calculations for an All-Electric Manufactured Home

PG&E	**SCE**
Assumption: 1,440 square foot home in coastal California	Assumption: 1,200 square foot home[74]
Appliances: • Electric resistance water heater • Electric range* • Level 2 electric vehicle charger • Electric furnace and electric air conditioner[75] • Electric clothes dryer • Other loads: refrigerator, garbage disposal, and dishwasher, and lights	Appliances: • Heat pump water heater • Electric range* • Level 2 electric vehicle charger • Mini split heat pump system • Electric clothes dryer • Other loads: refrigerator, range hood, dishwasher, and lights
Total Calculated Electrical Load**:** 41,241 VA Total Allowable Amperage: **172 amps**[76]	Total Calculated Electrical Load: 37,823 VA Total Allowable Amperage: **158 amps**[77]

**PG&E and SG&E did not specify if the cooking equipment were induction or electric-resistance ranges.*

PG&E's and SCE's scenarios assume different technologies for some appliances. PG&E assumes electric resistance water and space heaters, while SCE assumes a more efficient heat pump water heater and mini split heat pump system. Under both scenarios, the load calculations show that these two homes will

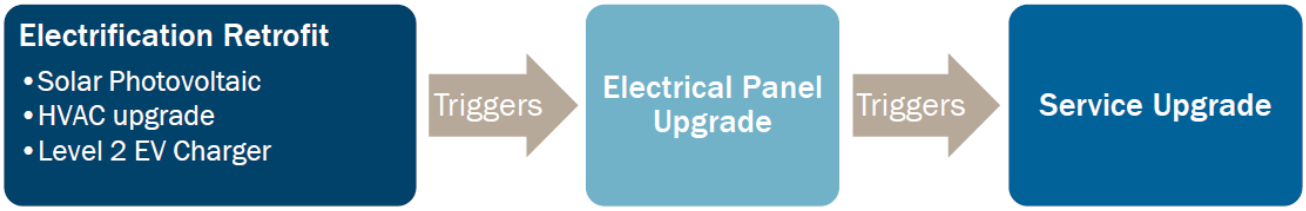
[73] SDG&E did not submit a load calculation, claiming that "SDG&E does not independently possess the data or knowledge required to complete this request," SDG&E Response to ALJ Ruling on MHP Conversion and Upgrade Costs, filed April 26, 2018, at B-1.
[74] SCE did not specify a climate zone for the hypothetical home it used in its load calculation.
[75] PG&E assumed the furnace would generate the largest load.
[76] In this calculation, it is assumed that the voltage is constant at 240V, which is typical of most residential dwellings. Divide the calculated electrical load in VA by 240V to derive the minimum allowable amperage of the service and panel.
[77] Ibid.

require service above 100 amps, requiring more than 150-amp service, without employing any of the "Watt Diet" strategies, discussed below.

Common Triggers for Service Upgrades

On-the-ground evidence corroborates the link between electrification and the tendency to require panel and service upgrades to 200 amps. In a 2021 study conducted by the consulting firm NV5 and commissioned by PG&E and SDG&E, researchers found that electrical service upgrades were usually requested due to increases in a home's electrical load. The most common triggers for upgrades were PV solar installations (43%), EV charging (12%), and new heat pump HVAC systems (no percentage specified). As discussed above, EV chargers and electric HVAC systems have the potential to add significantly to a home's overall load given their tendencies to have higher nameplate ratings.

Figure 6: Service Upgrade Triggers[78]



PV solar systems often trigger service upgrades because of certain electrical safety rules that tie a PV solar system's size to the home's main panel rating; upgrades to the panel size sometimes trigger service upsizing, as well. For customers interconnected to the grid, when a PV solar system is installed on a home, it connects to the home's main electric panel and any excess power generated is fed back to the grid. The main panel must also be capable of handling the power that is coming from the grid to the home. For safety reasons, the NEC directs that the total combined amperage from a home's PV solar system and grid cannot exceed 120% of the main electric panel's busbar rating.[79] Busbars are the metal bars inside a panel used to carry current between the grid and a home; depending on how the busbars are built, they can hold varying levels of current safely. The busbar rating is the maximum amount of current the panel can handle. If a home's busbar panels are not rated high enough for the amount of solar a homeowner wants or needs to

[78] See: "Service Upgrades for Electrification Retrofits Study Final Report," https://pda.energydataweb.com/api/view/2635/Service%20Upgrades%20for%20Electrification%20Retrofits%20Study%20FINAL.pdf at 19.

[79] This only applies to load-side connections, wherein the PV solar system is connected to a circuit breaker on the main electric panel. This is the most common way PV solar systems are installed. See NEC Section 705.12 for more detail on this "120% rule."

cover their energy needs, contractors usually suggest a panel upgrade, which may require an accompanying service upgrade. A home with a 100-amp panel is generally limited to a PV solar system size of 3.8 kW; since the average residential solar system size in California is 5 kW, many homes with 100-amp electric panels and service may require upgrades, often to 200-amp panels and service.[80] While existing MHs are less likely to have solar, partly because their rooves are usually not designed to support the weight of solar panels, newer MH designs are beginning to incorporate solar in an effort to reduce overall energy costs for MH residents, as discussed below.

Alternatives to Service Upgrades

It should be noted that 100-amp service does not definitively preclude full-home electrification and electric vehicle charging; however, this size of electrical service may add additional barriers that could deter individuals from opting for electrification. A popular concept among building decarbonization advocates is the "Watt Diet," a set of strategies that households can use to avoid panel and service upgrades even as they increase their electrical load. The Watt Diet encourages individuals to choose "power efficient" appliances that draw less power at once, such as lower amperage HPWHs or EV chargers, thereby reducing a home's electrical load. Other measures include installing smart panels to manage home loads, and circuit switching devices, which allow two appliances, such as a Level 2 EV charger and clothes dryer, to share a circuit but prevent them from operating at the same time. While these strategies may allow homes to fully electrify with 100-amp electrical service, they may not be suitable for all residents, including those who want a broader selection of appliances, more EV charging capacity, or do not want to (or cannot) pay more for smart electric panels. There is also a knowledge disconnect: contractors and electricians may not yet be familiar with these concepts and technologies, and may still recommend that homeowners upgrade their panels based on traditional electrical load calculations and in anticipation of future added loads. As the PG&E and SDG&E study indicates, homeowners and contractors are usually not aware of the above "Watt Diet" strategies when faced with increased electrical loads. Recommendations for panel upsizing may also motivate homeowners to request service upsizing, as discussed above.[81] While the "Watt Diet" is an

[80] There are other ways to accommodate larger PV solar system installations, such as using special inverters or "derating" a panel wherein the main service breaker is replaced with a lower-rated breaker. If a home installs more energy efficiency measures, and uses less electricity, it may also be able to cover its energy needs with a smaller PV solar system. See: "Service Upgrades for Electrification Retrofits Study Final Report" at 22.
[81] "Service Upgrades for Electrification Retrofits Study Final Report," at 23.

important tool for overcoming building electrification retrofit hurdles, it may not be the best or most feasible choice for every home.

Lastly, limiting a home's electrical service standard to 100 amps may preclude households from deciding to electrify their homes due to high service upgrade costs, if they are not aware of or do not want to take advantage of more power-efficient appliances. Existing tariff rules give residential customers a fixed "Electrical Service Line Allowance" for any service upgrades, the allowance may not be adequate to cover the full cost of upgrades. Such work can include upsizing distribution transformers and undergrounding cables, which can be costly. Any costs for service upgrades exceeding the fixed allowance must be covered by the customer; these costs can range from $3,000 - $18,000.[82] PG&E's 2022 Annual Report for the SJV Program makes a similar observation that the costs of electric service upgrades can range from hundreds to thousands of dollars, and that outside of the pilot program, "where costs are billed directly to the end-use customer, this may be an insurmountable barrier to customers who might otherwise consider building or transportation electrification at their home."[83] Consequently, if a household needs to replace a gas appliance and is faced with the choice of electrifying and having to pay for a costly service upgrade, or simply purchasing a replacement gas appliance, there is a strong likelihood that they will choose the latter option.

New Manufactured Homes May Require 200-amp Service in the Future

A 100-amp electric service standard will also likely be inadequate for newer, all-electric MHs. All-electric MHs already make up 50% of all MHs sold in California as of 2019.[84,85] Many newer, larger MHs features 200-amp panels, even those with gas appliances, depending on the size of the home. Although MH construction standards have historically lagged behind those of site-built homes, new programs and technical developments are closing that gap, especially in the areas of electrification and solar-readiness.

The DOE, which was authorized to create new energy efficiency rules for MH construction via the EISA 2007, has indicated an interest in advancing electrification readiness in all homes. In October 2021, the DOE released a Technical Brief in conjunction with the Pacific Northwest National Laboratory analyzing the need for electric readiness in residential energy and building codes and proposed sample code language to facilitate this shift. The paper concluded that most all-electric homes will require at least a 200-

[82] "Service Upgrades for Electrification Retrofits Study Final Report," at 33.
[83] PG&E 2022 Annual Report for the SJV Pilot Program, at 26.
[84] "Stakeholder Workshop: Building Decarbonization Phase II Staff Proposal and Mobilehome Park Electrification and Tenant Protection Topics, September 15, 2020," at 109.
[85] CEC staff report that Clayton Homes, one of the main manufacturers of MHs, produces 95% dual-fuel MHs and has a 43% market share. This is based on conversations between CEC staff and Clayton Homes staff.

amp service.[86] It is also worth noting that the 2021 IECC, the code that DOE referenced for its updated 2022 MH energy efficiency rules, also initially adopted electrification readiness standards before they were ultimately removed by appeals from a few parties.[87] While the DOE has not yet officially adopted a mandatory electrification readiness provision in its efficiency standards for MHs, the DOE's dissemination of electrification-ready code language indicates a move in the direction of full electrification.

The DOE has also developed a pilot program to incentivize MH manufacturers to produce homes that can accommodate PV solar systems to produce energy on-site. The Zero Energy Ready Home (ZERH) Manufactured Homes Program pilot, established in January 2023, seeks to take advantage of provisions in the 2022 IRA legislation that provide a $5,000 tax credit to builders who produce MHs that exceed HUD's building energy efficiency standards. The DOE defines a Zero Energy Ready Home as "a high-performance home that is so energy efficient that a renewable energy system could offset most or all of the home's annual energy use."[88] In its technical requirements for the pilot (Requirements 16.1-16.4), the DOE mandates electrical conduit, inverters, panel space, and a main service panel, all appropriately sized to accommodate future PV solar systems. The DOE's solar-readiness requirements for manufactured homes stop short of mandating a minimum panel amperage (which would dictate what electric service size is needed), but as mentioned earlier, many homes in California seek larger PV solar systems that require upgrades to 200-amp service. It is likely, then, that an MH will also require 200-amp service and panels to accommodate PV solar systems, especially if the MH is similar in size to a standard site-built home. While older MHs tended to be smaller than the average site-built home, newer MHs tend to be larger and closer in size to a site-built home. In 2022, 84% of all MHs shipped to California were multiwides,[89] which generally range between 1,000 – 2,200 square feet.[90] In comparison, the median home size for site-built homes in California falls in this range, at 1,860 square feet.[91] It is likely, therefore, that a new, larger MH will require a 200-amp panel to install PV solar system large enough to meet a home's electrical needs, on par with site-built homes. For older, existing MHs that want to install solar, it is likely that these homes may require even

[86] The report did not differentiate between site-built and manufactured homes. See: "Electric Readiness in Residential Code: Technical Brief," Department of Energy, at 10, October 2021. https://www.energycodes.gov/sites/default/files/2021-10/TechBrief_Electric_Readiness_Oct2021.pdf.
[87] The appeals claimed, in part that an energy efficiency code was not the appropriate place to incorporate an electric readiness standard, and that an electrical code (like the National Electrical Code) would be a more suitable place. See: https://community.apga.org/blogs/rene-lani1/2020/05/14/apga-aga-jointly-file-appeal-of-icc-actions-on-iec.
[88] See: https://www.energy.gov/eere/buildings/zero-energy-ready-home-program.
[89] "2022 Manufactured Housing Facts: Industry Overview," at 8, Manufactured Housing Institute, 2022. http://www.manufacturedhousing.org/wp-content/uploads/2022/04/2022-MHI-Quick-Facts-updated-05-2022-2.pdf.
[90] See: https://www.thehomesdirect.com/blog/mobile-home-sizes-and-dimensions.
[91] See: https://www.ahs.com/home-matters/real-estate/the-2022-american-home-size-index/.

larger PV solar systems, given that older MHs are generally built to less stringent energy efficiency standards, and have been shown to use more energy per square foot than site-built homes.

Existing CPUC Building Electrification Programs Already Require Infrastructure to Support 200-amp Service

Existing CPUC programs have already determined that 200-amp service will likely be necessary for building and vehicle electrification.

The SGIP proceeding (R.20-05-012) adopted a decision (D.22-04-036) in April 2022 that extends SGIP incentives to cover heat pump water heaters (HPWHs) and the costs of upsizing existing electrical service and panels that are currently under 200-amp capacity, which the CPUC identified as a barrier to adopting this electrification technology. The Staff Proposal supporting this decision concludes that "without funding, the costs associated with a necessary electric panel upgrade and potentially an electrical service upgrade will likely deter customers from adopting a HPWH."[92] The final decision addresses service upgrade costs exceeding the Electrical Service Line Allowance for customers in the SGIP HPWH program, directing IOUs to cover these costs and treat them as common facility costs covered by all ratepayers.[93] The combination of these measures demonstrate the CPUC's recognition that 200-amp service is necessary to adopting electrification measures.

The SJV Program launched in 2018, aims to fully electrify homes that rely primarily on wood or propane for space and water heating, and cooking. The program targets eligible households in 11 disadvantaged communities throughout the San Joaquin Valley, all of which lack access to gas service. (All 11 communities have electrification pilots, while one of the 11 communities – California City – also includes a gas service line extension pilot.) The SJV Program serves both site-built homes and MHs. Households participating in the electrification pilot receive, at no cost, new heat pump HVAC systems, induction or electric resistance cooking ranges, HPWHs, and electric clothes dryers, along with any remediation work needed to accommodate full electrification, including rewiring in the coaches, if necessary. The three electrification Pilot Administrators (PG&E, SCE, and a third-party implementer, Richard Heath and

[92] SGIP HPWH Staff Proposal, at 46.
[93] D.22-04-036, at 48. See: http://docs.cpuc.ca.gov/SearchRes.aspx?DocFormat=ALL&DocID=467581288.

Associates) provide all homes with upsized 200-amp service to accommodate the homes' increased electric load and to prepare homes for future electric vehicle charging.

Another existing program, PG&E's Butte County Mobilehome Park Rebuild Program, also mandates TTM infrastructure that can support 200-amp service for all MHP lots, and upgrades to 200-amp pedestals where possible. The program, based on the existing MHP Program, aims to restore electric and gas service to the 36 parks (1,652 spaces) in Butte County that were destroyed by the 2018 Camp Fire.[94] The CPUC approved PG&E's program proposal with a few alterations that deviate from the existing MHP Program, including mandating infrastructure to accommodate a higher electric service standard, where possible.

In its original proposal (Advice Letter 4116-G/5581-E), PG&E proposed to install 100-amp TTM and BTM infrastructure, in accordance with the existing MHP Program, unless the parks could prove they received higher amperage electric service prior to the Camp Fire. Three MHPs – Forest Glen MHP, Skyway Villa MHP, and Ridgewood MHP – filed protests in response to PG&E's original proposal, arguing that 100-amp service would be insufficient for the needs of their tenants and modern manufactured homes, which are larger (some over 1,500 square feet) and have larger load requirements.[95] Ridgewood MHP's protest expressed that electric service for modern parks should be at minimum 150 amps in order to sufficiently power homes switching from gas to electric appliances. Ridgewood MHP claimed that most parks in Butte County contained 1960s-70s era MHs, which only required 70-100-amp service, but as newer homes with bigger loads populated these parks, they are overloading the existing electrical distribution infrastructure. The owner reports that he replaced 16 old singlewide homes in his park with new doublewide homes, which "were delivered with every appliance possible on gas so there was enough electrical service remaining for the HVAC system. Then residents switched out some of the gas appliances for electric and the problems with the overloaded electric system started."[96] In its analysis, the CPUC concluded that modern, all-electric manufactured homes with electric vehicles will likely need 200-amp service upgrades,

[94] Resolution E-5070, "PG&E requests authorization to establish a Butte County MHP Rebuild Program agreement for MHP owners and operators in Butte County," at 7, May 20, 2021.
[95] Resolution E-5070 at 13-14 and Ridgewood MHP Response on August 1, 2019, at 1.
[96] Protest of Ridgewood MHP at 1, in response to PG&E's AL 4116-G/5581-E.

and that demand for this level of service will continue to escalate as newer manufactured homes enter the state.[97]

Although the intent of the Butte County MHP Rebuild Program was to only replace the energy infrastructure at the same level of service prior to the fire, the CPUC ultimately directed PG&E to upsize the TTM underground service cable and conduit rated to a minimum of 200 amps, in anticipation of MH owners electrifying their homes and installing EV charging. The CPUC also directed PG&E to "work with MHP owners and operators…to identify which spaces shall receive a 200-amp service, and allow for the installation of 200 amp rated pedestals and configuration of the secondary distribution system" to the extent this was feasible.[98] The CPUC did not ultimately set a 200-amp service standard for all MHs because this specific program was aimed at only restoring service, not upsizing service to MHPs. The Butte County MHP Rebuild Program measures were recently adopted in PG&E's Dixie Fire Mobilehome Park Rebuild Program, an identical program for MHP victims of the Dixie Fire.[99] Although these resolutions are not precedential, they express agreement between the CPUC and some MHP owners that 100-amp service is insufficient to serve electrified manufactured homes moving forward, and that 200-amp service may be the more appropriate, forward-looking standard.

3.2 Current Program Rules Exclude Appliance Installation and Rewiring

This Staff Proposal recommends the creation of an initiative for full electrification of coaches, which would entail expanding the scope of BTM work to include in-home remediation, including rewiring and updating a coach's internal subpanel, and replacing existing gas appliances with new electric appliances.

The current MHP Program covers the costs for only a small portion of the BTM electrical infrastructure and does not include any in-home work. Current upgrades are limited to the pedestal (which houses the electric meter), a cable leading from the pedestal to the outside of the MH, conduit that houses these wires, and the junction box, which contains the connection between the new cable and the home's existing cable. This BTM work is performed by a third-party contractor who is selected and managed by the MHP owner. The MHP owner pays for all BTM construction costs upfront, which include materials, labor,

[97] Resolution E-5070 at 31.
[98] *Ibid* at 3-4.
[99] PG&E Advice Letter 4609G/6594-E.

and permit costs, and is reimbursed by the utility for the costs covered in the MHP agreement, which exclude common area BTM work, any service upgrades above 100 amps, and certain permit costs.

Fully electrifying homes would add potentially significant costs to the program due to the age and design of the existing MH stock in California. As WMA reports, nearly 35% of MHs in California were built before 1976, when the HUD code first went into effect. Most MHs from this era were built to handle 30-50 amp service, and most rely on gas or propane for water heating, space heating, cooking, and clothes drying, partly to avoid overloading the limited electrical capacity of the home.[100] Many coaches use outdated internal aluminum wiring, which is no longer the common standard for wiring, given aluminum wiring's tendency to cause fire hazards if not installed properly, and especially if the home seeks to add additional electrical load.[101,102] All these factors mean that most coaches will need some level of rewiring, panel upsizing, and possibly other retrofitting to accommodate increased electrical load and modern appliances. WMA claims that pre-1976 homes likely cannot be rewired and therefore these homes may need to be replaced entirely; however, findings from the SJV Program indicate that pre-1976 coaches with old wiring can usually be retrofitted to accommodate electrification. Additionally, the in order to provide full electrification while maintaining benefits to the customer, the MHP Program would likely need to offer appliance replacements at no-cost, given that the majority of residents are low-income or on fixed incomes and most likely cannot afford to pay for these upgrades.

WMA provided cost estimates for additional costs associated with mobile home electrification at the CPUC's March 20-21, 2019 workshop:[103]

Table 6: WMA's Estimated Costs for Mobile and Manufactured Home Electrification Retrofits[104]

Upsizing to 200-amp panel	$1,500 - $3,000
Cooking	$320 - $500 for conventional electric range

[100] WMA comments on October 17, 2018 workshop, at 3. See: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M251/K152/251152614.PDF.
[101] WMA comments on ALJ April 2, 2019 Ruling, at 9. See: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M290/K872/290872397.PDF.
[102] Section 24CFR 3280.801(e) of the HUD Code prescribes specific installation requirements for installing aluminum branch circuits in manufactured homes, but this type of wiring is not explicitly banned.
[103] WMA, "Issues with Electrification of Converted MHPs," at 6, Mobilehome Electrification Workshop March 20-21, 2019.
[104] WMA comments on ALJ April 2, 2019 Ruling, at 9. See: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M290/K872/290872397.PDF.

	$1,000 – $1500 for induction range
Water heater	$350 – $450 for resistance water heater $2,000 - $3,000 for heat pump water heater
Space heating and cooling	$500 – $1,000 for resistance heater $5,000 - $8,000 for two-way heat pump with cooling
Internal coach rewiring for 200-amp service	$12,000 for HUD-compliant home[105]
Cost of coach replacement (for pre-1976 homes, which WMA claims cannot be rewired)[106]	$60,000 for single-wide pre-HUD home $110,000 for double-wide pre-HUD home
Total costs per space (does not include clothes drying) (Assuming most efficient version of appliances, i.e., induction stove, heat pump water heater, and heat pump HVAC)	HUD-compliant home: $21,500 - $27,500 Pre-HUD compliant home (coach replacement): $60,000 - $110,000

SJV Program Remediation and Electrification Cost Data

The SJV Program offers more recent data from actual MH electrification retrofits. It is important to note, however, that no MHs converted through the SJV Program were situated in MHPs. PG&E and Richard Heath and Associates (RHA), two of the Pilot Administrators, reported the following average costs for remediation of the MHs that have received electrification retrofits through February 21, 2023.

[105] These costs are based on WMA's claims that manufactured homes must be entirely rewired to be fully electrified. As noted above, Program Implementers from the SJV Program reported that manufactured homes were able to be fully electrified without complete rewiring of the home. Therefore, Staff believe these costs may be an overestimate of rewiring costs for electrification retrofits.

[106] While it is true that pre-1976 fabrication coaches typically cannot replace their existing wiring with new wiring, these coaches can be outfitted with the modern wiring necessary to safely power new heat pump appliances without necessarily needing to replace the entire coach.

Table 7: Remediation Costs for MHs for PG&E and RHA from the SJV Program[107]

	Community	# of MH Completed	# of MH completed that required remediation	Total remediation	Avg Remediation Cost per MH
PGE	Allensworth	26	19	$60,539.87	$3,186.31
	Cantua Creek	12	6	$8,083.45	$673.62
	Seville	6	6	$72,600.49	$12,100.08
RHA	Alpaugh	2	2	$2,502.24	$1,251.12
	Fairmead	3	2	$2,588.90	$862.97
	La Vina	1	1	$7,369.79	$7,369.79
	Lanare	1	1	$4,908.60	$4,908.60
	Le Grand	2	2	$11,137.96	$5,568.98
SCE	West Goshen	37	n/a	$177,415.00	$4,795.00
	Ducor	4	n/a	$8,452.00	$2,113.00
	Total	**94**	**39**	**$347,146.30**	**$3,693.05**

Although the average remediation cost is low, the range of these costs is quite wide: ranging from no remediation needed to up to $22,000 in total costs. Ten of the 39 homes that required remediation exceeded the initial program cap for remediation costs of $5,000. Additionally, these homes do not include remediation costs for approximately 30 MHs that are still in the queue for electrification, at least a third of which will have remediation costs exceeding $15,000. Lastly, this data does not include approximately 40 MHs that were deemed too costly to remediate (exceeding the $25,000 of funding from the pilot and external sources), and were therefore excluded from the MHP Program altogether.[108] The Pilot Administrators report that the costs for remediating these homes were generally around $30,000.[109]

The SJV Program classified remediation costs in five categories, namely:

1. **Building Code Repairs**: fixing items to pass municipal inspection, usually for replacing knob-and-tube wiring, and covering exposed wiring and open junction boxes.
2. **Remediation – General**: most often trenching from the main panel to the MH subpanel and upgrading conduit; also includes relocating meter panel, tree service, and installing a new weatherhead.

[107] Data response from SJV Program Pilot Administrators, PG&E and RHA, sent via email, February 28, 2023, and SCE, sent March 8, 2023.
[108] MHs exceeding the remediation cost caps were usually those that needed excessive trenching.
[109] Data response from SJV Program Pilot Administrators, PG&E and RHA, sent via email, March 1, 2023.

3. **HVAC**: removing an existing wall furnace or air conditioning (AC) unit and patching walls; repairing ducts; sealing of return air vents; and removing AC window units.
4. **Plumbing**: relocating water heater to outside the home and removing old water heater platform to accommodate a taller heat pump water heater.
5. **Cooking**: installing a cook top or wall oven and installing a new circuit.

Examining the 10 homes that exceeded the $5,000 remediation cost cap reveals that the "Remediation-General" category far exceeded the other categories in costs.

Table 8: Remediation Costs for MHs Exceeding $5,000 RHA and PG&E Communities[110]

MH #	Building Code Repairs	Remediation - General	HVAC	Plumbing	Cooking	Grand Total
1		$17,781.73	$1,175.11	$1,336.50		$20,293.34
2		$16,569.26		$1,321.34		$17,890.60
3		$16,569.26		$1,298.67		$17,867.93
4		$8,707.17	$730.94	$1,293.37	$2,104.00	$12,835.48
5		$9,734.48		$132.75		$9,867.23
6		$5,615.48	$1,233.34	$1,414.14		$8,262.96
7		$4,580.08		$2,000.71	$789.00	$7,369.79
8	$5,479.72		$1,174.04	$526.00		$7,179.76
9		$2,794.89	$1,316.69	$1,308.42		$5,420.00
10		$4,055.43		$1,176.66		$5,232.09
Average	**$547.97**	**$8,640.78**	**$563.01**	**$1,180.86**	**$289.30**	**$11,221.92**

One of the largest drivers of high costs in this category was trenching to install new cables and conduit between the main panel, which is located next to the electric service drop from the utility, and the internal subpanel in participating MHs. Since many of the MHs were built to only handle 30–50-amp service, most required upsized cables and service to handle the new increased load. To install these new cables, trenches were dug between the main panel and the MH's internal subpanel. These trenching distances ranged from 25 to 500 feet in length, due to where the MHs were located relative to the service drop.

However, in the context of the MHP Program, most of the trenching costs to upgrade electrical service are already covered in the existing scope of work. Therefore, the total MH remediation costs from

[110] Data response from SJV Program Pilot Administrators, PG&E and RHA, sent via email, February 28, 2023.

the SJV Program do not accurately reflect the additional BTM costs for in-home remediation work needed for electrifying MHs in an MHP. Unfortunately, SJV Program data does not separately record the costs of electrical trenching work from the costs of rewiring and panel upgrades inside the home, making it challenging to disaggregate these two costs. However, according to the one Program Implementer responsible for performing the remediation work for PG&E service territories, trenching outside the home accounted for approximately 80-90% of the total costs for electrical work, with the remainder for in-home electrification.[111] Therefore, it is likely that the remediation costs for the homes in the SJV Program account for additional costs that will likely not be required in an MHP electrification pilot program.

Other remediation measures in the SJV Program included in-home rewiring, panel upsizing, and in-home construction to make room for new appliances and ensure that the home complied with HCD Code to pass inspection. Notably, contrary to what WMA asserts about pre-1976 MHs not having enough attic space to replace wiring, MHs can accommodate adjacent copper wiring or can use existing aluminum wiring, if such wiring is treated and spliced safely according to code.[112] The contractor for PG&E and RHA reported encountering aluminum wiring inside homes, but indicated no issues with remediation measures so long as they made sure the wires were installed properly and that the current flowing through the wires did not exceed safety standards.[113] To ensure safety, the Program Implementer used a greasing agent to prevent degradation of the aluminum wiring, avoided splicing the old wiring with copper, and used right-sized conduit to match the existing wire's ampacity. For new circuits, the implementer installed new copper wiring.[114] The HUD Code does not ban aluminum wiring, but rather prescribes specific measures, consistent with the SJV Program to ensure the wiring does not cause safety hazards. The Program Implementer reported that knob-and-tube wiring may require the most extensive rewiring work, due to additional safety risks that are more prevalent with this type of wiring. However, since knob-and-tube wiring requires attic space that most MHs do not have, the Program Implementer reports that this type of wiring is rare in MHs; the SJV Program did not encounter any MHs possessing knob-and-tube wiring.[115]

---

[111] E-mail communication with RHA, February 28, 2023.
[112] WMA's comments filed on May 5, 2019 in response to April 2, 2019 ALJ ruling, at 9-10. See: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M290/K872/290872397.PDF.
[113] Email communication with RHA, March 3, 2023 and in-person conversation with Synergy, PG&E and RHA's Pilot Implementer, on June 14, 2023
[114] Ibid.
[115] Ibid.

Installing new appliances would add additional costs to the program, including appliance purchases and labor costs for hauling out the old appliances and installing replacements. SCE reports that the average cost of appliances for its three pilot communities is $20,189, excluding additional remediation costs.[116] Assuming similar appliances installed in the SJV Program for an average household of 2-3 people around 1,300 square feet leads to a similar estimate of about $21,200 per MH for appliance and labor costs combined.[117] The below table shows a sample estimate of appliance material and installation costs, as of March 2023.

Table 9: Estimated Appliance and Labor Costs for a Sample Fully Electric MH

Appliance	**Estimated Cost**	**Estimated Labor Costs[118]**
Electric Clothes dryer – 7.5 cu. ft. (Samsung) (not heat pump, vented dryer)	$848[119]	$300
Electric Induction Range (Range/Oven Combo) - 30 inch – black (Frigidaire Gallery)	$1,549[120]	$300
Ductless Mini-Split Heat Pump – 3 Zone (Comfort-Aire)	$14,762[121]	
Heat Pump Water Heater - 65 gal - w/Wi-Fi capability (Rheem)	$2,189[122]	$1,611[123]
Total Cost of Appliances and Labor	$21,559	

[116] This proposal does not use PG&E and RHA's actual costs for appliances and installation for two reasons. First, the costs are vendor-specific and thus represent sensitive pricing information. Second, these two PAs entered into contracts that locked in the price of labor and materials at the time the contract was negotiated in 2019; due to inflation and rising labor costs, it is likely these costs would be an underestimate for any future electrification pilot considered through the MHP Program.

[117] The 2019 Residential Appliance Saturation Study estimates that the average manufactured home has 2.3 occupants per household and ranges between 1,295 – 1,316 square feet in size. See: https://www.energy.ca.gov/sites/default/files/2021-08/CEC-200-2021-005-MTHLGY.pdf at 38.

[118] Except for the Heat Pump Space Heater and Heat Pump Water Heater, all labor costs are estimated via Homewyse. See: https://www.homewyse.com/services/cost_to_install_range.html, and https://www.homewyse.com/services/cost_to_replace_electric_dryer.html.

[119] See: https://www.homedepot.com/p/Samsung-7-5-cu-ft-Smart-Stackable-Vented-Electric-Dryer-with-Steam-Sanitize-in-Platinum-DVE45B6300P/319615951.

[120] See: https://www.homedepot.com/p/FRIGIDAIRE-GALLERY-30-in-5-4-cu-ft-Induction-Electric-Range-with-Self-Cleaning-Oven-in-Smudge-Proof-Black-Stainless-Steel-with-Air-Fry-GCRI3058AD/313233500.

[121] The TECH Initiative Implementer in California reported $14,762 as the average total cost of installing mini split heat pumps for homes between 1,000 – 1,500 square feet between December 2021 and May 2022. The labor costs were assumed to be $14,762 - $5,020 (cost of mini split system) = $9,742 https://carbonswitch.com/heat-pump-costs/.

[122] https://www.homedepot.com/p/Rheem-Performance-Platinum-65-Gal-10-Year-Hybrid-High-Efficiency-Smart-Tank-Electric-Water-Heater-XE65T10H45U0/312741511.

[123] Assumed a total cost of $3,800 for heat pump water installation, based on Sacramento Municipal Utility District's average reported cost for HPWH installations. See: http://eta-publications.lbl.gov/sites/default/files/less_-_emerging_pathways_to_upgrade.pdf at 96.

Assuming that MHs will require extensive remediation, we assume an average cost of $11,200 for remediation based off of SJV Program findings, and the above estimate of $22,600 for appliances and labor, leads to a per-MH electrification cost of around $33,800. Staff note that this is likely a conservative estimate, given that the MH remediation costs reported in the SJV Program were due to high TTM trenching costs for new electric service lines; these TTM trenching costs are already built in to the existing MHP program and would not be counted in any BTM electrification remediation costs in the MHP Program context.

If MHP owners own the coaches and are responsible for these upgrades, it is unlikely that they will have the resources to pay for these upgrades, since the MHPs in this program generally already lack the resources to maintain safe utility systems, let alone cover costly upgrades. Similarly, for MHP tenants, many of whom are low-income or seniors on fixed income, spending tens of thousands of dollars on full-home electrification would likely present a significant financial burden. As discussed in Section 4.3, MH tenants face higher energy cost burdens and more limited access to financing options, making electrification upgrades out of reach for many residents.

3.3 Full-home Electrification Could Shift Additional Costs onto Electric Customers

Incorporating both a higher electrical standard and additional BTM costs for full home electrification would increase the overall cost of the MHP Program and put upward pressure on electric rates unless the program finds alternative funding sources. As outlined in the decision establishing the MHP Program, all TTM and BTM construction costs are capitalized, meaning that participating IOUs will receive a rate of return on costs incurred, which electric ratepayers will be responsible for paying.[124]

Potentially Large Cost Shift to Electric Ratepayers for Full Electrification

As discussed in Section 4 of this Staff Proposal, the additional TTM and BTM costs for switching from the current 100-amp standard to a 200-amp standard for the MHP Program are estimated to be low (<5% increase in overall per-space conversion costs). Full-home electrification, if approved, will likely be the largest driver of program cost and electric rate increases. As discussed in the previous section, in-home

[124] D.14-03-021 Findings of Fact 35, at 71.

remediation and appliance replacement will possibly add $33,800 to per-space conversion expenses, driving up the overall cost of the MHP Program.

If full electrification of MHPs is approved, there would be no need for gas infrastructure upgrades, thus shifting all trenching costs to electric ratepayers. This could nearly double the costs that would otherwise be covered by electric ratepayers, since trenching costs would be recorded solely as electric system costs and no longer be shared with gas ratepayers. Trenching accounts for the largest share of the MHP Program's TTM costs, making up between 41.4%-65.8% of overall TTM costs across the IOUs.[125] Nearly all newly installed gas and electric systems are undergrounded, so utilities must dig trenches to place new distribution infrastructure throughout the MHP. PG&E and SDG&E cover the entire cost of TTM trenching because they are responsible for replacing both the gas and electric infrastructure. Single-fuel utilities split trenching costs if both gas and electric systems are being updated, with electric utilities (SCE, PacifiCorp, Liberty, and BVES) covering 52% of the costs and gas utilities (SoCalGas and SWG) covering the remaining 48%.[126] If only the gas or electric system requires upgrades, then the corresponding utility will cover 100% of the trenching costs for that project.

If full electrification also entails forgoing gas system upgrades, then all costs would be recorded solely as electric system costs, since the utility would only be upgrading electrical infrastructure. Although material and labor cost savings due to avoided gas system upgrades may result in some savings, the entirety of the remaining upgrade costs, which would be solely electrical costs, would fall onto electric ratepayers. Since electric system upgrades still require trenching, this means that electric ratepayers would bear 100% of trenching costs instead of only 52%, effectively doubling their share of trenching costs, one of the MHP Program's largest sources of TTM construction costs. Forgoing gas system upgrades would thus shift trenching costs onto electric ratepayers and lead to an increase in electric rates.

Prioritizing Non-Ratepayer Funds for Full Electrification Work

Although MHP electrification would advance the state's building decarbonization priorities, if all program costs are borne solely by electric ratepayers through Public Purpose Program (PPP) surcharges, the resulting potential electric rate increase would work in opposition to the state's goals. As households electrify their buildings and vehicles, their electricity usage would increase. Electric rate increases will have a greater impact on customers who rely solely on electricity to power their homes and cars, and could

[125] See: IOU 2022 Annual Reports for the MHP Program.
[126] Data Response from SCE, January 11, 2023.

disincentivize others from considering electrification. The Legislative Analyst's Office (LAO) also acknowledged this point in its analysis of Governor Newsom's 2022-2023 $2 billion Clean Energy Package, noting also that electricity rates are a "regressive approach to raising revenue," in that low-income households spend a larger percentage of their income on electricity than high-income households. To mitigate these rate increases, the LAO asserts that instead of using ratepayer funds, there is "a strong rationale for using General Fund for programs that aim to provide broad societal benefits," including building decarbonization programs that reduce greenhouse gas emissions.[127]

CEC's Equitable Building Decarbonization Program

The CEC's EBD Program was established in 2022 by AB 209, which directed the CEC to establish a program aimed at decarbonizing the state's existing building stock. The EBD Program includes a direct-install component that covers the installation of "energy efficient electric appliances, energy efficiency measures, demand flexibility measures, wiring and panel upgrades, building infrastructure upgrades, efficient air conditioning systems, ceiling fans, and other measures to protect against extreme heat, where appropriate, and remediation and safety measures to facilitate the installation of new technologies."[128] For low- to moderate-income residents, the installs will be provided at little to no cost. The second component of the program is a statewide incentive program for building decarbonization technologies, with 50% of funds allocated for under-resourced communities. The state has allocated up to $922 million to the program from Fiscal Years 2022-23 through 2025-26.[129] Thus far, the legislature has approved $62 million in Fiscal Year 2022-23 and $432 million in Fiscal Year 2023-24, for a total of $494 million.[130] Around two thirds of the EBD Program budget is reserved for the direct-install program, and the remaining one third for a statewide incentive program.[131] AB 209 specifically includes "mobilehomes" in its list of eligible residential buildings for the EBD Program and directs the CEC to coordinate the program with existing CPUC building decarbonization programs. While the CEC is still refining the details of the EBD Program, its initial Request for Information specifically addresses issues around MH decarbonization and retrofits to accommodate electrification.[132]

---

[127] See: https://lao.ca.gov/Publications/Report/4554.
[128] See: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB209.
[129] Fiscal Year 2022-23 California Budget Addendum. See: https://ebudget.ca.gov/2022-BudgetAddendum.pdf at 6.
[130] Fiscal Year 2023-24 California Budget. See: https://ebudget.ca.gov/2023-24/pdf/Enacted/GovernorsBudget/3000/3360.pdf at 3.
[131] See: https://lao.ca.gov/Publications/Report/4554.
[132] "Equitable Building Decarbonization Request for Information," at 6, December 9, 2022. See: https://efiling.energy.ca.gov/GetDocument.aspx?tn=248009&DocumentContentId=82299.

Federal Inflation Reduction Act Funding

The IRA provides federal funding for electric appliances, building electrification retrofit work, and energy efficiency improvements through two major building decarbonization programs, the HOMES Rebate Program and the HEEHRA.[133] HOMES will offer California around $292 million to put towards performance-based rebates for residential whole-house energy efficiency upgrades, with up to $8,000 for single-family residences.[134] The HEEHRA program offers the state $290 million for point-of-sale rebates for purchasing Energy Star electric appliances, and also covers panel upgrades, wiring, and insulation. HEEHRA will provide up to $14,000 per household and is limited to households with incomes 150% below area median income. The CEC expects these rebates to become available in 2024, once the DOE finishes developing program guidelines. Although these rebates are not geared explicitly toward MHPs, the majority of MHP residents fall in the eligible categories of low- and moderate-income households. The HEEHRA funding of up to $14,000 may offset a large percentage of the $33,800 in costs for full MH electrification, as estimated in the previous section.

[133] See: https://www.energy.gov/articles/biden-harris-administration-announces-state-and-tribe-allocations-home-energy-rebate.
[134] See: https://www.energy.ca.gov/programs-and-topics/programs/inflation-reduction-act-residential-energy-rebate-programs-california.

4. Recommendations

This Staff Proposal responds generally to the issues outlined in the Order Instituting Rulemaking for R.18-04-018 and the specific questions outlined in the Phase 2 Scoping Memo, and focuses on recommendations to implement an electrification-ready standard for electrical service for the MHP Program. Staff recommend adopting a 200-amp service level standard and mandating installation of TTM and BTM infrastructure to accommodate this electrical service standard. Staff address how upsizing TTM and BTM infrastructure for 200-amp service adds minimal costs to the existing program and avoids costly future upgrades. Also, consistent with state goals and actions to decarbonize buildings, as outlined in Section 2.3, Staff recommend adopting a small-scale MHP electrification initiative to provide information regarding the costs and challenges associated with full electrification of MHPs so that the CPUC can determine at a future date whether to encourage electrification at MHPs more broadly.

4.1 Mandate TTM infrastructure to Accommodate 200-amp Electric Service

The MHP Program should mandate TTM infrastructure upgrades that are capable of accommodating at least a 200-amp service from the utility to anticipate future electrification of MHs. This new standard will result in an estimated 0.8%-8.2% ($141-$887) increase in per-space TTM electric conversion costs over current program costs. Assuming a space receives both gas and electric system conversions, a 200-amp standard will result in an estimated 1.7% - 4.6% ($478-$1,118) increase in total conversion costs per space. As discussed earlier in this Staff Proposal, adopting a 200-amp service standard will allow more options for households wishing to electrify their homes and/or adopt Level 2 EV charging in the future. While Staff recognize that a 200-amp standard is not required for full-electrification, and that Watt Diet strategies may allow for full home electrification without the need for service and panel upgrades, in this particular program legacy electrical infrastructure is being fully replaced by new IOU-owned infrastructure. Consequently, Staff believe that brand new electric infrastructure should be built to modern standards, which generally stipulate that such infrastructure should accommodate 200-amp service.

Minor Increase in Costs for 200-amp TTM Infrastructure

The cost of installing TTM infrastructure for a 200-amp service standard is only marginally more than the current cost for a 100-amp service standard in MHPs. A 200-amp service standard will require the

IOUs to install upsized distribution cables and conduit (primarily 3" and 4") throughout the park, and to add transformers to handle the additional electrical load. The IOUs expect that labor, trenching, and electrical design and construction costs will increase negligibly, if at all.[135]

In response to the ALJ's April 19, 2022 ruling seeking the estimated cost impacts of adopting a 200-amp service standard, PG&E, SCE, and SDG&E submitted cost data for upgrading gas and electric infrastructure for three parks: two actual parks in their respective territories—one with fewer than 50 parcels, and one with more than 50 parcels—and one "common case" park based on an actual park in PG&E's territory. All three IOUs submitted cost estimates for installing 100-amp service and 200-amp service in the same common-case park. PG&E and SDG&E provided actual conversion costs for two additional parks within each of their respective territories at a 100-amp electrical service standard. The two IOUs also provided estimated conversion costs for these same parks, assuming that these parks were upgraded directly from legacy sub-metered systems to a 200-amp standard, while also still upgrading the gas infrastructure.

SCE's cost estimates for the two additional parks differ slightly from SDG&E's and PGE's because (1) SCE resubmitted its data for the two parks in its territory, using March 2023 pricing for labor and materials, and (2) SCE submitted cost estimates, instead of actual costs, for installing 100-amp electric service in these two parks (which have not yet been converted.)[136] In contrast, PG&E's and SDG&E's cost data for the 100-amp scenarios in the two sample parks include actual conversion costs and reflect pricing from when they submitted their initial responses, in May 2022. Despite these differences, the cost estimates across the three IOUs still offer insight into the incremental cost increases due to adopting a 200-amp standard versus a 100-amp standard. Table 10 compares the TTM costs for the 100-amp and 200-amp scenarios.

[135] Responses from PG&E, SDG&E, and SCE to April 19, 2022 ALJ Ruling.
[136] SCE submitted an initial data response in May 2022, in response to the ALJ's April 19, 2022 Ruling. However, these initial cost estimates did not accurately reflect the incremental cost differences between installing a 100-amp versus a 200-amp standard for their two additional (non-common case) parks. Instead, these initial cost estimates added in a flat-rate price increase to the 200-amp scenario, to account for inflation and pricing changes in SCE's pricing system. To maintain consistency with the PG&E and SDG&E scenarios, Staff requested SCE submit new data that only reflected the incremental cost of installing a 200-amp standard without any additional flat-rate increases for inflation and pricing increases.

Table 10: Per-Space Cost Increases for TTM Electric System Upgrades, 200-amp Scenario[137]

	PG&E		SDG&E		SCE	
	Increase in Electric System TTM costs ($ and %)					
	Per space increase	% increase	Per space increase	% increase	Per space increase	% increase
Common Case	$519	2.3%	$176	1.0%	$779	5.9%
< 50 spaces	$486	2.8%	$79	0.5%	$573	5.7%
> 50 spaces	$691	4.0%	$167	0.9%	$1,309	13.1%
Average	**$565**	**3.0%**	**$141**	**0.8%**	**$887**	**8.2%**

PG&E and SDG&E estimated a marginal percentage increase in electric system TTM costs for the 200-amp scenario across all three parks, averaging 3.0% ($565 per space) and 0.8% ($141 per space), respectively. PG&E's and SDG&E's minor increases in costs are primarily driven by increased quantities of upsized conduit and cables and the need for more transformers throughout the park to handle increased load. Both IOUs anticipate no changes in trenching costs and negligible increases in labor costs. SCE estimates a slightly higher increase in costs, averaging 8.2% ($887 per space), also due to increased costs in transformers, trenching, and labor. However, all three IOUs' cost increases from a 200-amp standard represent minor increases in the total per-space conversion costs, as seen below.

[137] Data Response, PG&E, SDG&E, and SCE, May 31, 2022.

Table 11: 200-amp TTM Incremental Costs vs. Total Per-Space Conversion Costs (2022)

	PG&E	SDG&E	SCE	SoCalGas	Space Served by SCE and SoCalGas
Per-space Conversion Cost[138]	$37,123	$28,692	$15,104	$9,163	$24,267
200-amp incremental TTM costs	$565	$141	$887	NA	$887
% of Per Space Conversion Cost	1.5%	0.5%	5.9%	NA	3.7%

Note that SCE's overall per-space conversion costs are lower than PG&E's and SDG&E's, given that SCE's estimates reflect only electric system conversions, since it is an electric-only utility, while PG&E and SDG&E estimates reflect both gas and electric system conversions. SoCalGas's per-space costs are displayed beside SCE's costs for reference; an MHP receiving both gas and electric upgrades from SoCalGas and SCE would have an approximate per-space conversion cost averaging $24,267; the incremental increase for a 200-amp standard in this scenario would be about 3.7% of the total conversion costs.

Avoiding Costly Electric Service Upgrades in the Future

Requiring electrical TTM infrastructure to accommodate 200-amp electric service also prevents the need for costly service upgrades in the future. Retrofitting a system for a 200-amp service in the future will most likely require re-digging trenches to remove existing conduit and cables and replacing them with upsized versions. Not all TTM infrastructure would need to be replaced; the extent of these replacements will vary from park to park depending on many factors, including park layout. However, it is likely that the costs of re-trenching even a fraction of a park's electrical infrastructure replacement will exceed the incremental cost of installing 200-amp service over 100-amp service. As noted previously, the IOUs' 2022

[138] Per-space cost estimates are derived from the total TTM and BTM costs for each IOU in across all years the Pilot and Program have been in operation, divided by the number of spaces converted. Numbers were sourced from each IOU's 2022 Annual Reports.

Annual Reports for the MHP Program show that trenching costs made up the bulk of electric system TTM construction costs, ranging from 41.4% (PG&E) to 78.8% (SDG&E).

Table 12: 2022 Civil and Trenching Costs for Electric TTM Upgrades[139]

	PG&E	SDG&E	SCE
Civil/Trenching Electric TTM Costs	$8,862,748.68	$9,792,615.00	$7,025,891.00
Total Electric System TTM Costs	$21,418,134.39	$12,423,517.00	$10,682,197.00
% of Total Electric System TTM Costs due to Civil/Trenching	41.4%	78.8%	65.8%
# of TTM MH and Covered Common Area Locations Converted (Electric)	1,412	1,371	1,322
Per Space Civil/Trenching Electric TTM Costs	$6,276.73	$7,142.68	$5,314.59

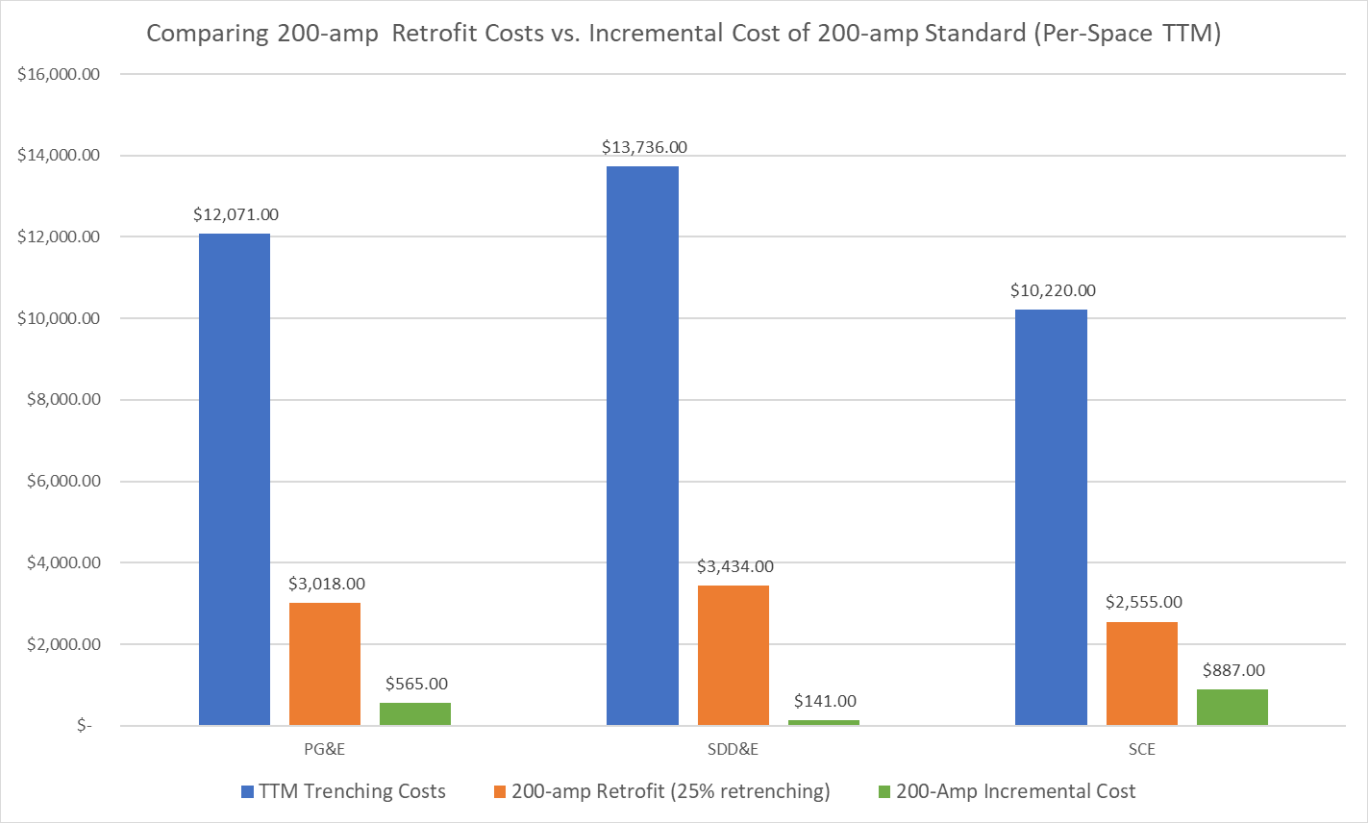
Per-space estimates for TTM electric system trenching (i.e., excluding gas trenching costs) in 2022 were approximately $5,315 for SCE, $6,277 for PG&E, and $7,143 for SDG&E.[140] Because almost all of the MH spaces converted through the MHP Program received both gas and electric system upgrades, the *total* per-space trenching costs are likely double the electric per-space trenching costs listed above. This is because, as noted previously, for trenches housing both gas and electric infrastructure, the trenching costs are split, with the electric system accounting for 52% of the costs and the gas system accounting for the other 48%.[141] Therefore, since the figures in the table above only reflect TTM electric system trenching costs

[139] Costs are drawn from the PG&E, SDG&E, and SCE 2022 Annual Reports for the Mobilehome Park Utility Conversion Program.
[140] This is an approximation. The number of spaces used to calculate per-space costs include MH spaces and common areas, so the actual per-space estimates may be slightly different.
[141] For example, if a park were served by SCE for electric service and SoCalGas for gas service, SCE and SoCalGas would share trenching work for an MHP receiving gas and electric system upgrades; SCE would pay for 52% of the trenching costs, and SoCalGas would pay for the remaining 48%. For PG&E and SDG&E, which perform both gas and electric system upgrades, they will pay for 100% of the trenching costs, but will record 52% of trenching costs as electric costs, and 48% of costs as gas system costs.

(52% of total trenching costs), the *total* per-space TTM trenching costs would be higher, at $10,220 for SCE, $12,071 for PG&E, and $13,736 for SDG&E.

These per-space TTM trenching costs for a post-conversion future 200-amp service retrofit far exceed the per-space incremental TTM costs for adopting a 200-amp service standard as part of the program. Even assuming, conservatively, that a retrofit would require replacing only 25% of TTM infrastructure (therefore assuming a quarter of the trenching costs) it would still be more cost-effective to install 200-amp service as part of the program than retrofit parks in the future. The table below illustrates the per-space cost comparison of this retrofit scenario to the incremental cost of upgrading the program to a 200-amp standard:

Figure 7: 200-amp TTM Retrofit Costs vs. Incremental TTM Costs for Mandating 200-amp Standard



The CPUC reached a similar conclusion in its resolution establishing PG&E's Butte County MHP Rebuild Program, and ultimately decided to mandate TTM infrastructure capable of delivering 200-amp service to MHPs. Using cost data supplied by PG&E in 2020, the CPUC found that retrofitting a 200-amp service cable to homes in the future would cost 16 times more than upgrading the cables as part of the rebuild program. The Resolution concludes that a future upgrade to 200-amp service would likely be "cost

prohibitive" for MH owners and that ultimately, "the long run benefits of serving the increased demand of modern and all-electric mobilehomes outweighs the incremental costs of service cable capable of 200-amp service."[142]

Anticipating California's ban on the sale of gasoline-powered vehicles after 2035 and wider EV adoption across the state, a 200-amp service standard will likely become even more important to support the need for in-home Level 2 EV charging, as discussed in Section 3.1. Given the small marginal cost of switching to a 200-amp service standard, and the substantial costs of retrofitting MHPs to this same standard in the future, the CPUC should mandate installing TTM infrastructure to accommodate 200-amp service as part of this program and avoid saddling electric ratepayers with potentially millions of dollars in future costs.

Ensure Adequate Time to Transition to a 200-amp Standard

Staff recommend that IOUs be given sufficient time to transition to implementing a 200-amp standard. Building in lead time for this new standard will allow IOUs to work with suppliers to ensure the adequate supply of materials needed for installing infrastructure to accommodate a 200-amp service standard. IOUs have faced prolonged and numerous delays waiting for materials such as transformers, electric boxes, cable, conduits, and pedestals due to supply chain constraints. While a new service should be prioritized in anticipation of future electrification, this new standard should also not cause unnecessary delays that prevent ongoing conversion of MHPs. It may be reasonable to require the MHP Program adopt a new 200-amp standard one year following the issuance of a decision.

4.2 Mandate BTM infrastructure to Accommodate 200-amp Electric Service

The MHP Program should similarly mandate BTM upgrades that will accommodate 200-amp electric service and ensure that MHP owners are fully reimbursed for any additional expenses required to meet this new standard. This new standard will result in an estimated 3.8%-8.4% ($146-$337) increase in per-space BTM electric conversion costs over current program costs. As stated in Section 4.1, assuming a space receives both gas and electric system conversions, a 200-amp standard will result in an estimated 1.7% - 4.6% ($478-$1,118) increase in total conversion costs per space.

[142] Resolution E-5070, at 35-36.

Minor Increase in Costs for 200-amp BTM Infrastructure

The changes required for providing BTM 200-amp service involve installing larger conduit and service cables between the electric pedestal and the junction box, and upgrading to a 200-amp electric pedestal, which houses a 200-amp main circuit breaker and bus bars that can handle this current. All three IOUs expect that the increases in BTM costs for a 200-amp standard will be due solely to increases in material costs; BTM labor, trenching, and permit costs are expected to remain the same between the 100-amp and 200-amp scenarios. The table below summarizes the increases in BTM electric system costs for a 200-amp standard:

Table 13: Per-Space Cost Increases for BTM Electric System Upgrades, 200-amp Scenario

	PG&E		**SDG&E**		**SCE**	
	Increase in Electric BTM Costs ($ and %)					
	Per space increase	**% increase**	**Per space increase**	**% increase**	**Per space increase**	**% increase**
Common Case	$145	3.8%	$317	8.2%	$292	7.0%
< 50 spaces	$146	3.9%	$380	8.6%	$200	4.7%
> 50 spaces	$146	3.72%	$313	8.3%	$200	4.7%
Average	**$146**	**3.8%**	**$337**	**8.4%**	**$231**	**5.5%**

Across the IOUs, incremental increase in BTM costs for a 200-amp standard range from 3.8% (PG&E) to 8.4% (SDG&E) per space. These costs, however, are BTM-only and represent a marginal

increase in *overall* program costs, making up a small portion (0.4%-1.5%) of total conversion costs per space, as depicted in the table below.

Table 14: 200-amp BTM Incremental Costs vs. Total Per-Space Converion Costs[143]

	PG&E	SDG&E	SCE	SoCalGas	Space Served by SCE and SoCalGas
Per-space Conversion Cost	$37,123	$28,692	$15,104	$9,163	$24,267
200-amp Incremental BTM Costs	$146	$337	$231		$231
% of Per-Space Conversion Costs	0.4%	1.2%	1.5%		1.0%

As in Section 4.1, note that SCE's per-space conversion costs are lower than PG&E's and SDG&E's, given that SCE only converts electric systems while PG&E and SDG&E convert both gas and electric systems. SoCalGas's per-space costs are displayed beside SCE costs for reference; an MHP receiving gas and electric upgrades from SoCalGas and SCE respectively would see a 1.0% increase in total conversion costs with a 200-amp service standard.

Avoiding Costly Future BTM Upgrades

As is the case for TTM infrastructure, installing BTM infrastructure to accommodate 200-amp service during electric system conversions will help MHP owners and/or residents avoid costly upgrades in the future. Retrofitting BTM systems for 200-amp service will involve removing old conduit and cables, and replacing them with upsized versions. Material and labor costs will likely cost thousands of dollars per space, which can make these upgrades prohibitively expensive for MHP tenants who must cover the costs of these upgrades if they do not happen initially as part of the MHP Program. Again, data from the IOUs' 2022

[143] Per-space conversions costs are derived from PG&E, SDG&E, and SCE's 2022 Annual Reports for the MHP Program.

Annual reports show that the cost of labor to perform these upgrades is the largest driver of costs for BTM electrical infrastructure installation:

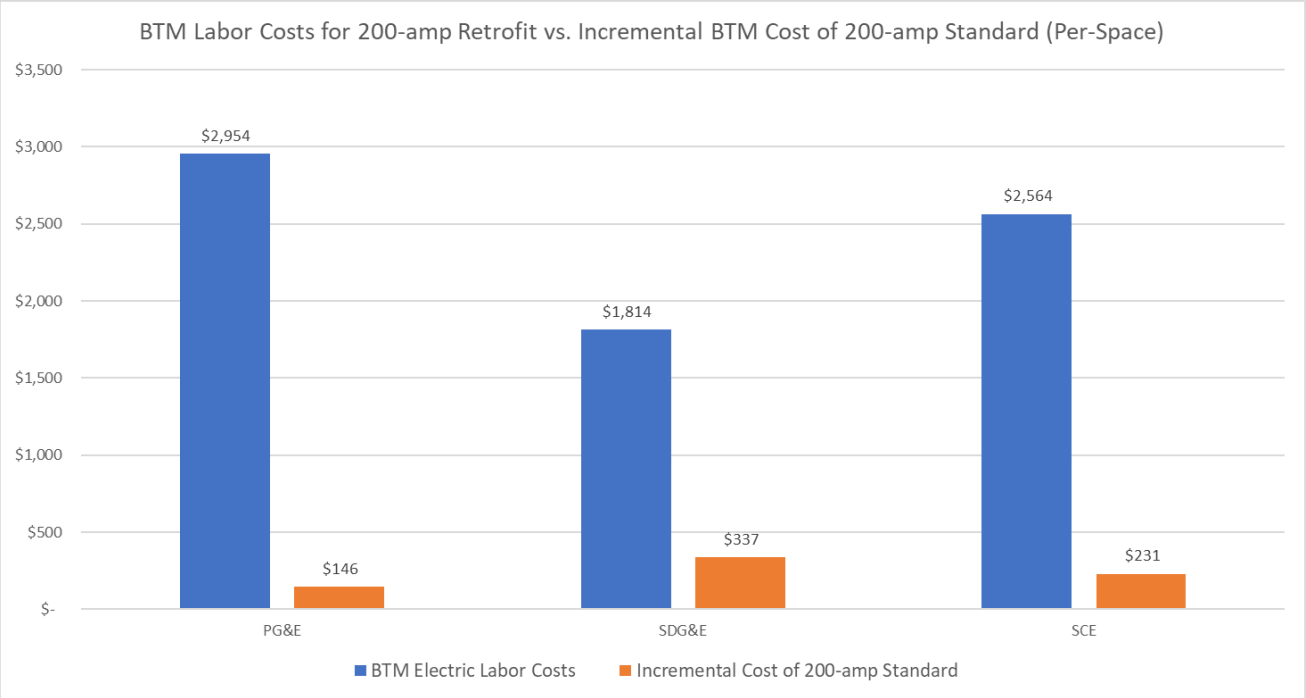
Table 15: Labor Costs for Installing BTM Electrical Infrastructure[144]

	PG&E	SDG&E	SCE
BTM Electric System Labor Costs	$4,168,932	$2,382,364	$3,325,729
Total Electric BTM costs	$4,956,669	$4,695,748	$5,764,087
% Labor of Total BTM Costs	84.1%	50.7%	57.7%
# of BTM spaces converted (electric)	1,411	1,313	1,297
Per-space BTM Electric Labor costs	**$2,954**	**$1,814**	**$2,564**

The BTM labor costs for retrofitting an already-converted MHP to 200-amp service in the future can be anywhere from 540% (SDG&E) to 2,000% (PG&E) of the incremental costs of installing a 200-amp service standard as part of the MHP Program, as depicted in the graph below:

[144] PG&E, SDG&E, and SCE 2022 Annual Reports for the Mobilehome Park Utility Conversion Program.

Figure 8: 200-amp BTM Retrofit Costs vs. Incremental BTM Costs for Mandating 200-amp Standard



Most MHPs on the priority list for conversion likely lack the resources to maintain their existing systems to modern safety standards or pay for additional electric system upgrades. The MHP Program should ensure that any BTM upgrades up to the junction box necessary to accommodate a 200-amp standard are considered as standard, reimbursable costs to the MHP operator, though the program may continue to exclude costs for special permits, common area construction costs, and alternative construction arrangements that differ from the most "cost-effective" design offered by the IOUs. This approach is consistent with the original purpose of this program: to incentivize MHP owners to convert their sub-metered energy systems to safer, direct-metered service to each MH.

4.3 Adding an Initiative for MHP Electrification

Staff recommend that the CPUC commence a limited $50 million initiative (Initiative) to explore the costs, barriers, and impacts of fully electrifying MHPs through the MHP Program. This Initiative should seek to fully electrify all homes in an MHP and include 200-amp service upgrades to the home, replacement of gas appliances with efficient, all-electric appliances, and any in-home remediation work necessary to accommodate electrification. Each MH should have panel capacity to accommodate future Level 2 EV charging. Fully electrified MHPs should receive updated, direct-metered electrical systems *only*, and since

these homes will no longer rely on gas appliances there should be no replacement of gas infrastructure. Participating Initiative MHPs should also receive TTM and BTM infrastructure upgrades to accommodate electrification of MHP common areas so as to eliminate the need for any gas infrastructure in the park. In addition to existing and future heat pump appliance incentive programs, the Initiative should leverage other existing programs, including the Energy Savings Assistance (ESA) program for weatherization measures and the SGIP for solar and storage installations.

Mobilehome Park Selection Criteria

This electrification Initiative should include a mix of different types of parks and MH conditions to ensure that data is collected across a variety of conditions. The parks should reflect a mix of the following conditions:

- **Number of MH lots served**: HCD reports that the average number of lots per MHP, among those that have 2 or more MH lots, is 80 spaces.[145] Staff find it reasonable to therefore target parks with fewer than 80 spaces and more than 80 spaces. Choosing parks of different sizes would also enable cost comparisons between smaller and larger parks; the IOUs already report conversion cost differences between park sizes, with higher costs for smaller parks.
- **MH ages**: Parks chosen should represent a spectrum of home ages: namely, there should be some parks that primarily comprise MHs built before 1976—when the HUD MH standards were first established— and some parks should contain a majority of MHs built after 1976. This will allow the program to assess the feasibility and costs of remediation measures, especially electrical work, for these two types of homes.

PG&E, SDG&E, and SCE should each target, at minimum, four parks in their respective service territories, for a minimum of 12 parks across the largest three electric IOUs. Assuming an average of 80 spaces per park, 12 parks would suggest a target of around 960 spaces. Staff suggest this as a rough target, but ultimately recommend that the number of parks be limited by the cost cap of the program, given the uncertainty around per-space electrification costs. Staff recommend a $50 million cost cap for the Initiative, which will be discussed below.

[145] For access to HCD's MHP database, see: https://casas.hcd.ca.gov/casas/cmirMp/onlineQuery/?f=LPL6x6dbedVwyoQGFlZnSZHyZ9j3yvwfA7Fy7Fx8xW0=. Database accessed March 21, 2023.

One of the largest barriers to implementing the proposed Initiative will be receiving MHP owner consent to install only electric system upgrades and forgo gas infrastructure upgrades, as well as receiving homeowner consent to install full electrification measures in each home. A common ownership structure in MHPs is one in which the MHP owner owns the parcel of land, and the residents own the manufactured home. As pointed out by WMA, PG&E, SoCalGas, and SDG&E in response to the March 20-21, 2019 Workshop and Scoping Memo Questions, receiving consent from 100% of residents for full electrification may be difficult.[146] Staff recommend that, if possible, IOUs choose parks where a consenting MHP owner owns both the land and the coaches, thus eliminating the risk that a single homeowner could reject full electrification and delay or prevent successful execution of a full-MHP electrification initiative. However, if there are MHPs wherein the owner and all the resident homeowners agree to full electrification, these parks should absolutely be considered for the Initiative.

The Initiative parks should also have previously had both gas and electric infrastructure prior to full electrification, in order to collect data on the cost impacts of moving from gas to all-electric. Mixed gas and electric MHPs comprise the majority of parks that have been converted thus far in the program, thus it would be most helpful to gather Initiative data from this kind of park. This is also consistent with the prioritization criteria of the current proceeding, which directs utilities to prioritize MHPs with sub-metered gas and electric systems, or just gas sub-metered systems. While D.20-04-004 makes note that electric-only or electric and propane-reliant parks may be the best candidates for electrification, as noted by some parties, the decision also notes that MHPs with only sub-metered electrical systems tend to reside in high-wildfire threat areas and are subject to public safety power shutoff events, and thus reliability may be a concern for fully electrified homes unless additional measures, like on-site generation and storage are also considered, which may not be feasible for every home considered in this initial Initiative.[147] For all these reasons, Staff suggest limiting the Initiative to only parks with existing access to gas and electricity, and excluding MHPs that rely on propane.

Parks should ideally be located in under-resourced communities, as listed in the EBD draft guidelines, to ensure that those receiving the electrification benefits are those who may not otherwise have

---

[146] See comments on March 20-21, 2019 Workshop and Outstanding Scoping Memo Questions: WMA at 7, PG&E at 10 and SoCalGas & SDG&E at 13-14. WMA's comments: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M290/K872/290872397.PDF; PG&E's comments: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M289/K993/289993747.PDF; and SoCalGas & SDG&E's comments: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M290/K872/290872379.PDF.

[147] D.20-04-004 at 88.

the financial means to pursue these upgrades[148]. An under-resourced community is one that meets one or more of the following criteria:[149]

- Disadvantaged community as designated by the California Environmental Protection Agency for the purposes of SB 535
- Census tracts with median household incomes at or below 80 percent of the statewide median income
- Census tracts with median household incomes at or below the threshold designated as low-income by HCD

If there is sufficient interest in the Initiative to merit a priority list, MHPs in under-resourced communities should be prioritized. However, if only a few MHPs express interest in the Initiative, and the $50 million allocated can serve all interested MHPs, all MHPs in this scenario should be allowed to participate in the Initiative even if they are not located in under-resourced communities. Staff recommend the latter exception to ensure that there is sufficient participation in the Initiative so that the CPUC can collect adequate data to inform future iterations of this Initiative.

Staff also recommend that MHPs meeting the following criteria should be prioritized:

- An MHP that is best able to advance the goals of the long-term gas planning process (R.20-01-007) and strategic decommissioning of gas distribution infrastructure
- An MHP that can demonstrate that the municipality in which it is located is willing and able to provide additional funding for BTM electrification work

Given these specific criteria, Staff recommend that the IOUs be allowed to choose parks across the Category 1 and Category 2 lists and to prioritize these parks for upgrades alongside the parks at the top of the priority list. Currently, IOUs are directed to prioritize parks highest on the list, but Staff believe that it is unlikely that all of the highest priority parks will agree to full electrification. In the interest of implementing this Initiative in a reasonable amount of time, Staff recommend that the IOUs be allowed to choose from among all the high-risk parks across the Category 1 and 2 lists.

---

[148] See EBD Draft Guidelines at 7.
[149] Underresourced communities are those identified pursuant to Section 39711 of the Health and Safety Code, subdivision (d) of Section 39713 of the Health and Safety Code, or subdivision (g) of Section 75005. See CARB's map of these areas here: https://webmaps.arb.ca.gov/PriorityPopulations/.

Initiative Implementation

The Initiative should keep most elements of the current MHP Program, but it should eliminate gas system installations and increase the electric service standard to 200 amps for all lots and common areas. The Initiative's in-home measures can mirror most installation elements of the SJV Program, including the removal of existing gas appliances and replacement with electric-only appliances. Specifically, the Initiative should install a new heat pump HVAC system, heat pump clothes dryer, HPWH, and induction cooking equipment. Residents should be notified that they may be required to buy new cookware if their existing pots and pans are not induction compatible. All homes should receive necessary in-home remediation measures, including any rewiring, panel upgrades, and general in-home work to accommodate new appliances and ensure that the MH passes code inspections for the newly installed measures. All participants in the Initiative should be automatically moved to an all-electric baseline allocation. Participating homes should also receive infrastructure necessary to accommodate future Level 2 EV charging and solar PV system installation if desired. It may be helpful for program implementers to consider technologies that allow customers to manage their loads and enable load switching, such as smart circuit sharing devices.

At this time, the Initiative should not consider any additional BTM electrification measures for common area facilities that go beyond the external point of connection to the facility. However, these facilities should be given 200-amp electric service, at no additional cost to the MHP owner, to accommodate any additional electrification measures the MHP owner wants to install independently.

Staff recommend that the IOUs maintain responsibility for finding and managing the contractors necessary to complete the additional BTM full electrification work required in the Initiative. PG&E and SCE have existing knowledge about implementing electrification measures from the SJV Program and can leverage lessons learned to implement BTM electrification work behind the junction box. Staff encourage PG&E, SCE, and SDG&E to work together and share information on how to best implement in-home electrification measures. Staff expect that having the IOUs as the only entity coordinating contractors will ensure more efficient implementation of electrification measures in participating Initiative parks. IOUs must use competitive bidding to select contractors, and all workers performing BTM electrification installations should be paid prevailing wage. Staff recommend that the Initiative adhere to the final EBD program guidelines for wages and workforce standards when they become available.

Staff also recommend that the IOUs partner with other institutions, such as POUs, community choice aggregators, or local governments, who express interest in electrifying MHPs in their respective service areas.

Justification for a Mobilehome Park Electrification Initiative

As California moves toward building and vehicle electrification, MHPs are at greater risk of being left behind. MHPs are an important source of affordable housing in California, and the majority of MHP tenants are low-income households or seniors on fixed incomes. While mandating a 200-amp standard is a crucial step toward enabling MHP electrification, homes in these parks may still face several barriers to switching from gas to all-electric end uses. As mentioned above, the cost of remediating older MHs to accommodate all-electric appliances can cost thousands of dollars. Purchasing and installing appliances can add $20,000 or more to these costs, making electrification prohibitively expensive for MHP residents, who may need to instead continue relying on gas appliances.

As more households electrify and leave the gas system, remaining gas customers will face higher gas rates, as there will be fewer customers over which to spread the fixed costs of maintaining and operating the gas system. Most MHP households already spend a greater percentage of their income on energy costs, a burden which will be exacerbated by remaining on the gas system in the long run.[150] Financing options are also limited for MH owners; since those owners must pay higher interest, shorter tern personal loans instead of mortgages, their ability to take out additional loans for electrification upgrades will likely be limited. Given the cost barriers, MHP residents will likely need substantial financial and technical assistance to achieve full home electrification.

Federal and state policies call out the need to center under-resourced and vulnerable communities in the transition to building electrification, with many policies and programs offering specific funding for these target populations. The federal IRA's primary building electrification programs, HOMES and HEEHRA, direct billions of dollars to low-income households, with maximum rebates reserved for the lowest income households.[151] On the state level, the CEC's 2021 IEPR recommends that the CPUC should "prioritize and fund decarbonization retrofits and supporting resources in low-income and disadvantaged communities" and "researching and collaborating to reduce energy burden."[152] CARB's 2022 Scoping Plan remarks: "Low-income homeowners are less likely to be able to afford the upfront costs of new electric equipment without substantial support. Because existing buildings in frontline and low-income communities tend to be older and have more deferred maintenance, the retrofit cost to these homeowners is generally higher than that of

[150] Drehobl, A., L. Ross, and R. Ayala. 2020. *How High Are Household Energy Burdens?* Washington, DC: American Council for an Energy-Efficient Economy. See: https://www.aceee.org/research-report/u2006.
[151] See: https://www.energy.gov/articles/biden-harris-administration-announces-state-and-tribe-allocations-home-energy-rebate.
[152] CEC's 2021 IEPR: Volume 1, at 180. See: https://efiling.energy.ca.gov/GetDocument.aspx?tn=241599.

higher-income homeowners."[153] The CPUC's own ESJ Action Plan underscores the need to invest in clean energy resources and integrate equity across programs. An Initiative aimed at expanding electrification in MHPs, many of which serve low-income communities, would work toward these equity goals.

WMA's response to the August 5, 2020 ALJ ruling states that an MHP electrification initiative may not be appropriate, given that many MHs in the state are past their useful life and that coach replacement may be more appropriate given the potential costs of home remediation.[154] While Staff acknowledge that coach replacement may be the ideal option, this may not be financially feasible for many homeowners, and such an option is not within the scope of the CPUC's authority. While HCD announced in May 2023 up to $10 million for MH upgrades and replacements via its Manufactured Housing Opportunity and Revitalization (MORE) Program, it is unclear which MH residents qualify for the funds and the amount of funding available per resident for MH replacement.[155] Furthermore, preliminary data from the SJV Program indicate that while MH electrification retrofits may be expensive, they still may cost far less than purchasing and installing a brand new coach.[156] A pilot program led by the Energy Trust in Oregon aimed at replacing MHs with new coaches reported project costs ranging from $75,000 to $123,000 for singlewide replacements, which far exceed the remediation costs reported by the SJV Program.[157] An MHP electrification initiative would likely cost less per coach and accelerate MH electrification to the pace needed to meet the state's broader building electrification goals.

Waiting for MH owners to replace their homes with newer, all-electric homes will mean many MHs will be stranded with gas-based homes for years. Replacement of homes may also be financially untenable for residents, given that cost for a new MH averaged $86,200 for a singlewide and $167,300 for a doublewide in October 2022.[158] Financing may not be a viable option, either: the Consumer Financial Protection Bureau found that only 27% of MH loan applications resulted in fully financed loans even after

---

153 CARB 2022 Scoping Plan, Appendix F: Building Decarbonization at 20-21. See: https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp-appendix-f-building-decarbonization.pdf.
154 WMA's comments in response to August 5, 2020 ALJ ruling at 4-5. See: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M348/K886/348886962.PDF.
155 See HCD's MORE Program Notice of Funding Availability from May 2, 2023, at 15-16: https://www.hcd.ca.gov/grants-and-funding/programs-active/manufactured-housing-opportunity-and-revitalization-program#deck-section-1.
156 The SJV program estimates remediation costs of ranging from $500 – $22,300. Costs for new appliances were approximately $20,000, according to the Pilot Administrator's annual reports (see SCE 2022 Annual Report at 11). In total, this sums to around $43,000. Even the smallest manufactured home at under 400 square feet, purchased new, in California, costs around $75,000 not including taxes and shipping. See: https://www.thehomesdirect.com/park-models
157 "Energy Trust of Oregon: Manufactured Home Replacement Pilot Evaluation," August 12, 2020, Opinion Dynamics at 5. https://www.energytrust.org/wp-content/uploads/2021/05/Manufactured-Home-Replacement-Pilot-Evaluation_Final-.pdf
158 Manufactured Housing Survey from the U.S. Census Bureau. See: https://www2.census.gov/programs-surveys/mhs/tables/time-series/mhstabavgsls.xlsx.

controlling for credit scores. MH buyers also largely rely on personal property (chattel) loans (42% of all MH loans in the U.S) instead of traditional mortgages to finance purchases, because many MH owners do not own the land on which they plan to place their MH, a requirement for mortgages.[159] Chattel loans generally have shorter loan periods and higher interest rates than traditional mortgages, and result in even fewer fully financed loans (20.5%) compared to site-built homes (73.9%).[160] In 2022, only 3,716 new MHs were shipped to California; given that 165,823 spaces remain in the queue for conversion, it could take decades before the current stock of MHs turns over to new homes.[161, 162] Staff's suggested Initiative would be the first step toward discerning how to ensure MHP residents also receive the electrification benefits that many homes in the state are already reaping.

Lastly, the CPUC is continuing to explore pruning of the gas distribution system as part of the Long-Term Gas System Planning rulemaking (R.20-01-007). Given that the current MHP program seeks to replace aging gas infrastructure for a defined cluster of residences, it may be beneficial to explore the feasibility of electrifying MHPs now, as the CPUC continues to refine the framework for decommissioning gas distribution infrastructure.

Collecting Important Metrics and Data

An Initiative would be the most appropriate way to explore if and how full MHP electrification can be a financially feasible option for the existing MHP Program, and what impacts it may have on residents. Importantly, such a program could answer important cost, usage, load, and bill impact questions that are crucial for expanding this Initiative, and can also inform broader building electrification efforts.

Staff recommend that the CPUC coordinate with the CEC on metrics and data collection to align the Initiative with the EBD program, insofar as is practical.[163] In addition to this data, Staff recommend that the Initiative collect, at minimum, the following data, in coordination with the IOUs:

---

[159] See: https://www.consumerfinance.gov/data-research/research-reports/manufactured-housing-finance-new-insights-hmda/ at 4.

[160] Analysis of Home Mortgage Disclosure Act Data found that the average chattel loan for manufactured housing "cost consumers 4.4 percentage points more per year than the average mortgage for manufactured housing." See: https://www.urban.org/urban-wire/more-mortgages-manufactured-homes-could-mean-more-affordable-housing. For manufactured home loan information, see: https://files.consumerfinance.gov/f/documents/cfpb_manufactured-housing-finance-new-insights-hmda_report_2021-05.pdf.

[161] "Annual Totals of Shipments to States: 1994 – 2022," Manufactured Housing Survey, U.S. Census Bureau, https://www2.census.gov/programs-surveys/mhs/tables/time-series/annual_shipmentstostates.xlsx

[162] Data from CPUC Gas Safety and Reliability Branch.

[163] See EBD Draft Guidelines at 19-20.

- Costs for remediating MHs in MHPs to accommodate electrification, including specific data for pre-HUD code homes and post-HUD code homes;
- Barriers to retrofitting existing MHs for electrification;
- Impacts on total energy costs for homes transitioning from gas and electric MH to a fully electric home;
- Total monthly energy usage of all-electric MH; and
- Energy loads of all-electric MHs.

While the SJV Program data provides similar data, the proposed Initiative would be fundamentally different in a few ways. First, the SJV Program focuses on fuel switching from propane and wood, which are generally more expensive fuel sources than gas. Second, the SJV Program focuses on a mix of MHs and single-family homes, resulting in a small sample size of around 94 MHs (as of March 2023) that were actually electrified (44 from PG&E, 9 from RHA, and 41 from SCE) compared to a total of 652 households treated. While a useful starting point, this is too small a sample size to make a definitive determination on realistic average MH remediation costs. Third, the SJV Program focuses on MHs on privately owned lots; none were in MHPs. The way many of the SJV Program's participating homes were situated in relation to the main service connection resulted in extensive trenching between the main service panel (where the IOU's electric service line ends) to the home's internal subpanel. Because the costs for this work were lumped together with actual in-home remediation work, it significantly added to the total remediation costs for participating MHs.[164] In the MHP Program, all electrical work to the junction box outside the MH is already included in program upgrades, and no trenching occurs beyond the meter pedestal. Thus, the SJV Program MH remediation costs (through March 1, 2023), which ranged from $526-$22,293 per home, may not accurately reflect the in-home portion of electrification work that would be additional to the MHP Program.

SJV Program remediation data may also be incomplete, as some of the more difficult homes to remediate have not been fully electrified as of March 2023, and some homes were denied participation due to excessive remediation costs. Pilot Administrators reported that 36 homes in PG&E's territory were not fully electrified for a variety of reasons, including remediation costs that exceeded the $25,000 available in the program, and infeasible or cost prohibitive trenching due to obstructions (e.g., fences, permanent

[164] RHA 2022 Annual Report, at 17; PG&E 2022 Annual Report, at 14; and SCE 2022 Annual Report at 10, all filed for SJV Program (R.15-03-010).

structures, etc.) on the MH property.[165] In order to fully evaluate the costs of expanding this program to include full MHP electrification, the CPUC would benefit from collecting actual remediation cost data for MHs specifically located in an MHP through a dedicated Initiative.

An Initiative would also provide critical bill and energy use impact data on homes that switch from gas to all-electric appliances. This data will be crucial to understanding how home electrification may impact a household's energy use patterns, overall usage, and costs. Very little data exists on how fuel substitution affects MHs in particular, which generally have energy costs double that of site-built homes, on a per-square foot basis, due to lower energy efficiency construction standards.[166] SJV Program preliminary bill impact data has been sought as a reference in other proceedings for how whole-home electrification can affect households' overall energy savings, since it is one of the few programs that tracks this data for fully electrified homes. An MHP electrification Initiative could offer valuable insight into electrification bill impacts not only for this program, but also for future building electrification efforts.

Leveraging Existing Programs

Initiative participants should be encouraged to leverage existing installation programs, namely the ESA program, Disadvantaged Communities – Single-Family Solar Homes (DAC-SASH), TECH, and the SGIP battery storage and HPWH programs. ESA provides zero-cost weatherization services to low-income households who are eligible for CARE. Given MHs are much less energy efficient than site-built homes, ensuring eligible Initiative participants take advantage of ESA will be critical for reducing overall energy usage and costs for the home. SGIP's HPWH program sets aside incentives for HPWH installations and panel upgrade costs and can help defray these specific electrification costs, if households qualify. DAC-SASH provides low or no-cost solar installations to customers living in disadvantaged communities, and SGIP's Equity Budget allocates 25% of SGIP's funds to provide low to no-cost home energy storage. These two programs can help offset additional electricity usage from home electrification, and potentially help reduce overall energy costs for participants. DAC-SASH and SGIP may have limited applicability, given the roofs of many MHs are not able to support solar panels, and solar installations would likely require extra work for roof reinforcement. Nonetheless, Initiative participants should be made aware of these programs and decide whether or not these options are feasible for their particular situation.

---

[165] E-mail communication with PG&E Pilot Administrator on March 1, 2023.
[166] "Mobilizing Energy Efficiency in the Manufactured Housing Sector," ACEEE, July 2012. See: https://www.aceee.org/sites/default/files/publications/researchreports/a124.pdf.

The SJV Pilot Administrators encouraged program implementers to become qualified ESA and SGIP contractors to help authorize and enroll participants in these programs while also conducting work for the SJV Program. This efficient approach should be considered for the Initiative where possible to ensure that customers only need to be contacted once for these programs and to enable installations to happen simultaneously.

The Initiative should also integrate measures to incorporate demand flexibility to the fullest extent possible, including leveraging outcomes from the California Flexible Unified Signal for Energy framework, and should include allowing participants to participate in load reduction and load shifting programs.

Leveraging Bill Savings Programs

The following programs should be leveraged to ensure Initiative participants can maximize savings on their electric bills:

1. CARE, which offers low-income customers a minimum 20 percent discount on rates.[167]
2. FERA, which allows households with three more people, who also meet income guidelines, to receive an 18 percent discount on electric rates.[168]
3. HPWH demand response programs, including PG&E's WatterSaver program, any similar programs established in the future, which will allow customers to install "smart," grid-connected heat pump water heaters and optimize water heating during times when energy costs are lowest.
4. Disadvantaged Communities Green Tariff (DAC-GT) program offers customers in disadvantaged communities the opportunity to use utility-scale clean energy and receive 20% off their electric bill.
5. Community Solar Green Tariff (CSGT) programs offer customers 20% off their electric bill if they live in a disadvantaged community and are located within five miles of a community solar project.

The DAC-GT program availability varies by service territory. Currently, PG&E's program auto-enrolls customers who have been prioritized based on likelihood of disconnection due to missed payments; the program is full and has a waitlist. SCE and SDG&E have not yet procured projects to begin enrolling

[167] Submetered customers are already eligible for CARE, but this pilot should ensure all residents participating in the pilot receive CARE discounts.
[168] Similar to CARE discounts, submetered customers are also already eligible for FERA, but pilot participants should be enrolled in FERA if they do not already participate in this program.

customers. Only three of the nine participating community choice aggregators have procured resources to begin enrolling customers; two have already filled their capacity. The CSGT program projects are still in development and no customers have yet been enrolled. The CPUC is also exploring the next phase of community solar programs, which this Initiative may consider taking advantage of when they become available.

Bill Protection Measures

This Initiative should consider time-limited bill protections for residents, as the cost impacts of switching from gas to all-electric are uncertain, and part of this Initiative's intent is to explore the bill impacts of electrification on MH residents moving off gas.

The SJV Program, which provided electrification measures to homes, including many MHs, indicates that bill protection measures have been necessary to protect participants from overall increases in their post-electrification energy costs (see Appendix D). The SJV Program mandates bill protection measures that are capped at 10 years for participants receiving electrification measures.[169] For the first five years after the first electric appliance is installed in a participant's home, PG&E and SCE offer a 20% SJV-specific bill protection discount on participants' monthly electricity bills. An evaluation of participants' total energy cost savings will be conducted three years and six months after the first participant receives the bill protection discount. If most of the homes in this evaluation (except for "statistical outliers") experience cost savings, the 20% SJV Program discount will be reduced to 10% for an additional five years. If, however, the evaluation finds that homes experience an increase in energy costs, then the 20% SJV Program discount will continue for an additional five years. In addition to the SJV Program discount, participants receive an additional 20% bill discount through enrolling in the CSGT or DAC-GT; if neither are available, or if a customer is ineligible for either program (such as no CSGT projects sited within 40 miles of the community), then the customer will receive a 20% transitional community solar discount instead. All of these discounts will be in addition to CARE/FERA and medical baseline discounts for eligible customers.

SJV Program preliminary data indicate that customers saved in overall energy costs in SCE and PG&E service territories only after bill discounts were offered (See Appendix D for detailed analysis of SJV

[169] Resolution E-5034, "Resolution authorizing bill protection approaches for Pacific Gas and Electric Company, Southern California Edison Company, and Southern California Gas Company San Joaquin Valley pilot participants pursuant to Decision 18-12-015" at 30-32.

Program discounts).[170,171] Notably, all pilot households only needed one of the 20% discounts to realize bill savings. The preliminary bill impacts for RHA and SCE households are listed in Appendix D (PG&E is in the process of submitting updated bill impact summaries, since it recently found errors in its previous numbers, so their data was not available at the time of writing this staff proposal.). While SJV Program data offer preliminary insight into the energy cost impacts of electrification, the final impact evaluation has not yet been performed for the SJV Program to draw formal conclusions.

SJV Program cost data are also based on pre-electrification energy costs using wood and propane, and not gas, as would be the case in this MHP electrification Initiative. Given that gas is generally less expensive than these alternative fuel sources, MHP Initiative participants may see a larger increase in their energy costs post-electrification than SJV Program participants.

Given the pending results from the SJV Program and given that no formal evaluation has been conducted specifically on the bill impacts of switching gas-and-electric MHs to fully electric end uses, Staff recommend the Initiative adopt bill protection measures for fully electrified MHPs to ensure residents are not harmed by potential bill increases. The specific bill protection measures should factor in a MH-specific fuel substitution bill analysis provided by the IOUs using the estimated average gas usage in the top 20th percentile of MHPs. This analysis should model post-electrification electric loads and usage, and factor in current electric rates to derive the potential bill impacts that MH residents may experience after switching from gas to all-electric end uses. Staff recommend that such bill protection measures be treated as expenses, collected by IOUs through the electric PPP surcharge.[172]

Tenant Protection Measures

Staff recommend that the Initiative require tenant protections for renters residing in participating MHs. The Initiative should seek to follow the guidelines for tenant protections as laid out in the final EBD guidelines, insofar as is practical. The current draft guidelines stipulate that "property owners shall be subject

[170] RHA communities are in PG&E's territory.
[171] This bill impact data is preliminary; each Pilot Administrator (PA) will conduct formal bill impact evaluations after all installations are complete. The annual averages are based off quarterly bill impact data submitted by each PA. Each quarterly report only reports bill impacts for customers who have received full home installations for the full three months of the previous quarter. As more installations are completed, more customers are included in the bill impact summaries for each successive quarter.
[172] Staff do not recommend using EBD funds to cover the costs associated with bill protection, as this does not fall under the purview of allowable EBD expenditures.

to all applicable state and local laws regarding tenant displacement, eviction, and rent increases."[173] Additionally, tenants should be given clear and complete information in the predominant language spoken in the mobilehome park regarding:

- Measures that will be installed;
- Estimated duration of construction and hours of construction;
- Whether the tenant will need to be temporarily displaced; and
- Tenant rights regarding displacement, rent increase, and eviction.

Insofar as possible, projects should try to avoid temporary displacement of tenants; if tenants must temporarily move, they shall be given the right of return to the same unit after all construction is finished. Property owners should also commit in writing that tenants should not be evicted "before, during, or after the project without just cause as defined in California Civil Code Section 1946.2," and that the measures installed should not be the reason for just cause eviction or rent increases.[174]

Funding and Ratepayer Impacts

This Initiative should seek to leverage non-ratepayer funding where possible. The following programs offer incentives that can help to cover remediation costs, appliances, and labor costs:

- CEC's EBD Program, currently being formulated, which will offer both direct installation retrofits and incentives for electric appliances;
- Existing CPUC programs providing heat pump appliance incentives, such as the TECH Initiative, SGIP HPWH Program, and energy efficiency fuel substitution programs that promote electrification technologies;
- State and federal weatherization programs, including California's ESA Program and the federal Weatherization Assistance Program and Low-Income Home Energy Assistance Program, to make homes more energy efficient and reduce overall energy costs;
- Federal incentives, primarily IRA incentives outlined in the HEEHRA, which will provide up to $14,000 for low-income households for rewiring, panel upgrades, weatherization, and appliances;[175] and

[173] See EBD Draft Guidelines at 21.
[174] *Ibid* at 22.
[175] See: https://www.energy.gov/articles/biden-harris-administration-announces-state-and-tribe-allocations-home-energy-rebate.

- HCD programs aimed at rehabilitating MHs.

Staff propose that the Initiative prioritize using non-ratepayer funds, including EBD Program funds, to the extent they are available and applicable at the launch of the Initiative.[176] Staff recommend that the Initiative align with the EBD Program's final guidelines where possible, should the CEC decide to provide some funding to the proposed Initiative. If EBD funds are insufficient to cover Initiative implementation, Staff suggest using funding from existing programs, including those listed above, as well as any other non-electric-ratepayer funds that are available. The Initiative should also strive to leverage any local government funding, to the extent it is available, to cover electrification measures. Using electric PPP funds to cover the cost of this program should be considered only after alternative funding options are exhausted, to minimize rate impacts on electric customers.

A $50 million initial Initiative budget would enable full electrification of approximately 1,405 MHs. This assumes a conservative $33,800 per-space estimate for full electrification work ($47.5 million total), as estimated in Section 3.2, and includes all remediation work and appliance purchases and installations. This estimate also assumes that 5% of the budget ($2.5 million) would be set aside for administrative and outreach costs.

If $50 million of electric PPP funds are used to fully fund this Initiative, the expected average annual bill impacts on bundled, non-CARE customers are expected to range between $1.71-$2.95 for the three large electric IOUs.

Table 16: Annual Electric Bill Impacts Using $50 million of Electric PPP Funds[177]

	Annual Bill Increase for Electric Ratepayers[178]
PG&E	$1.71
SDG&E	$1.98
SCE	$2.95

[176] CEC and CPUC Staff are coordinating on aligning these efforts and will continue to do so until the final EBD guidelines are developed.
[177] These impacts assume 2023 electric rates.
[178] Bundled, non-CARE customer.

Cost Recovery

Any Initiative expenses not covered by these funding sources, and which are not included in the existing scope of the MHP Program (TTM and BTM upgrades up to the junction box) should receive similar treatment as in the SJV Program, wherein IOUs record all BTM costs beyond the junction box (i.e., costs for home remediation, appliances, and appliance installations) as expenses, recoverable through PPP surcharges. The IOUs should record these costs in a one-way balancing account since the cost of the Initiative is uncertain and should be subject to CPUC approval.

5. Conclusion

California must rapidly decarbonize its buildings sector to reduce the state's overall GHG emissions and meet its climate goals of carbon neutrality by 2045. Electrifying existing homes plays an essential role in achieving these goals. Expanding these electrification efforts to MHPs, whose residents are primarily low-income, ensures that vulnerable populations are not left behind in California's climate transition. Adopting the recommendations in this Staff Proposal would (1) ensure that MHs receive a 200-amp service standard, eliminating a common barrier to home electrification and at-home Level 2 EV charging and (2) take the first steps toward initiating a full-home electrification component of the existing MHP Program by establishing an initiative to explore impacts and cost considerations. Staff reiterate that 200-amp service is not necessarily required for full home electrification, but given that this program installs new electric infrastructure, Staff believe that such infrastructure should be built to modern standards and accommodate 200-amp service. These efforts directly complement the CEC's newly established EBD Program and fulfill priorities set forth in that agency's Integrated Energy Policy Report. Staff's recommendations also fall directly in line with CARB's 2022 Scoping Plan's recommendations, which urge the State to center building decarbonization efforts on existing buildings and in low-income communities.

Staff's recommendation of a $50 million Initiative would allow for full electrification of approximately 1,405 MHs. While Staff's recommendations for a new MHP electrification Initiative will incur additional costs, the influx of over $1 billion of public funding across all levels of government will more than likely help to offset costs borne by ratepayers. Data from the proposed Initiative will also help the CPUC consider the applicability of requiring a 200-amp service standard in other proceedings or instances where utilities are required to conduct trenching to upgrade existing electric, and perhaps even gas, infrastructure. This may help to further prepare the state's electric distribution infrastructure in anticipation of increased building and vehicle electrification.

The CPUC should capitalize on existing programs to expand its building electrification policies, given the monumental task of decarbonizing the majority of buildings across the state. Staff's recommendations steer the MHP program in this direction, and in doing so, also advance important equity goals adopted by the CPUC, the State, and the Federal government.

Appendix A: HCD Manufactured Home Electrical Load Worksheet

STATE OF CALIFORNIA — DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

Division of Codes and Standards
Manufactured Home Electrical Load Worksheet
Title 24. Housing and Urban Development Section 3280.811

NOTE: 1 WATT = 1 VOLT-AMPERE

DTN:_____ Existing Home Amps:_____

A. Lighting: Length of home times width of home (outside dimensions) = square foot, times 3 watts per square foot
Length_____ X Width_____ x 3 watts.....=_____watts

B. Small Appliances: Enter number of 20-amp small appliance (exclude laundry) circuits, times 1,500 Watts.
Number of circuits_____ x 1,500 watts.....=_____watts

C. Laundry: Include 1,500 watt minimum if installed.....=_____watts

D. Total (the sum of lines A, B and C):..... =_____watts

E. First 3,000 watts at 100%.....=_____watts

F. _____ (FROM LINE D) minus 3,000 = _____watts multiplied by 35% (.35).....=_____watts

G. Net computed load (SUM OF LINE E AND LINE F)..... =_____watts

H. _____ (FROM LINE G) watts divided by 240 volts..... = _____amps per leg

LOADS IN AMPS - PART 1	LEG A	LEG B
1. Lighting & small appliances (line H above)		
2. Bath fan 1		
3. Bath fan 2		
4. Range hood		
5. Freestanding electric range ***		
6. Electric furnace *		
7. Electric space heater		
8. Exhaust Fans		
9. Air conditioner *		
10. Gas furnace blower motor *		
11. Other		
12. Add 25% of the largest motor from line 6, 7, 8, 9 or 10 above		
13. SUB-TOTAL		
LOADS IN AMPS - PART 2		
14. Disposal		
15. Electric water heater		
16. Dishwasher		
17. Electric wall mounted oven		
18. Electric cooktop		
19. Electric clothes dryer **		
20. Other		
21. SUB-TOTAL		
22. If 4 or more appliances are used in Part 2, use 75% of line 21		
23. **TOTAL LOAD IN AMPS (combine Parts 1 & 2)**		

- 1 kW = 1000 watts; 1 volt ampere = 1 watt; watts divided by volts = amps
- Use nameplate ratings on fixtures/appliances for load values.
- Determine values for freestanding range based on name plate rating and table below. (A reduction is allowed)
- If de-amping an MH-unit, a permit from HCD is required. Use HCD 415 Application, include $196.00 in fees, complete and attach this form and indicate on the HCD 415 what electrical loads will be reduced or eliminated to reduce the loads to the desired level.
- A 15 amp evaporative cooler circuit must be included in the calculations if the home is de-amped to 50 amps.

* Omit smaller of air conditioning and heating ampere load.
** If home is wired for electric dryer but the dryer is not installed, use 21 amp value.
*** Derive amps for free-standing range (as distinguished from separate oven and cooking units) by dividing values below by 240 volts.

FREESTANDING RANGE REDUCTION TABLE

Nameplate Rating (in watts)	Use (in watts)
10,000 or less	80 Percent of rating
10,001 to 12,500	8,000
12,501 to 13,500	8,400
13,501 to 14, 500	8,800
14,501 to 15,500	9,200
15,501 to 16,500	9,600
16,501 to 17,500	10,000

HCD-MH 527 (REV. 10/2013)

STATE OF CALIFORNIA — DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

Division of Codes and Standards
Manufactured Home Electrical Load Worksheet
Title 24. Housing and Urban Development Section 3280.811

NOTE: 1 WATT = 1 VOLT-AMPERE

Example:

A 24 x 60 MH-unit is equipped with the following equipment. Calculate all loads and "balance" the 120 v load.

Two small appliance circuits
Two bath fans: 1 rated 1.2 amp/120 v, 1 rated 1.7 amp/120 v
Freestanding electric range: 13.2 kW/240 v
Electric Furnace: 10.5 kW/240 v (motor load 4.0 amp included)
Air conditioner: 24 amp/240 v (motor load 8.0 amp included)
Electric water heater: Upper element 4500 watts/240 v; Lower element 4500 watts/240 v
One laundry circuit
Range hood: 1.9 amp/120 v
Disposal: 7.3 amp/120 v
Dishwasher: 8.7 amp/120 v
Dryer Circuit: 21 amp/240 v

A. Lighting: Length of home times width of home (outside dimensions) = square foot, times 3 watts per square foot
Length 60 X Width 24 x 3 watts.....= 4320 watts

B. Small Appliances: Enter number of 20-amp small appliance (exclude laundry) circuits, times 1,500 Watts.
Number of circuits 2 x 1,500 watts.....= 3000 watts

C. Laundry: Include 1,500 watt minimum if installed.....= 1500 watts

D. Total (the sum of lines A, B and C):.....= 8820 watts

E. First 3,000 watts at 100%.....= 3000 watts

F. 8820 (FROM LINE D) minus 3,000 = 5820 watts multiplied by 35% (.35).....= 2037 watts

G. Net computed load (SUM OF LINE E AND LINE F).....= 5037 watts

H. 5037 (FROM LINE G) watts divided by 240 volts.....= 20.9 amps per leg

LOADS IN AMPS - PART 1	LEG A	LEG B
1. Lighting & small appliances (line H above) (20.9 amps)	20.9	20.9
2. Bath fan 1 (1.2 amps)	1.2	
3. Bath fan 2 (1.7 amps)		1.7
4. Range hood (1.9 amps)	1.9	
5. Freestanding electric range (13.2 kW or 13,200 watts)	35.0	35.0
6. Electric furnace (10.5 kW or 10,500 watts)	43.7	43.7
7. Electric space heater (n/a)		
8. Exhaust Fans (n/a)		
9. Air conditioner (24.0 amps, Omit smaller load than furnace)		
10. Gas furnace blower motor (n/a)		
11. Other (n/a)		
12. Add 25% of the largest motor from line 6, 7, 8, 9 or 10 above	2.0	2.0
13. SUB-TOTAL	104.7	103.3
LOADS IN AMPS - PART 2		
14. Disposal (7.3 amps)	7.3	
15. Electric water heater (9000 watts, combine upper and lower elements)	37.5	37.5
16. Dishwasher (8.7 amps)		8.7
17. Electric wall mounted oven (n/a)		
18. Electric cooktop (n/a)		
19. Electric clothes dryer (21 amp circuit)	21.0	21.0
20. Other (n/a)		
21. SUB-TOTAL	(65.8)	(67.2)
22. If 4 or more appliances are used in Part 2, use 75% of line 21	65.8 x .75%=49.4	67.2 x .75 = 50.4
23. **TOTAL LOAD IN AMPS (combine Parts 1 & 2)**	154.1	153.7

- All loads for this example must be converted to amps.
- Voltages for equipment in this example are 120 v or 240 v.
- The electric range load is 13.2 kW (13200 watts) using the freestanding electric range reduction table, a 13200 watt load reduces to 8400 watts. 8400 watts divided by 240 volts = 35 amps.
- If the home is equipped with air conditioning, omit the smaller of either the heating (gas or electric) load or the a/c load. In this example, the heating load is 43.8 amps and the a/c load is 24 amps, hence the a/c load is omitted from the calculations.

HCD-MH 527 (REV. 10/2013) SIDE 2

Appendix B: PG&E Sample Load Calculation for an All-Electric Manufactured Home

<table>
<tr><th colspan="5">NEC Standard Electrical Load Calculation for Dwelling Units</th></tr>
<tr><td colspan="5">Loads were developed based on requirements listed in the National Electrical Code (NEC). Appliance loading and other associated BTM work is outside of PG&E's scope for the MHP Utility Conversion Program. Please note that it is likely that not all appliances will be using maximum loads simultaneously. Load is subject to change based on different assumptions made for appliances (i.e., brand, model, etc). Location assumed will also alter loading. For this scenario, a Coastal California location was assumed, where an electric furnace will be more heavily used than an electric air conditioner.</td></tr>
<tr><td colspan="5">Calculating general lighting and general receptacles loads (except for small-appliance and laundry receptacles)</td></tr>
<tr><th>Procedure</th><th>Note</th><th colspan="3">Calculation</th></tr>
<tr><td>From NEC 220.14, for dwelling units, minimum general lighting load is 3 VA/ft^2.</td><td>Minimum unit load should not be less than 3 VA/ft^2</td><td colspan="3">The general lighting load is calculated by multiplying the floor area (in ft^2) of a dwelling unit by 3 VA/ft^2.</td></tr>
<tr><td rowspan="2">Calculate the floor area for each floor of dwelling unit in ft^2.</td><td>The floor area for each floor shall be calculated from the outside dimensions of the dwelling unit.</td><td>Floor area in ft^2 =</td><td>1,440</td><td>ft^2</td></tr>
<tr><td>The calculated floor area shall not include open porches, garages, or unused or unfinished spaces not adaptable for future use (like some attics, cellars, and crawl spaces).</td><td>General lighting and general receptacles loads</td><td>4,320</td><td>VA</td></tr>
<tr><td colspan="5">Calculating Small-appliance branch circuits' load (including Refrigeration Equipment)</td></tr>
<tr><th>Procedure</th><th>Note</th><th colspan="3">Calculation</th></tr>
<tr><td rowspan="2">Calculate the required number of Small-appliance branch circuits in the dwelling unit</td><td>As per NEC 210.11(C)(1), in each dwelling unit, two or more 20-ampere Small-appliance branch circuits must be provided.</td><td colspan="3">The Small-appliance branch circuits' load, for dwelling units, is calculated by multiplying number of Small-appliance branch circuits by 1,500 VA.</td></tr>
<tr><td>The designers assign the number of small-appliance branch circuits based on existing condition (space dimension, number of required small appliances, etc.).</td><td colspan="3">As per 210.52(B)(1), Exception 2, An individual branch circuit is permitted for refrigeration equipment at 1,500 VA.</td></tr>
</table>

As per NEC section 220.52(A), each 2-wire small-appliance branch circuit load is calculated at no less than 1,500 volt-amperes.		Number of Small-appliance branch circuits in the dwelling unit	3 Circuits	2 for small appliances; 1 for refrigeration equipment.
		Small-appliance branch circuits' load	**4,500**	VA
Calculating Laundry branch circuit load				
Procedure	**Note**	**Calculation**		
Calculate the required number of laundry branch circuits in the dwelling unit	As per NEC 210.11(C)(2), in each dwelling unit, at least one 20-ampere branch circuit shall be provided	The laundry branch circuits' load, for dwelling units, is calculated by multiplying number of laundry branch circuits by 1,500 VA.		
As per NEC 220.52(B), each 2-wire laundry branch circuit is calculated at no less than 1,500 volt-amperes.		In multifamily dwelling building, if laundry facilities are provided on the premises and available to all building tenants (as common usage), laundry branch circuits load will not be added to each individual dwelling unit and will be added to a separate "house load" panelboard.		
		A combination of clothes washer and clothes dryer will be handled in calculations as if they are a clothes dryer		
		Number of laundry branch circuits in the dwelling unit	1	Circuit
		Laundry branch circuits' load	**1,500**	VA
Applying Demand Factors from NEC Table 220.42				
Sum Loads of Step-1, Step-2 and Step-3		Total Sum =	10,320	VA
Calculate the demand of the First 3,000 VA or Less at 100%		Demand of the First 3,000 VA or Less =	3,000	VA
Calculate the demand of (120,000 VA - 3,000 VA), if any, at 35%		Demand of (120,000 VA - 3,000 VA), if any =	2,562	VA
Calculate the demand of the reminder over 120,000 VA, if any, at 25%		Demand of the reminder over 120,000 VA, if any =	0	VA
General Load for Lighting, General Receptacles, Small Appliances and Laundry			**5562**	**VA**
Fastened in Place Appliances Load				
As per NEC Section 220.53, electric ranges, clothes dryers, space-heating equipment or air conditioning equipment must not be included with the number of appliances that are fastened in place. Also, all portable small appliances for kitchen and others are not Fastened-in-Place Appliances.				
As per NEC Section 220.53, it shall be permissible to apply a demand factor of 75 % to the nameplate rating load of four or more appliances fastened-in-place, that are served by the same feeder or service in a one-family, two-family, or multifamily dwelling.				
	Number of Appliances	**Loading of Appliance (VA)**	**Assumption(s)**	
Water Heater	1	4,500	A.O. Smith Signature 100 40-Gallon Short 6-year Limited Warranty 4500-Watt Double Element Electric Water Heater in the Electric Water Heaters department at Lowes.com	
Refrigerator	1	0	Refrigeration equipment load included in Section 2 above.	
Disposal	1	1,752	Load is based on "Manufactured Home Electrical Load Worksheet" provided by HCD: https://www.hcd.ca.gov/building-standards/manufactured-modular-factory-built/docs/hcd-mh527.pdf	

Dishwasher	1	1,044	Load is based on "Manufactured Home Electrical Load Worksheet" provided by HCD: https://www.hcd.ca.gov/building-standards/manufactured-modular-factory-built/docs/hcd-mh527.pdf	
EV Charger	1	4,800	EV Chargers draw power differently. The Level 2 charger can have a rating of 12, 16, 20, 24, 32, 40, 48 or 64 amps — and some can be set to throttle down to lower current levels to accommodate being fed by less robust circuits. A level 2 20 Amp charger was assumed. Load based on the following source: https://www.lifewire.com/ev-charging-levels-explained-5201716	
Total Number of Appliances		4		
Total Ratings of Appliances		12,096		
Total Load			**9072**	**VA**
Clothes Dryers Load				
Procedure	**Note**	**Calculation**		
Write the Nameplate Rating of Clothes dryer	As per NEC section 220.54, the load for household electric clothes dryers in a dwelling unit(s) shall be either 5000 watts (volt-amperes) or the nameplate rating, whichever is larger, for each dryer served.	5000 VA or the nameplate rating, whichever is larger	5,000	VA
	Table 220.54 states to use Demand Factor of 100% if assuming 1-4 dryers.	Demand Factor	1	
Total Demand Load of Clothes Dryers			**5000**	**VA**
Household cooking appliances load - Electric Range				
NEC Table 220.55 was followed.				
Household cooking appliances rating in kW	13.2			
Less than 3.5 kW Rating	3.5-8.5 kW	less than 12 kW	12kW < rating < 27kW	
0	0	0	8.482	
Household Cooking Appliances Demand Load			**8,482**	**VA**
Heating and/or Air Conditioning Loads				
NEC 220.82 (C) states that the largest of 6 scenarios shall be included. Assumed that the electric furnace will generate the largest load for this scenario.				
			Assumptions	
Room Air Conditioners Load in VA at 100%		-	Load is based on "Manufactured Home Electrical Load Worksheet" provided by HCD. Assumed that AC: https://www.hcd.ca.gov/building-	
Fixed Electric Space-Heating Load in VA at 100%		10,500		

Heating and Air Conditioning Load	10,500	VA	standards/manufactured-modular-factory-built/docs/hcd-mh527.pdf	
The Largest Motor: Electric Furnace				
NEC Section 220.50, 220.60, 430.22, 430.24 and 430.6 were considered.				
When calculating a feeder or service, as per NEC standard calculation method, the largest motor must be multiplied by 25% and added to the service load calculation.				
Section 220.60 states that "it is permissible to use only the larger of the noncoincident loads." The electric furnace is the largest motor for this scenario.				
VA of Largest Motor	10,500			
Largest Motor Additional Load			2,625	**VA**
Total Demand Load		41,241		**VA**
Total Amperage		172		**Amps**

Appendix C: SCE Sample Load Calculation for an All-Electric Manufactured Home

NEC Standard Electrical Load Calculation for Dwellings

Owner: SCE 1,200 sf dwelling unit (mobile home) Location: SCE territory

Total Floor Area of Dwelling (NEC 220.12) 1200 SQ FT.

Factor	Quantity	Volt Amperes (VA)
"General Lighting"		
1. General Lighting (SQ FT X 3 VA/SQ FT (Table 220.12)	1200 s.f.	3600
2. Small Appliance Circuits (1500 VA per circuit) (NEC 220.52(A)) (min. 2)	2	3000
3. Laundry Circuit (1500 VA per circuit) (NEC 220.52(B))	1	1500
4. Total General Lighting Load (Add lines 1, 2 & 3):		8100
5. First 3000 VA @ 100%:		3000
6. Total General Lighting Load – 3000 = 5100 @ 35%=		1785
7. **Net General Lighting Load** (Per NEC T. 220.42) **(Add lines 5 & 6):**		4785
Appliances	Quantity	Volt Amperes (VA)
refrigerator	1	1200
electric range	1	8000
range exhaust hood blower	1	650
dishwasher	1	1200
electric clothes dryer	1	5000
heat pump water heater	1	6000
Total		22,050
8. 3 or less Appliances, Total Appliance VA; 4 or more Appliances, 75% Total Appliance VA (NEC 220.53):		16,538
Other Loads (other than motors)	Nameplate Rating (VA)	Adjusted Rating (VA)
9. electric vehicle charging supply	9600	9600
10. HVAC: 3 ton 14 SEER split heat pump system	6500	6500
11.		
12.		
13.		
14. 25% of largest motor (NEC 430.24)		400
Total Volt-Amperes (VA) (Add lines 7, 8 & 9 thru 14) =		37,823
Total Volt-Amperes / 240-volts = Amperes		158
Conductor Size (Indicate Copper or Aluminum)		
Service Rating (Amperes)		200

Appendix D: SJV Program Bill Impact Analysis

Table 17: PG&E Bill Impact Data, 2020-2022[179]

	PG&E	Q3 2020 (Pre)	Q3 2021 (Post)	Q4 2020 (Pre)	Q4 2021 (Post)	Q1 2021 (Pre)	Q1 2022 (Post)	Q2 2021 (Pre)	Q2 2022 (Post)	Q3 2021 (Pre)	Q3 2022 (Post)
SJV and TCS discounts (36% total)	Avg Monthly Electric Costs (pre)	$146.52	-	$90.80	-	$94.89	-	$99.80	-	$151.11	-
	Average monthly costs w/ discount (post)	-	$174.62	-	$105.52	-	$144.58	-	$136.20	-	$208.45
	Avg Monthly Propane Costs	$100.36	$15.05	$67.54	$3.21	$67.67	$2.09	$62.56	$2.09	$67.87	$2.09
	Avg Monthly Wood Costs	$14.88	$0.00	$6.06	$0.00	$5.94	$0.00	$3.40	$0.00	$4.55	$0.00
	Total Fuel Costs (w/ discount)	$261.76	$189.67	$164.40	$108.73	$168.50	$146.67	$165.76	$138.29	$223.53	$210.54
	Change in fuel costs (w/ discount)		**-$72.09**		**-$55.67**		**-$21.83**		**-$27.47**		**-$12.99**
	Avg change in fuel costs (w/ discount)	**-$38.01**									
SJV discount only (20%)	Average monthly Electric Costs w/ only 20% SJV Discount		$218.28		$131.90		$180.73		$170.25		$260.56
	Total Fuel Costs w/ only 20% SJV discount		$233.33		$135.11		$182.82		$172.34		$262.65

[179] PG&E informed the CPUC that it needed to amend its quarterly bill impact figures that it had previously reported in its quarterly reports through Q4 2022. PG&E filed corrected quarterly bill impact figures in its 2023 Q1 report. See: https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M507/K825/507825184.PDF. Bill discounts include a 20% Transitional Solar discount and 20% SJV pilot discount. This amounts to a total of 36% off the initial electric bill after CARE, FERA, and Medical Baseline discounts. To find the post-electric bill without discounts, divide the discounted electric bill by 0.64 (1-0.36 = 0.64).

	Change in fuel costs w/ only 20% SJV discount		-$28.44		-$29.29		$14.32		$6.58		$39.12
	Average change in fuel costs w/ only 20% SJV discount	**$0.46**									
No discounts	Avg Monthly Electric Costs w/o discount		$272.84		$164.88		$225.91		$212.81		$325.70
	Total Fuel Costs (w/o discount)		$287.89		$168.09		$228.00		$214.90		$327.79
	Change in fuel costs (w/o discount)		**$26.13**		**$3.69**		**$59.50**		**$49.14**		**$104.26**
	Avg change in fuel costs (w/o discount)	**$48.54**									

	SCE	**Q1 2021 (Pre)**	**Q1 2022 (Post)**	**Q2 2021 (Pre)**	**Q2 2022 (Post)**	**Q3 2021 (Pre)**	**Q3 2022 (Pre)**	**Q4 2021 (Pre)**	**Q4 2022 (Post)**
SJV and TCS discounts (36% total)	Avg Monthly Electric Costs (pre)	$102.93	-	$164.74	-	$137.79	-	$135.26	-
	Average monthly costs w/ both discounts (post)	-	$128.12	-	$180.56	-	$157.47	-	$261.56
	Avg Monthly Propane Costs	$295.07	$7.02	$78.25	$4.92	$87.44	$2.53	$85.40	$5.74
	Avg Monthly Wood Costs	$4.29	-	$1.33	$0.00	$0.99	$0.00	$1.37	$0.00
	Total Fuel Costs (w/ both discounts)	$402.29	$135.14	$244.32	$185.48	$226.22	$160.00	$222.03	$267.30
	Change in fuel costs (w/ both discounts)		**-$267.15**		**-$58.84**		**-$66.22**		**$45.27**
	Avg change in monthly fuel	**-$86.74**							

	costs (w/ both discounts)								
SJV discount only (20%)	Average monthly Electric Costs w/ only 20% SJV Discount		$160.15		$225.70		$196.84		$326.95
	Total Fuel Costs w/ only 20% SJV discount		$167.17		$230.62		$199.37		$332.69
	Change in fuel costs w/ only 20% SJV discount		-$235.12		-$13.70		-$26.85		$110.66
	Average change in monthly fuel costs w/ only 20% SJV discount				**-$41.25**				
No discounts	Avg Monthly Electric Costs w/o discount		$200.19		$282.13		$246.05		$408.69
	Total Fuel Costs (w/o discount)		$207.21		$287.05		$248.58		$414.43
	Change in fuel costs (w/o discount)		**-$195.08**		**$42.73**		**$22.36**		**$192.40**

(END OF ATTACHMENT A)