

The Pathway Forward for Electrifying Multifamily Affordable Rental Housing

September 2023



CALIFORNIA HOUSING PARTNERSHIP

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The State created the California Housing Partnership (the Partnership) in 1988 as a private nonprofit organization with a public mission: to help preserve and expand California's supply of affordable homes and to provide leadership on affordable housing policy and resource issues. The Partnership is unique in combining on-the-ground technical assistance with applied research and policy leadership at the state and national level to increase the supply of affordable homes. Since 1988, the Partnership has helped more than a hundred California nonprofit and government housing agencies leverage more than \$30 billion in public and private financing, resulting in the creation or preservation of more than 85,000 homes affordable to low-income Californians.

The Partnership's Sustainable Housing team works directly with nonprofit affordable housing providers and public housing authorities to help them evaluate and finance clean energy and water improvements. This involves educating providers about the programs and opportunities for incentives available to them, as well as pursuing innovative demonstration developments to explore new technologies, financing tools, and sustainable financing models for preserving decarbonized affordable rental homes. The Partnership's Sustainable Housing team is leading efforts to ensure that nonprofit affordable housing providers and low-income residents can participate in California's path towards equitable decarbonization.

FUNDING AND SUPPORT

[Building Initiative for Low Emissions Development \(BUILD\) Program](#)

BUILD is a residential building decarbonization program that provides incentives and technical assistance to support the adoption of all-electric building design in new, low-income homes.

[Solar on Multifamily Affordable Housing \(SOMAH\) Program](#)

The **SOMAH Program** provides financial incentives for installing solar panel systems that benefit both low-income tenants and affordable housing providers throughout California.

Wells Fargo Foundation also provided financial support for the production of this report.

CONTRIBUTORS

Authors

Rachael Diaz, *Sustainable Housing Program Manager, California Housing Partnership*

Meena Venkatraman, *Sustainable Housing Program Intern, California Housing Partnership*

Editors

Blanca de la Cruz, *Sustainable Housing Program Director, California Housing Partnership*

Ian Sharples, *Sustainable Housing Program Manager, California Housing Partnership*

Matt Schwartz, *President & CEO, California Housing Partnership*

Special Thanks

Bryan Dove, *Mutual Housing California*

Cassie Gosgrove, *Community Corporation of Santa Monica*

Jesus Hernandez, *Community Corporation of Santa Monica*

Karen Krygier, *Community Corporation of Santa Monica*

Audrey Peterson, *Holos Communities*

Michael Rangel, *Holos Communities*

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EXECUTIVE SUMMARY

Meeting California's ambitious climate sustainability goals will require a substantial shift in how affordable housing is created and retrofitted while achieving equitable building decarbonization. Affordable multifamily housing has higher utility burdens, more limited access to capital by definition and operates within strict regulations that make the adoption of new technologies much more challenging. While all-electric design, construction and financing are part of an emerging practice in affordable multifamily rental housing, these developments often have steep learning curves for all parties and especially for nonprofit affordable housing providers, who typically operate on thinner margins with less access to working capital.

Thanks to the continuous support of innovative state funding programs, examples of all-electric affordable housing designs are emerging, offering valuable insights for providers and other stakeholders. It is important to acknowledge that policymakers have also played a crucial role in making these advancements possible, as their efforts have

made the transition to all-electric housing easier to achieve. By recognizing their contributions, we can foster a collaborative environment that encourages policymakers to further support and prioritize sustainable housing initiatives. Nevertheless, local, state, and federal investments in building decarbonization must prioritize capacity building for affordable housing providers as a pathway for low-income renters to benefit equitably from the clean energy transition.

This report explores strategies to electrify new and existing multifamily rental developments by three early adopters of all-electric affordable housing: Mutual Housing California, Community Corporation of Santa Monica, and Holo Communities. The lessons learned from these three nonprofit decarbonization case studies are intended to inform policymakers as well as peer affordable housing providers newer to the building electrification process to make it easier for them to plan and complete all-electric developments more successfully.

Key Findings and Challenges

The participating affordable housing providers identified five challenges as primary barriers to adopting decarbonization strategies in new and existing affordable rental housing:

1. Increased design, construction and maintenance complexity resulting from new electrification technologies and codes with the potential to increase both upfront and long-term operating costs.
2. Limited workforce capacity and availability.
3. Inaccurate utility and energy performance data.
4. Misaligned and insufficient energy program resources.
5. Tenant resistance to all-electric technologies.



Key Recommendations and Solutions

The Partnership developed the following recommendations based on the input of the report participants:

Solutions For Providers	Recommendations For Stakeholders
<ol style="list-style-type: none">1. Integrate electrification in initial design stages.2. Leverage clean energy program incentives and technical assistance (TA).3. Build staff capacity through training.4. Incorporate tenant education.	<ol style="list-style-type: none">1. Utilities must prioritize supporting affordable housing providers.2. Allocate funding to expand access to affordable energy storage.3. Increase clean energy incentives and adjust program eligibility criteria.

INTRODUCTION

Affordable housing providers are faced with the challenge of providing safe and comfortable housing for low-income families while also being mindful of their impact on the environment. California policymakers have embraced electrification as a promising solution for reducing carbon emissions and improving energy efficiency in buildings, which are associated with nearly one fourth of the state's Greenhouse Gas (GHG) emissions.

This report highlights the experiences of three affordable housing providers – Mutual Housing, Community Corporation of Santa Monica, and Holos Communities – as they began the process of electrifying their affordable home portfolios. Each of these nonprofit providers has embraced electrification design and

technologies at an early stage and employed a distinct strategy to make the transition, while overcoming various challenges in the process. The findings and lessons learned from these first all-electric developments show how housing practitioners can integrate building decarbonization and electrification solutions into their new developments and existing portfolios. While both Mutual Housing and the Community Corporation of Santa Monica completed their developments prior to the launch of the Building Initiatives for Low-Emissions Development (BUILD) and the Comprehensive Affordable Multifamily Retrofits (CAMR) programs in early 2023, their all-electric developments align with the kind of initiatives that these programs presently encourage and endorse.

RESOURCES FOR ELECTRIFYING AFFORDABLE RENTAL HOUSING

Clean energy incentive programs are vital for the affordable rental housing sector because investing in energy efficient technologies and renewable energy sources is often financially infeasible for these properties, which by design have very tight capital and operating budgets. Programs like BUILD and CAMR offer substantial financial incentives to help offset the

initial costs of upgrading building systems such as heating, and cooling, lighting, and water heating while also providing extensive technical support to help providers increase their knowledge in this area. Table 1.1 summarizes the clean energy incentive programs available to both new construction and existing multifamily affordable rental housing.

Table 1.1 Clean Energy Incentive Programs by Property Type

INCENTIVE PROGRAM PROPERTY TYPE	INCENTIVE PROGRAM NAMES
New Construction	<ul style="list-style-type: none">• Building Initiative for Low-Emission Development (BUILD)• Energy Smart Homes• California Energy Design Assistance (CEDA)• Zero by Design
Existing Buildings	<ul style="list-style-type: none">• Low-Income Weatherization Program (LIWP)• Comprehensive Affordable Multifamily Retrofits (CAMR)• Solar on Multifamily Affordable Housing (SOMAH)• Energy Smart Homes• TECH Clean California• Multifamily Affordable Housing Electricification Program (MAHEP)• Energy Savings Assistance Multifamily Whole Building (ESA MFWB)

MUTUAL HOUSING CALIFORNIA AT SPRING LAKE (WOODLAND, CA)



A view of Spring Lake post-Phase 2 of construction. Spring Lake © [Mutual Housing California](#)

[Mutual Housing California](#) provides sustainable affordable housing where residents are partners in advancing equitable communities in the greater Sacramento region. Their leadership in innovation is evidenced by their launch of cutting-edge sustainability initiatives, including the development of the first solar affordable housing project in the Sacramento Municipal Utilities District (SMUD). The Spring Lake project marked Mutual Housing's first endeavor into designing an all-electric, zero net energy (ZNE) development. Spring Lake consisted of two development phases taking place in 2015 (Phase I) and 2019 (Phase II) and was awarded the Department Of Energy's first Energy Ready Homes certification for rental housing. Mutual Housing initiated Phase II of development to add an additional 39 resident homes and implement site improvements including increased solar PV capacity to establish the property as a positive net energy community.

SPRING LAKE PROPERTY SNAPSHOT

- 100 affordable apartments with 1 manager's unit
- Phase 1: 62 homes
- Phase 2: 39 homes
- Serves agricultural workers and their families
- High-performance insulation system for enhanced quiet and comfort
- Fresh air system for cleaner indoor air
- Energy-efficient appliances and advanced lighting technologies for electricity and water savings

The Spring Lake project leveraged funding from both the United States Department of Agriculture (USDA) and the Low-Income Housing Tax Credit (LIHTC) Programs, which further encouraged sustainability measures through preferential scoring that are offered to high-performing buildings that significantly reduce energy usage.

With more than eight years of operation, Spring Lake sped up Mutual Housing's learning curve and informed its building electrification strategy shaping its portfolio of all-electric completed affordable housing and a pipeline of new developments, at least two of which are planning to participate in the BUILD Program.

Design

The Mutual Housing Development team and external consultants set the project's overall sustainability goal to exceed California's Title 24 standards by 30-40%. They also aimed for maximum achievable sustainability by combining energy-efficient design and renewable energy generation to produce an equal amount of energy to what they consume. They evaluated various combinations of energy efficiency and renewable energy measures, with occupant comfort and cost impacts (both at installation and long term) in mind, including modeling the expected energy consumption with the proposed efficiency measures, sizing the solar array to meet the expected load, and iterating the process to find the right balance between the system size and cost. They conducted energy modeling that provided valuable information for the calculation of the utility allowance (UA) using the California Utility Allowance Calculator (CUAC) as well as the overall budget. Lastly, given that the community is mainly composed of agricultural workers, the Development team gave priority to design elements that reduced residents' exposure to airborne toxins.

CHALLENGES & SOLUTIONS

Tech Barrier to Innovation

CHALLENGE: Design team members occasionally disagreed on newer technologies due to a lack of openness to new possibilities and risk-taking.

SOLUTION: The developer's commitment to ZNE and all-electric design helped to guide the team through disagreements.

Unpredictable Energy Demand

CHALLENGE: Estimating energy load was difficult due to unpredictable resident behavior.

SOLUTION: Mutual Housing installed color-coded energy monitors in every kitchen, engaging residents of all ages to track energy consumption.

Budget Limits Solar Coverage

CHALLENGE: Due to budget constraints, it was not possible to install a generously sized PV array that could cover 100% of energy consumption.

SOLUTION: The team chose a modeled scenario that met energy demands with little margin for error at the lowest cost.

Construction

A key to success was the emphasis Mutual Housing placed on holding pre-construction meetings with subcontractors, energy raters, and inspectors to align on energy efficiency

requirements and new construction methods. The same subcontractor team was used for both Phase 1 (2013–2015) and Phase 2 (2018–2019) of the Spring Lake project.

CHALLENGES & SOLUTIONS

Expensive Air Sealing

CHALLENGE: Multifamily buildings present unique challenges when it comes to air sealing, which is crucial for conserving energy and minimizing heat loss. These buildings typically feature complex designs with multiple units, shared walls, common areas, and numerous openings for plumbing, electrical systems, and HVAC ductwork. Ideally, the Mutual Housing team would have utilized house wrap throughout the entire building. However, due to budget constraints, this approach was not feasible.

SOLUTION: As an alternative, the project focused on reducing air leakage by sealing all wall penetrations and the junctions where walls meet the ceiling and floor plates. This was achieved through the application of caulking, foam, or fire-resistant putty pads for fire-rated walls.

Infeasible Attic Framing

CHALLENGE: Raised heel trusses were not feasible as a framing strategy to increase insulation depth in some attic perimeter locations because of structural limitations and space constraints.

SOLUTION: Rigid insulation was added between some trusses at the top plates in these locations.

Operation

Phase 1 consisting of 62 homes opened in March 2015 and was fully occupied by June 2015. Upon move-in, residents were given a Green Guide that included information on sustainable features and how to use them. The Green Leader program, comprised of a cohort of volunteer resident members dedicated to addressing climate change challenges within their communities, underwent training and received stipends to successfully conceive and guide green education initiatives including hosting in-person events to demonstrate best

practices for operating new appliances such as air conditioning and heating systems. Utility bills and consumption were monitored to track progress toward the ZNE goal. However, Phase 1 struggled to fully offset energy consumption with onsite renewables, leading to the goal of expanding the solar PV system in Phase 2. One year after opening Phase 2 in 2020, Mutual Housing achieved the goal of generating five percent excess energy production, making the property a Positive Net Energy community.

Energy performance and utility bills

By using the California Utility Allowance Calculator (CUAC) site-specific modeling features, Mutual Housing was able to set utility allowances close to actual energy consumption. The use of CUAC resulted in significant utility cost savings compared to the alternative of using Yolo County Public Housing Authority's natural gas and all-electric utility allowance schedules. Using CUAC, Mutual Housing effectively leveraged more borrowing capital by merely using accurate and reliable energy

data that showcased the building's energy performance and reduced utility costs. This increased borrowing power allowed them to finance Phase 2 of their development successfully. The table below shows total utility bills per unit illustrating the positive impact of electrification on utility allowances. Also, over time the disparity widens between the Yolo County Public Housing Authority utility allowances and CUAC reinforcing the long-term cost-effectiveness of using a project-specific utility allowance methodology.

Table 1.2 Impact of Electrification on Utility Allowances at Spring Lake – Comparison Between 2015 vs. 2023 Schedules

	2015 - PHASE I				2023 - PHASE I			
Spring Lake Utility Allowances by Unit Type	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom	1 Bedroom	2 Bedroom	3 Bedroom	4 Bedroom
Unit Count	12	20	22	8	12	20	22	8
Spring Lake – ZNE CUAC	\$6	\$6	\$13	\$12	\$14.27	\$13.76	\$29.80	\$28.13
Yolo County PHA – All-Electric*	\$114	\$144	\$184	\$227	\$163	\$204	\$266	\$326
Yolo County PHA – Natural Gas1*	\$94	\$114	\$143	\$172	\$87	\$107	\$134	\$158
Difference per unit	\$(202)	\$(252)	\$(314)	\$(387)	\$(235.73)	\$(297.24)	\$(370.20)	\$(455.87)

* The Yolo County Housing Authority now offers an energy efficient utility allowance schedule. The above 2023 utility allowance amounts refer to the [Energy Efficiency Garden](#) schedule, effective 7-1-22.

CHALLENGES & SOLUTIONS

Lack of Familiarity with Technology

CHALLENGE: Residents were unfamiliar with various energy-efficient features, including smart thermostats, shower shut-off valves, ceiling and humidistat fans, energy monitoring devices, and the allocation of solar credits through VNEM.

SOLUTION: Staff offered in-person training on operating energy-efficient equipment, engaging with energy monitoring systems, and understanding utility bills, in addition to the Green Guides and Green Leaders program they host, both in large group and individual settings at residents' homes.

Excessive Resident Energy Usage

CHALLENGE: During the first phase, residents did not reduce electricity usage as expected which resulted in reduced energy bill savings despite the solar system producing expected electrical generation output.

SOLUTION: Mutual Housing installed in-home monitors to provide real-time energy usage transparency to residents and added more solar capacity during Phase II to account for increased energy consumption, in addition to emphasizing tenant education training.

Utility Billing Errors Delay Savings

CHALLENGE: Delays in establishing the ZNE billing system through local utilities delayed credits to common area and resident accounts significantly.

SOLUTION: Mutual Housing provided education and resources to help residents understand the impact of solar on their utility bills and urged utility providers to expedite administrative processes to prevent delays in energy bill savings for low-income affordable rental housing.

Dirty Solar Panels Diminish Production

CHALLENGE: The solar panels became dirty, affecting energy production.

SOLUTION: Regular panel cleaning was added to building maintenance practices, which resulted in a 6% increase in energy production.

COMMUNITY CORPORATION OF SANTA MONICA AT 1616 OCEAN AVENUE (SANTA MONICA, CA)



1616 Ocean Avenue stands proudly adorned with its newly completed electrification measures. 1616 Ocean Avenue © [Community Corporation of Santa Monica](#)

The [Community Corporation of Santa Monica's](#) journey into all-electric affordable housing began with the rehabilitation of their 1616 Ocean Avenue property, setting out to remove gas infrastructure entirely. The Development team identified 1616 Ocean as an ideal candidate for electrification upgrades due to the smaller number of homes and the ability to have a more flexible rehabilitation timeline. The property's roof capacity was also ideal for a large solar array to maximize onsite energy consumption through solar PV. Community Corporation of Santa Monica avoided using complicated tax credits to finance the project thanks to a grant funding from the City of Santa Monica. Grant funding also allowed for experimenting with innovative strategies like fuel switching.

1616 OCEAN AVENUE PROPERTY SNAPSHOT

- 19 affordable homes, 1 manager's home
- Central laundry
- Solar photovoltaic (PV) array
- Tracking energy with Yardi and Energy Star Portfolio Manager
- Locally financed - non-tax credit

Although electrifying buildings is generally more complex than electrifying new construction, the successful execution of the project at 1616 Ocean demonstrates not only that electrifying existing buildings is possible but also can result in more significant savings for both providers and residents. The Community Corporation of Santa Monica team leveraged knowledge from the all-electric retrofit and the new construction electrification of Vista Ballona, completed a year later, to shape the organization's current comprehensive and aggressive electrification strategy for its pipeline of new developments, including leveraging the BUILD program's free technical assistance and incentives. Community Corporation of Santa Monica now has a portfolio of five active BUILD applications, six LIWP applications, and seventeen SOMAH applications.

Design

The planning and design phase for 1616 Ocean began at least five years before its completion. During this phase, the Community Corporation of Santa Monica team prioritized analyzing the electrical infrastructure's ability to handle increased capacity resulting from all-electric upgrades. They collaborated with Southern California Edison and incorporated new plumbing, electrical, and water systems while eliminating the gas infrastructure. The team's use of energy modeling early on was key to plan a solar PV system that maximized roof capacity, prioritizing the common area load.

Although Community Corporation of Santa Monica hired a qualified MEP consultant, the team initially had reservations about incurring additional financial burdens to remove the existing gas infrastructure from the project site. They were also concerned about the steep learning curve required for internal staff to maintain and ensure the longevity of the new all electric equipment.

The Community Corporation of Santa Monica team had two concerns regarding a rehabilitation electrification project: temporary resident displacement and the impact on residents. They worked hard to avoid significant delays that would affect residents' return to the property and sought feedback from the Resident Leadership Council to address resident concerns about increased utility bills and reluctance to use electric appliances. The Resident Services team implemented tenant education strategies such as hosting a demonstration kitchen to familiarize residents with electric cooktops before their installation.

CHALLENGES & SOLUTIONS

Electrification Efforts Hindered by Staff Turnover

CHALLENGE: Institutional knowledge of implementing all-electric design was reduced due to staff turnover, leading to the need for new staff to build capacity.

SOLUTION: Hired an experienced MEP engineering consultant early in the project to provide technical assistance to internal teams and contractors, and institutional knowledge and support in the case of staff turnover.

Existing Structure Required Complete Rehab

CHALLENGE: The existing building structure needed a gut rehab to adequately house upgraded plumbing, water, and electrical infrastructure.

SOLUTION: Opt for all-electric design in new construction developments for funding flexibility and the ability to accommodate necessary equipment and lines.

Inaccurate Estimates Due to COVID-19

CHALLENGE: Initial cost estimates were inaccurate, as they did not account for COVID-19 and inflation surcharges and were based on existing price per unit developments from the construction management team.

SOLUTION: Incorporate contractors into the planning process early on to obtain more precise cost estimates based on market prices.

Delays Due to Infrastructure Upgrades

CHALLENGE: All-electric infrastructure upgrades surpassed the capacity of the existing electrical infrastructure, forcing the design team to troubleshoot with local utilities, causing delays and requiring additional staff time to resolve approval issues.

SOLUTION: Utilities must prioritize affordable housing developments by expediting the approval process and implementing a streamlined verification process for project requirements. This should include a pre-construction walk-through with a utility representative and the affordable housing provider to identify potential challenges in greater detail and reduce project delays.

Anticipating Additional Local Approvals

CHALLENGE: The project's location in a California coastal zone required a Coastal Development Permit (CDP), adding 6-9 months to the pre-construction phase.

SOLUTION: Collaborate with the design team to submit a CDP application as soon as possible, including a comprehensive information package to expedite review and completeness determination. Pre-application meetings to discuss project details are also recommended. The state should also consider exempting electrification retrofits from having to obtain a new CDP if the existing building envelop is not expanded by more than a de minimus amount to accommodate the electrical infrastructure.

Construction

The project scope for 1616 Ocean included adding an additional apartment to the existing 18 and reconfiguring the laundry room to meet Americans with Disabilities Act (ADA) standards. Trenching to move electrical lines and meter

relocation was also needed to increase the property's electrical capacity, requiring the organization's contractor team to take a more involved role with utility coordination to secure project approvals.

CHALLENGES & SOLUTIONS

Adjusting Operating Budget for Perm Loan Conversion

CHALLENGE: The team experienced difficulties converting from construction financing to permanent financing resulting from the operating budget appearing artificially large due to utility cost assumptions from past non-all-electric developments.

SOLUTION: Utilities need to increase transparency and provide access to solar PV energy bill savings data to avoid impacting the borrowing power of affordable housing providers through inaccurate operating budget forecasts.

Using Energy Modeling to Inform Decision Making on Financing

CHALLENGE: Community Corporation of Santa Monica had to choose a Virtual Net Energy Metering (VNEM) allocation for common and resident area meters before getting utility interconnection; they selected a 5%/95% allocation but would have preferred a higher offset for the common area meter. However, readjusting the VNEM allocation would impact residents who are already benefiting from solar energy savings.

SOLUTION: It is crucial to conduct a comprehensive energy usage modeling for different common area and tenant allocations to ensure that an adequate portion of the solar system is directed towards offsetting common area operating costs. This allocation should be carefully determined from the beginning because it is not practical to make significant adjustments at a later date without negatively impacting residents.

Operation

The electrification of 1616 Ocean was completed and all 19 homes were fully occupied in 2021. While the Community Corporation of Santa Monica Asset Management team is collecting and analyzing the project's utility data, they plan to hire additional staff to assist with solar monitoring for this and other properties with solar PV. Despite slight issues with underperforming solar PV systems due to unforeseen circumstances, residents are satisfied with onsite solar PV as it effectively lowers their utility bills.

The Impact of Electrification on Utility Allowances

Community Corporation of Santa Monica utilizes the electric utility allowance schedule established by the Santa Monica Housing Authority. In this schedule, the utility allowance for electric technologies is marginally higher compared to the allowance provided for natural gas. It's important to note that the higher utility allowance helps residents save on energy costs that may have increased due to the increased electrical load.

Table 1.3 Impact of Electrification on Utility Allowances at Spring Lake – Comparison Between Gas and Electric Schedules

1616 OCEAN AVENUE UTILITY ALLOWANCES (UAS) BY UNIT TYPE	0 BEDROOM	1 BEDROOM
Unit Count	16	4
2023 Santa Monica HA – All-Electric UA	\$74	\$98
2023 Santa Monica HA – Natural Gas UA	\$57	\$73

CHALLENGES & SOLUTIONS

Monitoring Utility Billing Errors and Energy Performance Data

CHALLENGE: Utility billing errors have impacted the organization's solar energy bill savings, despite 1616 Ocean being fully operational. The Asset Management team has had to bear the burden of coordinating with utilities to ensure accurate accounting.

SOLUTION: Until the utilities accurately account for solar bill credits on energy bills, affordable housing providers must continue to monitor utility bills to ensure that savings are accounted for.

Performance Monitoring Protocols and Systems

CHALLENGE: The team lacks a standardized monitoring schedule, resulting in inconsistent analysis and unaddressed underperformance of the solar PV system during inactive monitoring periods.

SOLUTION: Affordable housing providers should identify a central solar monitoring system such as WeGoWise to track performance for their entire solar portfolio. Additionally, clean energy incentive programs should expand technical assistance resources to include operations and maintenance staff capacity for electric technologies.

HOLOS COMMUNITIES (LOS ANGELES, CA)



Design renderings for Holos Communities' first all-electric development, the Steps on St. Andrews. The Steps on St. Andrews Renderings © [Lorcan O'Herlihy Architects \(LOHA\)](#)

[Holos Communities](#), formerly Clifford Beers Housing, is a non-profit affordable housing provider in Los Angeles with twelve properties in operation, three under construction, and two in pre-development across Southern California. Holos Communities prioritizes affordable, sustainable, and integrated housing for individuals and families. They began pursuing all-electric design for their portfolio in 2019 because of direct outreach efforts by incentive programs including LIWP and SOMAH. While they have yet to complete an all-electric building, Holos Communities has demonstrated their commitment to electrifying new construction and existing properties through the development of a detailed phased plan to transition their portfolio.

Motivating Factors for Electrification

Holos Communities' decision to electrify their portfolio was motivated by various factors, including the desire to reduce resident utility bills and lower common area operating costs to preserve affordable housing. Additionally, concerns about the impact of natural disasters and regional power outages on resident well-being further heightened the need to explore electrification measures for their new and existing building stock. Lastly, Holos Communities emphasized the importance of being proactive and utilizing available incentives and free technical assistance support available for early adopters considering the City of Los Angeles' commitment to reach net zero carbon by 2050. The [City of Los Angeles' all-electric buildings mandate](#) went into effect April 1, 2023 for market rate housing and June 1, 2023 for affordable housing.

Holos Communities is also on track to access the BUILD program's free technical assistance and incentives for at least one property in the pre-development stage, one property through SOMAH, five properties moving through LIWP's technical assistance process, and one property in the early stage of the CAMR intake process.

Initial Concerns, Uncertainties and Perceived Risk

- Contractor and staff capacity: Initially, Holos Communities staff expressed concerns about finding a qualified team with the expertise needed to meet energy code requirements and assist with electrifying their portfolio. Given the lack of previous electrification experience, staff also had questions about the day-to-day operation and life cycle of electric technologies.
- Electrification costs and unknown return on investment: Holos Communities had uncertainties about electrification costs, including the return on investment throughout the equipment life cycle and how to plan for flexibility within their operating budget, due to the lack of previous project data.

Preparing for All-Electric Design

The following are Holos Communities' considerations for electrification design depending on whether the project is new construction or a retrofit.

New Construction

- Accurately sizing transformers and electrical infrastructure to account for the project's proposed electrical load.
- Avoiding roof obstructions to maximize roof capacity to house the solar system.

Retrofits

- Assessing the property's existing electrical capacity and begin conversations with utilities early on if electrical upgrades are needed.
- Developing a plan of action to relocate residents if the property is occupied.

New Construction and Retrofit

- Ensuring design plans are in alignment with building code.
- Developing and finalizing the project's scope of work.
- Identify clean energy incentive programs to offset the cost of electrification upgrades. and enroll in available technical assistance services.

CHALLENGES & SOLUTIONS

Using Program Support for Project Planning

CHALLENGE: Fire department approvals are crucial for solar PV design plans and can impact the onsite renewable capacity by restricting panel size, layout, and placement.

SOLUTION: Utilize free technical assistance services from clean energy incentive programs for solar feasibility and design assessments.

Exploring Strategies for Financing Renewables

CHALLENGE: A majority of Holos Communities' properties are ineligible for SOMAH due to being master-metered and/or outside of investor-owned utility (IOU) territories.

SOLUTION: The project team used incentive program technical assistance services to discover innovative funding and design solutions for ineligible properties such as enrolling in the Low-Income Weatherization Program (LIWP). Moreover, clean energy incentive program implementers should create flexible program requirements that enable wider participation of low-income multifamily rental housing.

Electrical Infrastructure Upgrade Costs

CHALLENGE: Electrifying existing building stock often requires electrical infrastructure upgrades, such as transformers, which are the responsibility of affordable housing providers to finance.

SOLUTION: Utilities and clean energy program implementers should share the cost of electrical infrastructure upgrades to alleviate the burden on affordable housing providers.

CONCLUSION

Electrification of new and existing affordable housing stock is a crucial strategy in reducing California's GHG emissions, contributing to long-term savings for affordable housing providers and their residents while improving health and comfort. However, there is no one-size-fits-all approach to this transition given that affordable housing providers have varying levels of experience with electrification and capacity to design, install and operate these new technologies. Despite the challenges, several

California clean energy incentive programs designed with affordable housing providers in mind are available now to assist with technical assistance to build internal organizational capacity while successfully integrating electrification technologies into their buildings. Nonetheless, electrifying affordable housing will require collaboration between affordable housing providers, policymakers, and other stakeholders to address the unique challenges faced by the affordable housing sector.

Key Findings and Challenges

The three early adopters of electrification profiled in this report identified five major challenges as primary barriers to adopting decarbonization strategies in new and existing affordable rental housing.

- 1. Increased project complexity and cost of clean energy technologies:** Providers highlighted the increased costs and design challenges associated with building electrification, including upgrading existing electrical services and central domestic hot water heating (DHW) systems, solar photovoltaics (PV), and procuring electric appliances. Furthermore, the transition to utilities setting rates based on Time Of Use (TOU) without access to affordable energy storage has further exacerbated long-term operating expenses for both affordable housing providers and renters.
- 2. Limited workforce capacity and availability:** Providers emphasized the need for qualified contractors to work with the housing provider management team, but there are few external contractors specializing in sustainable multifamily affordable rental housing design. Furthermore, internal staff lack prior experience in procuring, installing, and maintaining these new technologies.
- 3. Inaccurate utility and energy performance data:** Although granted permission-to-operate (PTO) by utilities, misaligned bills that fail to accurately account for onsite solar PV credits burden providers with the responsibility of resolving billing issues. Furthermore, staff inexperience with clean energy technologies impedes active monitoring of onsite energy data. Without active monitoring, underperforming technologies risk diminishing the return on investment.
- 4. Misaligned and insufficient energy programs:** Program implementers need greater clean energy incentives to alleviate the financial burden on affordable housing as well as the need for inclusive eligibility criteria that allows diverse building types to participate. Effective energy programs and financing solutions should be designed to facilitate ease of access to decarbonization resources, mitigating potential issues in the capital stack that may arise later in the process. Additionally, electrification programs should offer incentives to offset costs for electrical infrastructure upgrades like transformer upgrades, metering adjustments, and electrical trenching.
- 5. Tenant resistance to all-electric technologies:** Providers noted initial hesitations to pursuing all-electric design because of potential impacts on residents, who have expressed discomfort with using electric appliances like induction cooktops and concerns about the impact of electrification on their utility bills.



Key Recommendations and Solutions

The Partnership developed the following recommendations based on the input of the report participants:

Solutions For Providers

1. **Integrate electrification in initial design stages.** Providers should embrace all-electric concepts early to avert project delays and unnecessary costs from redesigns. To streamline this, engaging a skilled Mechanical, Electrical, and Plumbing (MEP) engineer or sustainability consultant for design and project management is recommended.
2. **Leverage clean energy program incentives and technical assistance (TA).** Enroll in programs for financial incentives and technical assistance to facilitate the electrification of both new and existing buildings.
3. **Build staff capacity through training.** With the rise of decarbonization requirements, it's crucial to provide affordable housing providers with education on emerging electrification technologies, empowering them to make informed choices.
4. **Incorporate tenant education.** Understanding the effects of electrification on utility costs, easing concerns, and adopting energy-saving techniques are essential through tenant education. Affordable housing providers should consider forming a resident-led council to get feedback on future initiatives and aid in tenant education outreach.

Recommendations For Stakeholders

1. **Utilities must prioritize supporting affordable housing providers.** Utilities must accurately represent energy credits from onsite solar PV on utility bills to benefit affordable housing developers and low-income residents. Moreover, utilities should simplify permitting, share costs for electrical infrastructure upgrades, and establish transparent tracking for solar PV savings, enabling access to more borrowing capital.
2. **Allocate funding to expand access to affordable energy storage.** Allocate funds for cost-effective energy storage to assist in countering rising operational expenses. Energy storage captures surplus daytime energy for use during peak hours, decreasing dependence on costly Time Of Use (TOU) rates and stabilizing utility bills over time.
3. **Increase clean energy incentives and adjust program eligibility criteria.** Policymakers should prioritize funding for electrification in new and existing affordable housing as well as updating incentives to match rising market costs and broadening eligibility criteria to support a broader range of affordable housing developments.

APPENDICES

Comparison of Standard Gas Design versus All-Electric Design

MEASURE	STANDARD GAS DESIGN	ALL-ELECTRIC DESIGN
Gas Service	Gas connection & meter	No gas connection or meter
Electric Service	Electrical service to building	(Possibly) larger electrical service to accommodate water heaters and electric dryers
Water Heaters	Condensing gas water heaters	Heat pump water heaters
HVAC	Gas furnace	Heat Pump HVAC (ducted, ductless, VRF, VCHP)
Renewables	Photovoltaic + Thermal	PV only
Clothes Dryers	Gas Dryers	Electric dryer options
Stove	Gas Stove	Electric stove options
BBQ Grills	Gas grills	Charcoal or propane tank grills
Carbon Monoxide alarms	Required throughout building	May not be required since there would be no combustion anywhere in the building
Utility Infrastructure, if applicable	Required, if existing infrastructure is not already appropriate for electrical demand for new multifamily developments	Required, if existing infrastructure is not already appropriate for capacity demand for new multifamily developments. In some instances, a higher electrical load might require a second transformer

Clean Energy Incentive Program Matrix for Multifamily Rental Housing

BUILDING TYPE	INCENTIVE PROGRAM NAME	MEASURES COVERED			
		Electrification	Energy Efficiency	Solar PV	Battery Storage
NEW CONSTRUCTION	Building Initiative for Low-Emissions Development (BUILD)	X	X	X	
	Energy Smart Homes (ESH)	X			
	California Energy Design Assistance (CEDA)	X			
	Zero by Design	X			
EXISTING BUILDINGS	Low-Income Weatherization Program (LIWP)	X	X	X	
	Comprehensive Affordable Multifamily Retrofit (CAMR)	X	X	X	
	Solar on Multifamily Affordable Housing (SOMAH)			X	
	TECH Clean California	X			
	Energy Smart Homes	X			
	Self-Generation Incentive Program (SGIP)				X

