Multifamily Affordable Housing Energy Retrofit Strategy for Richmond, CA

By

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ABSTRACT

Weatherization, energy efficiency, and electrification upgrades, which combined can be called energy retrofits, can reduce energy burden, provide health improvements through improved indoor air quality and increased comfort in the home, and reduce greenhouse gas emissions. This study explores how the City of Richmond, CA can incentivize weatherization, energy efficiency, and electrification upgrades as well as solar installation in multifamily affordable housing developments to provide these benefits to low-income residents in the City. Through interviews with energy program administrators, affordable housing providers, community-based organizations, and government agencies, this study identifies the key motivations, opportunities, and challenges of completing multifamily affordable housing energy retrofits in Richmond, CA. In addition, a comprehensive review of existing and upcoming federal, state, and local energy retrofit funding and resources was completed. Based on building permit data and utility payment structure and appliance fuel source survey data from buildings, existing affordable housing developments that are good candidates for electrification and solar installation in Richmond were identified. Utilizing interview findings, literature review, funding information, and building stock analysis, recommendations were created for the City of Richmond of short, medium, and long term programs that could be implemented to increase multifamily affordable housing energy retrofits, with staff capacity, funding requirements, and implementation timeline information included.

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Table of Contents

List of Tables

I. Executive Summary

A. Introduction

The City of Richmond, CA is located in the San Francisco Bay Area and has a population of 116,448 residents. It is a racially and culturally diverse city with 32 miles of shoreline, and was primarily developed through the World War II shipbuilding effort. [1] Due to a concentration of industrial facilities, the City has historically faced environmental burdens and 40% of census tracts in the City are defined as SB535 Disadvantaged Communities.[2] There are about 28 deed restricted affordable housing developments in the City and half were built in or before 1980.[3] Through the Department of Energy's Communities Local Energy Action Program (CLEAP) program, the City of Richmond has received technical assistance to help develop a City-wide existing building electrification and weatherization strategy.[4] To supplement the work of the CLEAP technical assistance, this project delves into the existing multifamily affordable housing sector in the City to determine programs and policies to increase energy retrofits in these buildings. In this report, energy retrofit refers to weatherization, energy efficiency, and electrification measures. Renewable energy, specifically solar, is also mentioned throughout and is incorporated into findings and recommendations.

B. Methods

In this study, I interviewed 12 energy program administrators, government agencies, affordable housing providers, and nonprofit organizations to discuss the motivations, opportunities, and challenges related to multifamily affordable housing retrofits. I also conducted a survey with 15 affordable housing developments in the City to learn about the utility payment structure and fuel sources for appliances in multifamily affordable housing buildings. I conducted an analysis utilizing information from the survey, building permit data on recent renovations and installations, and broader building characteristics to determine which affordable housing developments were good candidates for electrification and solar installation. In addition, I conducted a literature review of the opportunities and challenges of multifamily energy retrofits, reviewed best practices of municipalities as it relates to energy retrofits, and also identified the existing and upcoming federal, state, and regional funding and technical assistance resources for energy retrofits. Utilizing interviews, analysis, literature review, and funding information, I developed short-, medium-, and long-term programs the City could

[1] "City of Richmond Fact Sheet. Community Development Department.," accessed May 14, 2023, https://www.ci.richmond.ca.us/DocumentCenter/View/8348/COR-Fact-Sheet?bidId=.
[2] "CalEnviroScreen 4.0," n.d.
[3] "Affordable Housing Developments | Transparent Richmond," Tyler Data & Insights, accessed May 14, 2023, https://www.transparentrichmond.org/Housing-Community-Development/Affordable-Housing-Developments/c36c-x4iu.
[4] "U.S. Department of Energy (DOE) Communities Local Energy Action Program (LEAP) Pilot | Richmond, CA - Official Website," accessed May 14, 2023, https://www.ci.richmond.ca.us/4373/US-Department-of-Energy-DOE-Communities-.

implement to incentivize energy retrofits in multifamily affordable housing, with staff capacity and funding estimates for each measure.

C. Findings

1. Motivations and Opportunities

Through interviews, it was noted that a key motivation to complete an energy retrofit project is if it is financially viable through incentives available, especially as nonprofit affordable housing providers have limited cash flow. In addition, it was mentioned that energy retrofits should ideally be combined with additional building upgrades so that the building would only need to go through this process of financing and construction/rehabilitation once.

In terms of opportunities, Richmond's older housing stock is an opportunity to conduct cost effective energy retrofits as at least 61% of affordable housing units were built before 1978, and these buildings are less likely to have insulation as the California building codes requiring insulation were passed in 1978.[5] It was noted from multiple interviewees that in their work, workforce capacity had not been a large issue for electrification and that the policy atmosphere made it such that it has not been difficult to convince residents to move off gas infrastructure. Affordable housing providers mentioned they are eager to take advantage of available incentives before they become legal requirements. In some buildings, there is an opportunity for significant cost savings for the affordable housing provider through energy retrofits because they are responsible for all electric and gas utilities and would benefit financially from the upgrades.

2. Challenges

The challenges identified were grouped into the following categories: staff and organizational capacity, staff and organizational communication, electrification readiness, funding challenges, utilities and utility payments, permissioning between landlords and tenants, property decision making, supply chain issues and workforce capacity.

There were challenges of staff capacity mentioned related to the number of projects energy program administrators were able to take on, as well as the capacity needed from affordable housing providers to participate in existing programs such as the Solar on Multifamily Affordable Housing (SOMAH) program. In terms of communication, there was limited communication between some energy programs and the City. In terms of electrification readiness, there were challenges of deferred maintenance, electrical panel sizing, removal of gas infrastructure, timing of solar panel installation, and mold remediation. For funding challenges, interviewees mentioned challenges related to amount of funding as well as timing of available funding sources. In terms of utilities, interviewees mentioned the challenges of delays when working with local utilities for inspections on projects. For permissioning

[5] "Affordable Housing Developments | Transparent Richmond."

challenges, it was mentioned that tenants opt out of programs that do not require landlord approval, such as Rising Sun's free energy efficiency improvements, due to the assumption that landlord approval is needed. In addition, it was mentioned that during larger energy retrofits, landlords needed to gain residents' trust and make clear the benefits of the retrofit, as the process could be inconvenient to residents at times. For the challenge of property decision making, because affordable housing developments have complex ownership structures, seeking approval for projects from affordable housing investors, who may sometimes have different priorities than the affordable housing providers, was noted as a challenge. In addition, property managers, who are the most accessible for City staff to reach in terms of outreach, do not have decision making power for conducting energy retrofits. It was also mentioned that supply chain issues have led to delays in projects and that in terms of workforce, while energy contractors have been seen to be generally familiar with electrification projects, other contractors like plumbers have had difficulty with heat pump water heaters.

D. Recommendations

Utilizing information from interviews, building stock analysis, literature review, and funding sources, I have developed several recommendations. The following ideas are organized in terms of short-, medium- and long-term programs. Short term programs are programs the City can implement immediately with little staff capacity or funding requirements. Medium term programs are programs that could be funded through upcoming federal funding, including the $160,550 formula grant provided by Energy Efficiency and Conservation Block Grant (EECBG) funding or the $400,000 Buildings Upgrades Prize award. In addition, the City has some funds from the Chevron Environment and Community Investment Agreement and Transformative Climate Communities funding that could supplement federal funds received. Not all the medium-term programs listed below can be completed as funding is limited but these are some recommendations of programs that could be implemented if funding is secured. Long term programs and policies would require a great deal of stakeholder input and context specific research before implementation in addition to funding and staff capacity needs.

Recommendations below are organized in order of most effective and actionable. Staff capacity required to apply to funding sources are not included in the staff capacity estimates of the programs. This is the staff capacity needed to develop and implement the program. It is assumed that staff would apply to the funding sources regardless of the program type.

1. Short Term

(1) Conduct targeted outreach to existing multifamily affordable housing buildings for energy retrofits and multifamily solar based on Building Stock Analysis: Candidates for Electrification and Solar Installation analysis

(2) Attend existing meetings with property managers to present about energy retrofit resources

(3) Keep City website up to date on specifically multifamily programs and newsletter on energy programs applicable in Richmond for tenants and affordable housing providers

(4) Form relationships with and work closely BayREN to take advantage of new initiatives

(5) Stay connected with MCE staff and connect them with affordable housing providers interested in MCE incentives

(6) Support Richmond energy contractors in becoming part of BayREN contractor tool

(7) Collaborate with nonprofits such as with Rising Sun to provide credibility

(8) Track federal and state programs and funding sources through the IRA, IIJA as well as through agencies such as DoE, HUD, CSD, CEC, HCD, CPUC, and other federal and state level agencies

2. Medium Term

(1) Develop One Stop Shop: Appoint City point person on energy retrofit programs

(2) Partner with MCE to develop Healthy Homes Program

(3) Streamlining on Permitting

(4) Provide gap financing for multifamily retrofit projects in collaboration with MCE

(5) Provide Additional Funding for the Richmond Community Foundation Connects Net Zero Energy Homes Program

(6) Provide funding for workforce training programs such as Rising Sun or RichmondBUILD

(7) Expand funding for deferred maintenance for multifamily affordable housing buildings

(8) Funding for dehumidifiers in old multifamily affordable housing

(9) Create Home Energy Score Program for Selling Homes (for duplexes/triplexes/SFHs)

(10) Provide technical assistance and support for multifamily weatherization

(11) Revolving Loan Fund (for small businesses)

3. Long Term

(1) Develop energy benchmarking and transparency policy for multifamily properties

(2) Create Rental Property Efficiency Standard

(3) Require electrification of buildings over the size of 25,000 square feet

II. Introduction and Context

The City of Richmond, CA is located in Contra Costa County in the San Francisco Bay Area with a population of 116,448 residents[6]. It is a racially and culturally diverse city, is home to 32 miles of seashore, and had a prominent role in the World War II shipbuilding effort[7]. It is also a community that has historically been overburdened by environmental pollution through concentrated industry. Four census tracts are identified in CalEnviroScreen 4.0 as more environmentally burdened than 90% of census tracts in California and 8 are identified as SB535 Disadvantaged Communities[8].

Through the Department of Energy's Communities LEAP (CLEAP) program, the City of Richmond has received technical assistance to help develop a City-wide existing building electrification and weatherization strategy.[9] The City of Richmond has at least 3,724 affordable housing units and 47% of residents in Richmond, CA are renters.[10][11] There are about 28 affordable housing developments in the City, as seen on the dataset publicly available from the City on the Affordable and Safe Housing page under Built Environment on the City's Open Data and Performance Reporting Platform, Transparent Richmond, www.transparentrichmond.org.[12][13] Of these buildings, more than 70% are developed using the Low-Income Housing Tax Credit (LIHTC) program. The compliance years for LIHTC buildings range from 2054 to 2070. Of the affordable housing units, 1636 are for residents making 30-50% of Area Median Income, meaning very low-income tenants.[14]

Weatherization, energy efficiency upgrades, and electrification are key components of climate change mitigation and adaptation. Weatherization and energy efficiency reduce energy burden and increase comfort in a home while also reducing the overall energy used, reducing emissions. Electrification reduces greenhouse gas emissions but also provides health benefits in terms of reducing indoor air pollution. There are many existing weatherization and energy efficiency programs available regionally, statewide, and nationwide, with much more funding coming down through the Inflation Reduction Act and Infrastructure Investment and Jobs Act.

This thesis focuses on energy retrofit projects in multifamily buildings. Typically, this includes weatherization, energy efficiency, and electrification. Renewable energy is also mentioned throughout and is incorporated into findings and recommendations as part of energy retrofits for multifamily affordable housing. The following are a list of measures that could be described as part of energy retrofit projects and are derived through the rebates listed on MCE and BayREN's website's as cited in Table 1 below. Table 1 shows examples of upgrades

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[6] "City of Richmond Fact Sheet. Community Development Department."
[7] "City of Richmond Fact Sheet. Community Development Department."
[8] "CalEnviroScreen 4.0."
[9] "U.S. Department of Energy (DOE) Communities Local Energy Action Program (LEAP) Pilot | Richmond, CA - Official Website."
[10] "Affordable Housing Developments | Transparent Richmond."
[11] "U.S. Census Bureau QuickFacts: Richmond City, California," accessed December 16, 2022, https://www.census.gov/quickfacts/fact/table/richmondcitycalifornia/POP010220#POP010220.
[12] "Transparent Richmond," accessed May 14, 2023, https://www.transparentrichmond.org/.
[13] "Affordable and Safe Housing | Transparent Richmond," accessed December 16, 2022, https://www.transparentrichmond.org/stories/s/Affordable-and-Safe-Housing/ucew-7kkt.
[14] "Affordable Housing Developments | Transparent Richmond."

that come under the jurisdiction of the following types of upgrades (weatherization and energy efficiency, electrification, and renewable energy).

Weatherization and Energy Efficiency Measures	Electrification Measures	Solar Measures
ENERGY STAR® Appliances Insulation Lighting Water Fixtures Windows Furnaces Air Conditioners Faucet Aerators Hardwired LED Lighting Low-Flow Showerheads Packaged Terminal Air Conditioners Pipe Insulation Refrigerators Smart Thermostats Energy Efficiency Measures	In-Unit Heat Pump Water Heater In-Unit Heat Pump HVAC In-Unit Electric Laundry Dryer In-Unit Electric Cooking Central Heat Pump HVAC Central Heat Pump Water Heater Common Area Heat Pump HVAC Laundry/Common Area Heat Pump Water Heater Heat Pump Pool Heater Subpanel Upgrade Central/common area panel upgrades	Rooftop Solar Community Solar

Table 1: Energy Retrofit Examples[15] [16]

[15] "Energy Savings For Your Multifamily Building," MCE Community Choice Energy, accessed May 14, 2023, https://www.mcecleanenergy.org/multifamily-savings/.

[16] "Building Improvements | Bay Area Regional Energy Network," accessed May 14, 2023, https://www.bayren.org/multifamily-property-owners/building-improvements.

III. Literature Review

A. Energy Retrofit Context, Importance, and Challenges

1. Benefits of Weatherization, Energy Efficiency, and Electrification

Weatherization, energy efficiency, and electrification provide a multitude of benefits to tenants in multifamily housing. In addition to emissions reduction, electrification can also make significant health and safety improvements in the lives of tenants of multifamily affordable housing buildings.[17]Especially in multifamily affordable housing buildings that are older and in poorer quality due to limited financing for renovations, weatherization can bring large improvements in insulation significantly increasing comfort of residents in their homes as well as decreasing energy burden through reduced energy usage.[18] In addition, if multifamily affordable housing buildings are not prioritized in electrification, they may be some of the last buildings to electrify which would give them the financial burden of maintaining stranded fossil fuel infrastructure[19].

Electrification of larger buildings also addresses inequities in existing buildings. New York City projected that electrification of these buildings would reduce asthma emergency visits in low-income neighborhoods 10 times more than in wealthier neighborhoods[20]. In addition, it is generally possible to serve more families with the same amount of money when conducting retrofits for multifamily buildings[21].

Electrification can increase indoor air quality especially through the replacement of a gas stove as it has been found that residents with gas stoves are 32% more likely to have asthma[22]. In addition, through the installation of a heat pump which acts as a heating and cooling source, buildings can provide air conditioning which was previously not provided. Air conditioning can provide increased resilience to increasing temperatures from climate change. Weatherization can provide insulation (and thus comfort), air sealing, and integrated pest management measures leading to better health and quality of life outcomes for the tenants of the multifamily affordable housing buildings[23]. By improving only thermal heating, energy burden can be reduced 15% on heating and cooling costs and 11% of total energy costs.[24]

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[17] Dan York et al., "Building Decarbonization Solutions for the Affordable Housing Sector" (ACEEE, April 2022), https://www.aceee.org/research-report/u2204.
[18] York et al.
[19] York et al.
[20] Yu Ann Tan and Bomee Jung, "Decarbonizing Homes: Improving Health in Low-Income Communities through Beneficial Electrification" (Rocky Mountain Institute, 2021), https://rmi.org/insight/decarbonizing-homes/.
[21] Ryan Kristoff and Rob Foley, "Multifamily Weatherization: Opportunities and Challenges | National CAP," https://communityactionpartnership.com/webinar/multifamily-weatherization-opportunities-and-challenges/.
[22] Weiwei Lin, Bert Brunekreef, and Ulrike Gehring, "Meta-Analysis of the Effects of Indoor Nitrogen Dioxide and Gas Cooking on Asthma and Wheeze in Children," *International Journal of Epidemiology* 42, no. 6 (December 2013): 1724–37, https://doi.org/10.1093/ije/dyt150.
[23] Veena Singla et al., "Integrating Housing, Workforce, Health and Energy Equity in Building Decarbonization in Los Angeles, California," n.d.
[24] York et al., "Building Decarbonization Solutions for the Affordable Housing Sector."

2. Energy Retrofit Technologies

The different components of a home that utilize a great deal of energy are space heating and cooling, water heating, stoves, and dryers. In the US, electricity is currently used for heating in areas with warmer climates. For space heating and cooling, air source heat pumps provide an opportunity to provide an efficient technology that provides both heating and cooling. Some barriers are that heat pumps do not function as well in colder climates. In colder climates, when heat pumps are installed, the old furnace is maintained as a backup source of heating, which can limit the amount of greenhouse gas emissions reduced. For multifamily buildings, some barriers for installing heat pumps include potential increase in electrical load for buildings that previously did not have air conditioning, potential requirement to change ductwork to increase airflow, and outdoor space needed to store appliances. If a building lacks a centrally ducted HVAC system, a mini split air source provides a way for tenants to individuals control their heating and cooling. However, in large buildings, this mini split system might become very complex. After space heating, water heating is the second largest energy use and central heat pump water heaters are an opportunity to electrify water heating. By increasing the electrical load in the building, both space heating and water heating may trigger electrical panel and electrical service upgrades.[25]

For cooking, induction cooking is the energy efficient electric alternative to gas stoves. There is a large public attachment to gas stoves which may make it difficult to transition to induction cooking so more outreach and information sharing is required about the technology[26]. For dryers, the replacement technology is an electric clothes dryer.[27]

3. Barriers for Multifamily Energy Retrofits

One major barrier to implementing multifamily affordable housing retrofits are the high up-front costs and relatedly, the access to funding and financing for affordable housing buildings.[28] This barrier can be addressed through layering multiple available incentives and taking advantage of low-cost financing.

Another barrier is the split incentive issue, which occurs when a tenant is responsible for utilities and thus the landlord is not incentivized to complete energy efficiency, weatherization, or electrification upgrades because they do not see the direct linkage to their own benefit. It has been found that in buildings where the tenants pay the utilities, there is an underinvestment in energy efficiency initiatives, which resulted in an increase in tenant's bills of 2%[29]. One method of addressing this split incentive issue is through on-bill financing. One type of on-bill financing is "Pay As You Save" programs such as the program in Minneapolis where utilities recover the investment of the energy efficient improvements through a fixed

[25] Bastian and C Cohn, "Ready to Upgrade: Barriers and Strategies for Residential Electrification" (Washington, D.C.: American Council for an Energy-Efficient Economy, 2022), https://www.aceee.org/research-report/b2206.
[26] York et al., "Building Decarbonization Solutions for the Affordable Housing Sector."
[27] Tan and Jung, "Decarbonizing Homes: Improving Health in Low-Income Communities through Beneficial Electrification."
[28] York et al., "Building Decarbonization Solutions for the Affordable Housing Sector."
[29] Jesse Melvin, "The Split Incentives Energy Efficiency Problem: Evidence of Underinvestment by Landlords," *Energy Policy* 115 (April 1, 2018): 342–52, https://doi.org/10.1016/j.enpol.2017.11.069.

charge on utility bills that is capped at 80% of the estimated monthly savings. Thus in this case, the up-front payment is covered by the utility and it is paid off through the tenant's energy savings.[30]

Additionally, for many buildings, especially those that have not been renovated in a long time, there may be deferred maintenance concerns that would need to be addressed before the electrification upgrades could be made such as reroofs, electrical panel upgrades, etc. This is especially true of older buildings[31]. In addition, energy retrofits may require electrical panel and wiring upgrades as well as upgrades to power lines and transformers that utilities need to upgrade, especially if electrical load is increasing a great deal. These are additional costs outside of the costs of the weatherization and electrification additions/improvements[32].

Additional identified barriers for multifamily weatherization include complex ownership structure, project scale, difference in contractor skill set, long project times/long payback times, supply chain challenges, and consumer awareness and understanding[33]. Some contractors may have outdated perceptions of how heat pumps work and the effectiveness of these technologies[34]. Staff capacity is also an issue, as property managers may not have the capacity to work on coordination of energy retrofits on top of existing responsibilities[35]. In addition, the property managers may not have energy efficiency experience which would make it more difficult to complete a large retrofit of the building[36]. Another barrier is that the upgrades may disturb tenants in their homes, so it is very important to carefully plan out the upgrades to minimize disruptions to tenants.

4. Risks to Tenants from Energy Retrofits

One concern about energy retrofits specifically in naturally occurring affordable housing is that energy retrofits may result in an increase in rent as costs of the energy retrofits would be passed on to the tenants[37]. In a study commissioned by the Department of Energy Efficiency and Renewable Energy office, the incentives for multifamily owners are detailed. One of the outcomes they found was that rental incomes increased by almost 2.39% ($227.48/unit) annually in the year after energy-efficiency improvements were completed[38]. It also goes on to mention that energy efficiency improvements are beneficial for landlords working in "rent-stabilized environments"[39]. While these may be incentives for building owners to pursue energy retrofits, these findings are not beneficial to low-income tenants. Buildings that are at risk of rental increases in the situation described above are buildings with naturally occurring

[30] Alexander Jarrah and Kate Tanabe, "Energy Equity for Renters Toolkit" (ACEEE, November 2022), https://www.aceee.org/toolkit/2022/11/energy-equity-renters-toolkit.
[31] York et al., "Building Decarbonization Solutions for the Affordable Housing Sector."
[32] Bastian and Cohn, "Ready to Upgrade: Barriers and Strategies for Residential Electrification."
[33] Bastian and Cohn, "Ready to Upgrade: Barriers and Strategies for Residential Electrification."
[34] Bastian and Cohn.
[35] "Multifamily Weatherization: Opportunities and Challenges | National CAP."
[36] Jarrah and Tanabe, "Energy Equity for Renters Toolkit."
[37] Jarrah and Tanabe.
[38] D. Philbrick, R. Scheu, and L. Brand, "Quantifying the Financial Benefits of Multifamily Retrofits" (National Renewable Energy Lab.(NREL), Golden, CO (United States), 2016).
[39] Philbrick, Scheu, and Brand.

affordable housing. These units are unsubsidized but happen to have below market rents. The city should thus focus on encouraging energy retrofits in the 28 deed restricted multifamily affordable housing buildings in the City first before encouraging this shift in naturally occurring affordable housing, which is what this report focuses on.

The Weatherization Assistance Program has restrictions on rental increases after the use of funding from the program. First it states that the benefits of the program will primarily be for the tenants residing in the units and that for a "reasonable" period after weatherization, there shall not be rent increases unless they are demonstrated to be related to matters outside of weatherization work[40]. States are responsible for enforcing these rules. In California, building owners are not allowed to increase rent at all for two years after conducting building improvements and weatherization work[41].

However, AB1482 in California states that buildings that are at least 15 years old can increase rent up to 10% a year and for substantial remodels they may evict tenants in exchange for providing one month's rent amount[42]. Many organizations, including the NRDC state that this protection is not strong enough, as one month's rent is not sufficient to search for a new apartment and move in. The NRDC report also recommends that "substantial renovation" work is removed as just cause for eviction[43].

Another potential negative impact of energy retrofits on tenants is that because heat pumps provide air conditioning in addition to heating, residents who did not previously have air conditioning may notice an increase in their utility bills due to the increased electrical load, especially if the system shifts from central heating to in unit heating and cooling[44]. For deed restricted affordable housing, this utility bill increase can be prevented if the utility allowance provided for air conditioning is not high enough to make up the difference. However, because those in deed restricted affordable housing have utility allowances, the added cost of air conditioning is a larger issue for naturally occurring affordable housing units. One conclusion of these outcomes is that naturally occurring affordable housing should be acquired and affordability should be preserved by converting buildings to deed restricted affordable housing. This would prevent rental increases through upgrades to the building. Some cities, such as Boston, have begun programs to accomplish this goal.[45]

[40] Lisa Sitkin and James Grow, "SURVEY OF STATE TENANT PROTECTION POLICIES FOR THE WEATHERIZATION ASSISTANCE PROGRAM (WAP)," n.d., 33.
[41] "Weatherization Assistance Program for Low-Income Persons DRAFT Bipartisan Infrastructure Law State Plan and Application to the U.S. Department of Energy September 16, 2022," no. 4040 (n.d.).
[42] Singla et al., "Integrating Housing, Workforce, Health and Energy Equity in Building Decarbonization in Los Angeles, California."
[43] Singla et al.
[44] York et al., "Building Decarbonization Solutions for the Affordable Housing Sector."
[45] City of Boston, "ACQUISITION AND EXPANSION OF AFFORDABLE HOUSING IN EAST BOSTON ANNOUNCED," October 14, 2022, https://www.boston.gov/news/acquisition-and-expansion-affordable-housing-east-boston-announced.

5. Role of Local Governments

A local government's role in increasing energy efficiency in a city can be thought of as four separate roles: Educator, Facilitator, Enhancer, and Investor[46]. As an educator, the local government should provide information to building owners about existing incentives available. As a facilitator, the local government can provide support through providing technical assistance to access programs and financing. As an enhancer, the local government could provide gap funding for an energy retrofit for building affordable housing. As an investor, the local government can develop financing or funding that can reach targeted customers and create strategic partnerships with financial institutions. Cities also will need to engage several stakeholders involved in multifamily affordable housing to increase weatherization and electrification of buildings. These include primarily building owners, property managers, and tenants. Additional stakeholders include financiers, developers, utilities, community-based organizations, and affordable housing providers[47].

B. Energy Retrofit Funding and Resources

This section details federal, state, regional, and local funding and technical assistance resources available to the City and affordable housing providers to increase energy retrofits.

1. Federal Programs/Funding

a. Inflation Reduction Act

The Inflation Reduction Act, passed in August 2022 provides a great deal of federal funding for energy retrofit projects, and will have a big impact on affordable housing specifically.

i. HUD Green and Resilient Retrofit Program (GRPP)

This program, funded by the Inflation Reduction Act, is the largest program providing funding for specifically energy efficiency, greenhouse gas emissions reductions, renewable energy generation, and climate resilience strategies in multifamily housing. The program appropriates $837.5 million through HUD for grants or loans. Eligibility is focused on buildings that are Section 202, 811, or Project Based Section 8 and Section 236 properties. The program requires 5 years of extended affordability after the retrofits and a minimum of 15 years of affordability.[48]

HUD released the implementing notice for the program on May 11, 2023. It details that three parallel notice of funding availability will be released alongside this implementing notice. These are the "Elements" Awards which are up to $750,000 per property which provides funding to building owners to add climate resilience, energy efficiency, electrification, and renewable energy measures within recapitalization transactions that are already in progress. The "Leading

[46] Jarrah and Tanabe, "Energy Equity for Renters Toolkit."
[47] York et al., "Building Decarbonization Solutions for the Affordable Housing Sector."
[48] "Green and Resilient Retrofit Program for Multifamily Housing (GRRP) Notice (HUD, May 2023)," accessed May 16, 2023, https://www.hud.gov/sites/dfiles/OCHCO/documents/2023-05hsgn.pdf.

Edge" Award provides up to $10 million in funding per property for retrofits for more ambitious outcomes such as net zero buildings or use of low Embodied Carbon materials. This is targeted funding toward early planning stages of a recapitalization effort Lastly, the "Comprehensive" Award will provide up to $20 million per property recapitalization investments for properties with high need for investment in energy efficiency, emissions reduction and climate resilience and is targeted to initiate recapitalization investments designed from inception.[49]

ii. Renewable Energy Investment Tax Credits

The bill includes an estimated $10 billion in funding for the renewable energy investment tax credits (ITCs) until at least 2032[50]. Investment tax credits are a "dollar-for-dollar" credit for expenses invested in renewable energy properties, mostly in solar developments[51]. Through the IRA, it is extended as 30% credit for qualified expenditures. After 2032, the tax credit drops incrementally until it is eliminated by 2035. The ITC is not just applicable for new construction, it can also be used for existing buildings.

There are also several stackable bonuses available including a 10% domestic content (encouraging developers to use US materials) bonus, a 10% "Energy Community'' bonus, and a bonus for low-income communities of 10% or a 20% bonus for affordable housing and low-income economic benefit projects of 20%[52]. The maximum amount of low-income economic benefit affordable housing bonus projects under a specific year is 1.8 GW. The Department of Treasury issued a notice on February 13, 2023 for the low-income communities bonus credit program. For 2023, the notice announced allocations of 700 MW for facilities located in low-income communities, 200 MW for facilities located on Tribal land, and 200 MW for facilities serving federally subsidized residential buildings including those supported by LIHTC, and 700 MW for facilities where 50% of financial benefits of the electricity produced goes towards household with incomes less than the poverty line[53]. The application process will be conducted in two parts where facilities that are already part of low-income residential buildings and those that benefit low-income households will be accepted first. There will be additional information about eligibility and process to be released soon.

iii. Energy Efficient Home Improvement Credit

This credit is targeted towards owner occupied homes. Starting on January 1, 2023, the Energy Efficient Home Improvement credit amount is equal to 30% of the sum of amount paid by the taxpayer to certain qualified expenditures. The qualified expenditures are (1) qualified energy

[49] "Green and Resilient Retrofit Program for Multifamily Housing (GRRP) Notice (HUD, May 2023)."
[50] "The Inflation Reduction Act: An Overview of Clean Energy Provisions and Their Impact on Affordable Housing," January 13, 2023, https://www.novoco.com/notes-from-novogradac/inflation-reduction-act-overview-clean-energy-provisions-and-their-impact-affordable-housing.
[51] Novogradac, "About Renewable Energy Tax Credits," Renewable Energy Tax Credit Resource Center, accessed May 14, 2023, https://www.novoco.com/resource-centers/renewable-energy-tax-credits/retc-basics/about-renewable-energy-tax-credits.
[52] "The Inflation Reduction Act."
[53] IRS, "Initial Guidance Establishing Program to Allocate Environmental Justice Solar and Wind Capacity Limitation Under Section 48(e)," 2023, https://www.irs.gov/pub/irs-drop/n-23-17.pdf.

efficiency improvements installed throughout the year, (2) residential energy property expenditures during the year and (3) home energy audits during the year. There is a maximum of $1200 aggregate yearly tax credit maximum for building envelope components, home energy audits, and energy property, and energy property. For electric or natural gas heat pump water heaters, electric or natural gas heat pumps, and biomass stoves and biomass boilers there is a separate aggregate yearly credit of $2000. Thus, the total available is $3200 for the year. These upgrades also may be available to tenants who make eligible upgrades as listed in the Fact Sheet under Qualifying Residence Q1.A.1.[54]

iv. Residential Clean Energy Credit

This program is targeted towards owner occupied homes. The Residential Clean Energy Credit applies a 30% credit for residential clean energy expenditures qualified expenses including solar panels, solar water heaters, fuel cell property expenditures, small wind energy property expenditures, geothermal heat pump property expenditures, and battery storage technology expenditures between 2022 and 2032 and begins to phase down in 2033 and 2034. There is not a limit on the overall dollar limit for this credit. This program is targeted towards owner occupied homes. These upgrades also may be available to tenants who make eligible upgrades as listed in the Fact Sheet under Qualifying Residence Q1.A.1[55].

v. DoE High Efficiency Electric Home and Home Energy Performance Based Whole House Rebates (HOMES)

Almost 9 billion has been allocated to fund rebate programs including specific state allocations. $4.5 billion was allocated through 2031 for the High Efficiency Electric Home Rebate Program which provides point of sale rebates for electrification upgrades and means testing. The HOMES program has an allocation of 4.3 billion until 2031 and is a savings based retrofit program that has incentives for low to moderate income homes. The programs will both be administered by DOE in collaboration with state energy agencies.[56]

These funds are not yet available and are currently in the process of stakeholder outreach and development of program guidance[57]. Once available, the funding will be made available to states. On March 23, 2023, DOE posted the Administrative and Legal Requirement Document that details the way in which states can access the funds to prepare for and implement the program. It is mentioned that states will need to create a Home Energy Rebate Program Plan to distribute formula awards.[58]

[54] IRS, "Frequently Asked Questions about Energy Efficient Home Improvements and Residential Clean Energy Property Credits," December 2022, https://www.irs.gov/credits-deductions/frequently-asked-questions-about-energy-efficient-home-improvements-and-residential-clean-energy-property-credits.
[55] IRS.
[56] "The Inflation Reduction Act."
[57] "Home Energy Rebate Programs," Energy.gov, accessed May 14, 2023, https://www.energy.gov/scep/home-energy-rebate-programs.
[58] "Home Energy Rebates ALRD (Department of Energy, March 2023)," accessed May 14, 2023, https://www.energy.gov/sites/default/files/2023-03/Home_Energy_Rebates_ALRD.pdf.

vi. EPA Greenhouse Gas Reduction Fund

This $27 billion dollar program will fund technical assistance and financial assistance to reduce GHG emissions. Of the $27 billion, $15 billion is targeted to low-income and disadvantaged communities[59]. In April 2023, the GGRF guidance was released. The main objectives of the program are to reduce emissions of greenhouse gas and other air pollution, deliver benefits of GHG and air pollution reduction projects to American communities, specifically low-income and disadvantaged communities, and mobilize financing and private capital for additional projects. The competitions for funding are anticipated to start early summer 2023. The fund will be broken into three subcomponents: the National Clean Investment Fund, Clean Communities Investment Accelerator, and Solar for All. The National Clean Investment Fund is a $14 billion fund and will fund 2-3 national nonprofits to partner with private capital providers to deliver financing to a variety of organizations, including businesses, CBOs, community lenders and more to develop clean technology projects. The Clean Communities Investment Accelerator is $6 billion dollars and will fund 2-7 hub nonprofits with the ability to build the clean financing capacity of specific networks of community lenders (public, quasi-public, and non-profit) such as CDFIs, green banks, housing finance agencies, etc and others to make sure these institutions will provide financing to low income and disadvantaged communities for cost-saving and pollution reducing clean technology projects. Finally, the Solar for All program will provide up to 60 grants to states, tribal governments, municipalities and nonprofits to ensure low income and disadvantaged communities are able to access investment in residential and community solar.[60]

b. Additional Federal Funding/Programs

i. Weatherization Assistance Program (WAP)

The Weatherization Assistance Program which provides weatherization improvements and upgrades to homes received a $3.5 billion one-time infusion of funding from the Infrastructure Investment and Jobs Act. The WAP program has historically focused on serving single family homes. The IIJA removes the prevailing wage requirements for buildings with fewer than five units which could increase the amount of weatherization that occurs in small multifamily buildings. [61]

ii. Low Income Home Energy Assistance Program

The LIHEAP program is a federally funded program that provides low-income residents with utility assistance. Through the American Rescue Plan Act, $203 million was appropriated to California to provide additional relief due to the COVID-19 Pandemic. Funding for the LIHEAP program is distributed to states and each state is required to submit a LIHEAP Plan. That

[59] "The Inflation Reduction Act."

[60] "Greenhouse Gas Reduction Fund Factsheet. EPA.," accessed May 14, 2023, https://www.epa.gov/system/files/documents/2023-02/Greenhouse%20Gas%20Reduction%20Fund%20Factsheet.pdf.

[61] "Harnessing the IIJA's Weatherization Assistance Program to Leave No Household in the Cold | Joint Center for Housing Studies," January 31, 2023, https://www.jchs.harvard.edu/blog/harnessing-iijas-weatherization-assistance-program-leave-no-household-cold.

funding is then distributed to the 41 administering agencies.[62] For Richmond, services are provided by Contra Costa Employment & Human Services Department/Community Services Bureau. More information about how to apply to this program in Richmond can be found here: LIHEAP Richmond.[63] This program includes the Home Energy Assistance Program which provides one time utility assistance to balance a utility bill and the Energy Crisis Intervention Program (ECIP) which provides assistance in a crisis situation for low-income residents.[64]

iii. Energy Efficiency Conservation Block Grants (EECBG)

The EECBG program supports local governments, states, and Tribes in increasing energy efficiency and reducing fossil fuel and energy usage. The program was established in 2007 and $3.2 billion in funding was provided through the American Recovery and Reinvestment Act of 2009. The EECBG program provides formula grants to municipalities as well as competitive grants for communities that did not receive the formula grant. The program also has vouchers that provide technical assistance in place of the formula grants and is recommended for communities that are receiving less than $250,000 in formula grants. The Pre-Information Award Sheet for the program was due on April 28, 2023 and applications for the funding will be due in January 2024. Richmond was granted $160,550 in the EECBG formula grant. Local governments will have 2 years to utilize the funds. If the City decides to go with vouchers instead of the formula grant, they will not have to apply for and administer the grant. Vouchers can be used for technical assistance or equipment purchase and installation rebates.[65]

iv. Buildings Upgrades Prize

The Buildings Upgrades Prize is a $22 million prize offered by the DoE Buildings Technology Office. The prize encourages innovative submissions to support transition for buildings to become more energy efficient, reduce carbon emissions, and improve indoor air quality and occupant comfort. There are two pathways the City can apply to funding: Equity-Centered Innovation or Open Innovation. Through the Equity-Centered Innovation Pathway, teams can propose a concept that will deliver a replicable and scalable solution that provides upgrades to disadvantaged communities, low and moderate income households and underserved commercial, nonprofit, and public buildings. The winners will receive a $400,000 cash prize. The Open Innovation Pathway prize will propose a concept that is also replicable and scalable but for a specific geographic area or building type. These awards will be $200,000. By winning either prize, winners will move on to Phase 2 to access technical assistance. The Application Support Prize will also offer up to 50 teams $5000 and 10 hours of technical support for the Phase 1 application. In terms of timeline, the Phase 1 application is currently open and the

[62] California Department of Community Services and Development, "Low Income Home Energy Assistance Program," accessed May 14, 2023, https://www.csd.ca.gov/pages/liheapprogram.aspx.
[63] "Services in the City of Richmond," accessed May 14, 2023, https://www.csd.ca.gov/pages/Services.aspx?ct=Energy_Bill&SCI=Richmond&SCU=Contra%20Costa%20County&PT=H.
[64] California Department of Community Services and Development, "Low Income Home Energy Assistance Program."
[65] "Energy Efficiency and Conservation Block Grant Program," Energy.gov, accessed May 14, 2023, https://www.energy.gov/scep/energy-efficiency-and-conservation-block-grant-program.

Application Support Prize is being awarded until funds are expended. The Phase 1 application is currently open as of February 18, 2023 and will conclude by July 18, 2023. Winners will be announced in September 2023 and the Phase 2 prize will open in October 2023.[66]

v. Solar Technical Assistance

The US DOE provides technical assistance to local governments and other entities on addressing barriers to and improving access to solar energy. The SolSmart program recognizes local governments for implementing practices to make solar installation faster and easier. The program provides free technical assistance to communities that address barriers such as solar deployment, permitting, and zoning. SolarApp+, Solar Automated Permit Processing, specifically is a program that provides automated permit processing for solar projects. This allows building departments to streamline solar permits in the City. The City of Richmond is currently utilizing this program.[67]

2. California Programs/Funding

The following programs are administered by the state or funding is administered from the state to local governments. These programs are run by the California Department of Community Services.

a. Solar on Multifamily Affordable Homes Program (SOMAH)

The SOMAH program provides incentives for solar panel installation on multifamily properties in California in a way that benefits both property owners and the tenants. This program targets affordable housing but also includes eligibility for housing in environmental justice communities, called Disadvantaged Communities (DACs) (the 25% highest pollution burdened communities). The program has a target of 40% of participating projects being located in DACs. The program is administered by the Association for Energy Affordability, Center for Sustainable Energy, GRID Alternatives were selected in 2018 to administer the program. The subcontractors of the program include California Housing Partnership Corporation (CHPC), the Rising Sun Center for Opportunity and rotating CBOs. All SOMAH projects are required to provide direct economic benefits to tenants and at least 51% of the system's output must directly offset tenant load and be provided as virtual net energy metering credits. The program has a budget of $100 million per year. The SOMAH funding depends on GHG auction revenues and there is not a guarantee of funding beyond the years in which funds have been collected. The funds are capped per IOU territory and PG&E has about 43% of available funds. The total incentive can either be paid in full after the system has been installed and permission to operate has been

[66] "Buildings Upgrade Prize | HeroX," accessed May 14, 2023, https://www.herox.com/BuildingsUP.
[67] Department of Energy, "Solar Technical Assistance | Department of Energy," accessed May 14, 2023, https://www.energy.gov/eere/solar/solar-technical-assistance.

received or applicants can opt into the progress payment request once the equipment is installed but before the Permission to Operate.[68]

There are two tracks in the program, Track A is intended for property owners who would like access to Technical Assistance to understand their solar potential and/or identify contractors. Track B is for property owners that do not need technical assistance and have already identified a contractor. SOMAH Program Administrators also provide optional whole-building technical assistance that focuses on solar PV but also coordinating other energy efficiency and energy related programs.[69]

b. Low Income Weatherization Program (LIWP) Multifamily Energy Efficiency and Renewables

This program provides technical assistance and incentives for installing energy efficiency measures and solar photovoltaic systems in low income multifamily dwellings. The administrator of the program is the Association for Energy Affordability. The program covers 30-100% of energy efficiency upgrades and 50-100% of solar installations depending on the project as well as free technical assistance. In order to participate in the program, the development must be located in a disadvantaged community (DAC), contain at least 5 units, at least 66% of units must be at or below 80% of Area Median Income, and there must be at least 15% savings above existing conditions. In order to participate, the property owner would submit an interest form or send an email to the program at info@liwp-lmf.org, then they would receive free technical support, reserve the financial incentives, the upgrades would be installed at the property, and then the owner could claim the financial incentives. The program is funded by the State Cap and Trade auction proceeds and the General Fund.[70]

c. California Alternate Rates for Energy (CARE)/Family Electric Rate Assistance Program (FERA)

The CARE program provides low-income California residents a 30-35% discount on electricity bills and a 20% discount on natural gas bills. The FERA program provides a discount of 18% on only electricity for households of three or more. The income guidelines are different between the two programs but residents apply to the programs as part of one application. Tenants of sub metered residential facilities are required to use the CARE/FERA Submetered Residential Application and cannot apply online to the program. The program is administered by PG&E in Richmond.[71]

[68] "SOMAH Program Handbook | SOMAH," accessed May 14, 2023, https://calsomah.org/resources/program-handbook.
[69] "SOMAH Program Handbook | SOMAH."
[70] "California Low Income Weatherization Program Property Owners," California Low Income Weatherization Program, accessed May 14, 2023, https://camultifamilyenergyefficiency.org/about/propertyowners/.
[71] PG&E, "CARE and FERA Enrollment," accessed May 14, 2023, https://www.pge.com/en_US/residential/save-energy-money/help-paying-your-bill/longer-term-assistance/care/care.page.

3. Regional Funding/Programs

a. MCE Multifamily Energy Savings Program (MFES) and Low Income Families and Tenants Program (LIFT)

Marin Clean Energy is the community choice aggregation program for parts of four Bay Area counties that takes over generation services from the utility PG&E for communities that are part of it. They buy and provide clean energy to customers. MCE's Multifamily programs include technical assistance, energy efficiency upgrades, electrification measures, and program layering.[72]

Multifamily Energy Savings Program (MFES) provides cash rebates for electrification, energy and water saving measures for both common area spaces and within tenant units. The labor and materials for tenant units on in-unit LED lighting and low-flow fixtures are provided at no cost. If the building meets specific eligibility income criteria or is deed restricted affordable housing, the building is also eligible for the Low Income Families and Tenants Program (LIFT).[73]

With the MFES program, owners receive up to $6000 per unit for electrification measures as well as HVAC, windows, insulation, water savings, heat pumps, and other measures. If the property qualities for the LIFT program, there is an additional $1200 provided per unit. In addition, MCE provides a free comprehensive assessment and consultation with a multifamily energy and water expert. The program administrator for this program is Association for Energy Affordability (AEA), which also implements the California SOMAH and LIWP programs.[74]

b. MCE Heat Pump Water Heater Contractor Rebates

MCE program provides a $1000 rebate directly to contractors that replace customers' natural gas or propane water heaters with high efficiency heat pump water heaters.[75]

c. MCE Strategic Energy Management

MCE also provides a strategic energy management program which provides owners an assessment on how to reduce energy usage 3-15% with little capital investment. The tools to complete the upgrades as well as coaching, structure, and resources needed are provided through MCE as an Energy Coach. The program is free to participants. There are free quarterly workshops available throughout the two year program. The program administrator for this program is CLEAResult.[76]

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[72] "Multifamily Energy Webinar. Marin Clean Energy.," accessed May 14, 2023, https://www.mcecleanenergy.org/wp-content/uploads/2022/11/MCE-Multifamily-Energy-Webinar_PPT.pdf.
[73] "Energy Savings For Your Multifamily Building."
[74] "Energy Savings For Your Multifamily Building."
[75] Marin Clean Energy, "Offerings for Contractors in Contra Costa, Marin, Napa & Solano," accessed May 14, 2023, https://www.mcecleanenergy.org/contractors/#waterheater.
[76] "Strategic Energy Management | MCE," accessed May 14, 2023, https://www.mcecleanenergy.org/strategic-energy-management/.

d. Bay Area Regional Energy Network (BayREN) Rebates

BayREN provides rebates for multifamily building upgrades. They have recently upgraded their rebate system to incorporate more health, heat, and housing equity indicators. The program provides a base rebate of $500 a unit and then has adders for electrification measures at $1500 a unit each for heat pump water heater and heat pump HVAC and $750 for replacing a stove and $250 for replacing Laundry Dryers. There are also rebates for common area upgrades like a central heat pump HVAC or Laundry/Common Area heat pump water heater. There are rebates of sub panel electrical panel upgrades of $1000/unit and $5000 for the property for common area/central electrical panel upgrades.[77]

For upgrades that improve indoor air quality in areas with high pollution burden, there is an extra $500/unit. There is also an adder for buildings in areas with extreme heat. Richmond would not qualify for this adder as it is mostly in a more temperate environment. And lastly, in areas with high housing burden, for deed restricted affordable housing and housing cost burdened properties built before 2010 with less than 50 units, all other program rebates can be multiplied by 1.5-2x and there would be up to $500 reimbursable per unit for select in-unit appliances. Richmond is heavily housing burdened so this program would be great for property owners to take advantage of. [78]

As noted in an interview with energy program administrators, some MCE programs cannot be stacked with BayREN incentives, but the program implementer will support affordable housing providers in determining which incentives can be stacked.

e. PG&E Energy Savings Assistance Program

PG&E's Energy Savings Assistance Program (ESAP) provides a home assessment and energy savings measures including the following: "replacing your refrigerator, repairing or replacing your furnace or water heater* and installing insulation, weatherproofing, energy-efficient light bulbs, caulking, low-flow showerheads and more". Residents can apply online.[79]

4. Municipal Funding/Programs

a. Chevron Modernization Project Environmental and Community Investment Agreement

The City's Chevron Modernization Project Environmental and Community Investment Agreement was an agreement entered into by the City of Richmond and Chevron on July 29, 2014 and will invest $90 million dollars over 10 years in the City. The program funds competitive grants for community youth and youth sports services on a yearly basis. The agreement also has funded a scholarship program, community based greenhouse gas reduction

[77] "Building Improvements | Bay Area Regional Energy Network."
[78] "Building Improvements | Bay Area Regional Energy Network."
[79] PG&E, "PG&E Energy Savings Assistance Program," accessed May 14, 2023, https://www.pge.com/en_US/residential/save-energy-money/help-paying-your-bill/energy-reduction-and-weatherization/energy-savings-assistance-program/energy-savings-assistance-program.page.

programs such as the no-cost solar program, and a photovoltaic solar farm.[80] This agreement allows for funding for energy efficiency rebate programs. An example of this is the Energize Richmond program which provided gap funding for energy efficiency rebates for both multifamily housing and small businesses. This program has since sunsetted but it would be possible for the City to restart the program and provide potentially around $200,000-300,000 dollars in funding per year for energy retrofits.[81]

b. Transformative Climate Communities Implementation Grant

The City was awarded $35 million in funding through the state's Transformative Climate Communities grant in partnership with Trust for Public Land, Rich City, GRID Alternatives, Urban Tilth, and Groundwork Richmond. While most of this funding is allocated towards specific uses including improvising active transportation options, provide renewable energy and resilient homes, provide green infrastructure improvements and more, a small portion of funding could be utilized towards multifamily energy retrofits, especially if paired with the ECIA funding and additional federal funding.[82] The exact amount available for programs is unclear.

[80] "Adopted Operating Budget Fiscal Year 2022-2023," accessed May 16, 2023, https://www.ci.richmond.ca.us/DocumentCenter/View/61913/Adopted---Operating-Budget-Fiscal-Year-2022-2023-PDF.

[81] City of Richmond, CA, "Richmond - ECIA Community Grant Program | Richmond, CA - Official Website," accessed May 14, 2023, https://www.ci.richmond.ca.us/3250/Richmond-ECIA-Grants.

[82] Trust for Public Land, "Richmond Rising Partnership Receives $35 Million Grant from California Strategic Growth Council - Trust for Public Land," October 28, 2022, https://www.tpl.org/media-room/richmond-rising-partnership-receives-35-million-grant-from-california-strategic-growth-council.

IV. Methods

There were three main methods of data collection utilized in this research: building permit data, a survey for multifamily affordable housing buildings in the City, and interviews with a range of organizations working on or interested in weatherization, energy efficiency, and electrification, from community based organizations to energy program administrators to government agencies. In addition, I completed a review of existing and upcoming federal, state, regional, and local funding for energy retrofits as seen above. Utilizing all this information, I developed short-, medium-, and long- term recommendations for the City to implement, including the amount of staff capacity and funding needed for each program, to increase energy retrofits in multifamily affordable housing. The following section details the process of data collection and analysis.

A. Affordable Housing Developments Spreadsheet

Published on the City of Richmond's Open Data Platform is the Affordable Housing Developments Dataset.[83] This dataset includes the year built, total units, total number of subsidized units, total number of units by AMI restriction, compliance end year for deed restrictions, address, ownership entity, ownership entity contact information, property management entity and property management entity contact information. This spreadsheet was last updated in January 2020. Since then, there have been a few new developments that have been manually added to the sheet after conversations with City staff, including Hacienda and Terraces at Nevin. In addition, when contacting developments to complete the survey, I contacted the buildings through alternate phone numbers than listed in the spreadsheet. These new phone numbers are recorded in the updated spreadsheet. The link to the updated spreadsheet can be seen in Appendix D and will be uploaded to the City's Transparent Richmond platform to replace the previous iteration of the Affordable Housing Developments Dataset. This updated dataset will be able to support City staff in contacting developments for outreach about new federal, state, and local incentives for weatherization, energy efficiency, and electrification, for stakeholder engagement when developing a City policy or program, and calling to ensure compliance on new state and local policies.

B. Building Permit Analysis

In order to recommend affordable housing developments that were good candidates for electrification and solar installation, I reviewed all building permit data for the affordble housing developments in the City. Based on the Affordable Housing Developments spreadsheet, I looked up all building permits for each of the addresses of the developments listed on the City's Building Permits dataset that is updated daily on Transparent Richmond through the City's permit tracking database Permit TRAK.[84] Then the permits were reviewed

[83] "Affordable Housing Developments | Transparent Richmond."
[84] "Building Permits | Transparent Richmond," accessed May 14, 2023, https://www.transparentrichmond.org/dataset/Building-Permits/cam8-vanq.

and building permits unrelated to energy upgrades or major renovation of the building were removed. The remaining permits were used to understand which buildings would be good candidates for electrification and solar installation. Many buildings had permits pulled around solar installation, electrical panel upgrades, water system replacements, and other upgrades that factor into the timeline for other energy upgrades in a building.

The factors used to make recommendations for good candidates for electrification and solar installation can be seen in Section VI. Information collected through the Richmond Multifamily Affordable Housing Energy Survey as well as building characteristics information from the Affordable Housing Dataset data were used to make these determinations. The specific buildings recommended can be seen in Appendix B.

C. Richmond Multifamily Affordable Housing Energy Survey

This survey was developed to understand utility payment structure, existing appliance types, and recent renovations and installations in multifamily affordable housing projects in Richmond. This data will be helpful for the City to develop policies, incentives, and programs that will be effective to equitably increase weatherization, energy efficiency, and electrification in multifamily affordable housing buildings in the City. The survey is included in Appendix C. The survey was developed and then questions were reviewed by my thesis advisor, the City of Richmond Environmental Manager, and the City's consultant for the CLEAP program from the National Renewable Energy Laboratory (NREL). The way I was representing myself in relation to the City was also verified by the City to ensure it was clear that I am a student conducting research working alongside the City, but not a member of City staff.

The survey was sent out via email to all affordable housing developments using the contact information available on the affordable housing development spreadsheet. After sending emails, I followed up with phone calls and completed the survey via phone call. I spoke with mostly assistant property managers, property managers, or maintenance supervisors to get these answers. This method was faster and more effective to get answers. The survey took around 5 minutes via phone. Through several rounds of outreach via phone, 15 of the 28 developments responded to the survey. Results of the survey are discussed in Section V Richmond Multifamily Affordable Housing Utility Payment Structure and Appliances. The results of the survey helped inform Section VI of the survey, Candidates for Electrification and Solar Installation The Survey itself can be seen in Appendix C.

D. Interviews

To understand further the incentives, barriers, opportunities, and challenges of completing energy retrofits, I reached out to organizations working on or interested in energy retrofits of affordable housing, specifically affordable housing developers, community based organizations focused on tenants and energy, government agencies, and energy program administrators. The following organizations were interviewed, organized by the organization type.

Organization Name	Org Type	Interviewee Name/s
Eden Housing	AH Developer	Tom White, Woody Karp, Matt Schreiber
CHDC	AH Developer	Jacob Billitteri
Bridge Housing	AH Developer	Mike Sause, Mehul Kamran
Rubicon Programs	Non-profit	Anonymous
Richmond Community Foundation	Non-profit	James A. Becker
Rising Sun	Non-profit	Alejandro Castelan
Tenants Together	Non-profit	Eduardo Torres
Richmond Rent Program	Government	Nicholas Traylor
Contra Costa County Weatherization	Energy Program Administrator/Government	Laura Glass
BayREN	Energy Program Administrator	Ben Cooper
MCE	Energy Program Administrator	Grace Peralta Beasley
AEA	Energy Program Administrator	Priya Cortes

Outreach to these contacts occurred through email. A list of questions was developed in collaboration with my thesis advisor, the City, and NREL representatives to ensure we were capturing all the information we were looking for. However, as each organization was working on different projects and were at different stages of these projects, these questions were followed during interviews in a loose manner to guide the conversation. During the interview, I asked organizations about past energy retrofits and the opportunities, challenges, barriers, and motivations for completing the projects and considerations for moving forward for similar projects. These questions were applicable to affordable housing providers, energy program administrators, and some government agencies and nonprofits. For the organizations that were not actively completing energy retrofits but completing adjacent projects such as workforce development or tenant advocacy, I asked about their interests and considerations for supporting incentives to encourage weatherization, energy efficiency, and electrification projects. The interviews were guided by the questions in Appendix E but these questions were

primarily used as a starting point, as interviews built off of the topics that came up during conversation.

The interview transcripts were reviewed and the notes were categorized by topic area, such as Challenges, Opportunities, etc. Within each category there were subcategories, such as Funding under Challenges. Using this analysis of the data, the key concepts for considerations for weatherization, energy efficiency, and weatherization were determined and discussed in greater detail in the Findings section.

E. Literature Review

In order to make recommendations, I reviewed all existing and upcoming federal, state, regional, and local funding and technical assistance resources available for energy retrofits in the City to provide a comprehensive picture of what resources are available to incentivize energy retrofits. I also reviewed best practices of other municipalities in terms of incentivizing energy retrofits.

F. Limitations

Originally, I would have liked to interview more affordable housing developers/property owners of multifamily properties to understand more in depth their considerations when completing energy retrofits. But this was limited by the number and capacity of property owners. In addition, for most property owners, the outreach was done only through cold emails as my contacts did not have connections with them. This resulted in limitations in terms of response rates. Because there are only 3 or 4 of each type of organization (Non-profit, Government, Affordable Housing Developer, and Energy Program Adminstrator), it is not possible to determine any statistically significant results for these interviews. Instead, the interviews illuminated the issues that were common and different across these various organization types when considering weatherization, energy efficiency, and electrification upgrades. To ensure privacy for the interviewees, they are not directly quoted or referenced.

V. Richmond Multifamily Affordable Housing Utility Payment Structure and Energy Appliance Survey Results

A survey was conducted of the affordable housing properties in Richmond to learn about utility payment structure, existing appliance types, and recent renovations and installations in multifamily affordable housing projects in Richmond. Of the 28 properties contacted, 15 properties provided a response. This information was not verified and is based on the contact at the property that answered the questions, thus there may be some inaccuracies in the data collected based on their knowledge of this information. The information following represents the responses collected.

The results from the survey showed that for most of the respondents (all except for 3), tenants were responsible for electric utility payments. However, for seven of the 15 buildings, the building was responsible for gas utility payments. This shows that while in most buildings upgrading electric infrastructure will not result in savings for the property owners, converting gas to electric through energy retrofits may have positive cost savings as the new appliances would be much more energy efficient and as the utility allowance for electric heat pumps is lower due to this, the developers could save money in utility payments overall by no longer having to pay the gas bill.

Of the fifteen developments which completed responses, four already had all electric water heating. Three of these buildings were built after 2015 and the fourth was built in 2000. Of the fifteen developments, six had electric space heating. For these developments, 2 were built before 1980 and the other four were built after 2000, with two being built in the 2010s.

Four of the fifteen developments had central AC. For the rest of the developments, only two of the nine developments that did not have AC allowed for window units. None of the buildings included EV chargers. For all of the developments who provided the information, the owner was responsible for water and sewer utilities.

The findings from this survey were used to inform the Candidates for Electrification and Solar Installation in addition to building permit and building characteristic data.

VI. Building Stock Analysis: Candidates for Electrification and Solar Installation

The determination of good, decent, and poor candidates for electrification and solar installation were developed through compiling building permit data, reviewing survey responses from

affordable housing providers on energy appliances and utility payments and utilizing building characteristics data from the Affordable Housing Developments dataset.[85] All building permit data was taken from PermitTRAK data which is provided on Transparent Richmond, the City's Open Data Portal.[86]

This analysis provides the City with a list of buildings that are good candidates for solar installation and for electrification. This is based on a number of characteristics of the building. Most of this information was available through the building permit data. Other information was gleaned from the survey of buildings appliance fuel sources and utility payment structures and building characteristic data.

The factors that made a building a good candidate for electrification are listed below.

- Older building.
- No recent space heating or water heating system upgrade
- Solar installation
- Electrical panel upgrade
- Reroof completed
- Utilities all paid by property owner (no split incentives)
- Future planned upgrades to space and water heating

The factors that made a building a poor candidate for electrification are below.

- Newer building
- Already includes electric space or water heating
- Recent space or water heating system upgrade
- Building to be redeveloped or sold in the near future

The factors that made a building a better candidate for solar installation are below.

- Newer building (reroof not needed)

Through the analysis of the affordable housing developments in Richmond, the following results were found: Seven developments were good candidates for electrification, five developments were decent candidates for electrification and thirteen developments were not good candidates for electrification. For solar, ten developments have installed solar based on permits and Google maps review, three developments were good candidates for solar, ten developments may need reroof before solar installation based on age of the building, and two developments were not good candidate for solar due to redevelopment/disposition.

The specific buildings that fit each of the classifications for good, decent, and poor candidates for electrification or solar installation can be seen in Appendix B. This information is currently private due to including specific information about buildings, but that may change in the future.

[85] "Affordable Housing Developments | Transparent Richmond."
[86] "Building Permits | Transparent Richmond."

VII. Interview Findings

A. Motivation

Through interviews, there were several motivations identified for weatherization, energy efficiency, and electrification upgrades for existing multifamily affordable housing buildings.

One affordable housing provider mentioned that capital improvement projects need to be financially viable for them to be considered, especially because many affordable housing providers are nonprofits with limited cash flow overall. Two affordable housing providers mentioned specifically that the priority of projects selected for energy retrofits depends on the following factors: (1) the funding available for those specific properties based on individual characteristics of the building or the region it is located in and (2) the amount of energy consumption and costs of the building. If the energy consumption costs are very high, the building would be chosen earlier to focus on energy retrofits.

Two affordable housing developers mentioned the solar installed on multifamily affordable housing buildings generally are used to offset the common area utility costs that the affordable housing provider pays. However, this is not true in the case of solar installations that use funding from California's SOMAH program, the Solar on Multifamily Affordable Housing program, which provides funding to affordable housing providers to install solar on existing developments. A requirement of the SOMAH program is that at least 51% of the solar capacity installed needs to offset the utilities for tenants. More information about this program can be found in Section III.B.2.a.

It was mentioned by two affordable housing providers that federal funding from the Inflation Reduction Act (IRA) and Infrastructure Investment and Jobs Act will provide the necessary funding to move forward with energy retrofits in some existing buildings. It was mentioned by two affordable housing providers that the California Energy Commission's Net Zero program funding has also provided the needed motivation to develop all electric new buildings. Another motivation for completing retrofits mentioned by two affordable housing providers was the opportunity to combine with other required upgrades or rehabilitations of the building so that all upgrades and their respective financing could be completed at one time.

One affordable housing developer mentioned that they would like to utilize the incentives available before they become legal requirements. It was noted by one affordable housing provider that the cost of maintaining gas infrastructure will become more and more expensive over time, so this is another motivation to complete energy retrofits for existing buildings and utilize existing incentives.

B. Opportunities

1. Richmond Opportunities

Because 61% of Richmond's affordable housing units were built before 1978, there is a great opportunity for weatherization, energy efficiency, and electrification to have a large change in terms of improving energy efficiency, health, and comfort in a home.[87] In 1978, California adopted Title 24

[87] "Affordable Housing Developments | Transparent Richmond."

building codes that required measures to reduce energy required for indoor temperature control through ceiling and wall measures. Across the state, 42% of buildings already included the required ceiling insulation and 69% of buildings already met the wall insulation standards introduced in 1978, but around 31% of buildings did not meet this standard.[88] It is possible due to the historically temperate climate in Richmond that many buildings in Richmond did not meet the insulation standards prior to the requirements.

2. California Wide Opportunities

It was mentioned by an affordable housing developer and the energy program administrator that workforce capacity for electrification, in terms of contractor familiarity with the technology, had not been an issue for them. This is in contrast with literature reviews of conditions across the country more broadly which found that contractor skill set was a barrier to completing electrification upgrades.[8990] However, one challenge that was mentioned by an affordable housing provider was that while contractors are familiar with installing heat pumps and other electric appliances, other professions such as plumbers, are not as familiar with the technology yet. Overall, the contractor skill set in the Bay Area is an opportunity for completing additional energy retrofits.

Another opportunity for energy retrofit projects mentioned by an energy program administrator, is that it has not been too difficult to convince residents to move off of gas infrastructure. The exact reason for this is not clear and may range from residents' understanding of the climate impacts to the overall move towards electrification in buildings through building codes and city ordinances. The state overall is much further ahead than all other states in the US. However, one affordable housing provider noticed that higher income cities such as San Francisco and Los Angeles are taking advantage of electrification programs more than cities in the Central Valley, which don't have as much money overall to invest in these types of infrastructure upgrades.

One opportunity for specifically affordable housing providers to take advantage of in California that could support electrification is the Solar on Multifamily Affordable Housing (SOMAH) program which provides affordable housing providers with funding to install solar panels on multifamily buildings and requires that at least 51% of the systems' electrical output offsets the tenant area electrical needs at the site.[91] Thus, this system is beneficial to both affordable housing providers and to existing tenants in deed restricted affordable housing units. Only one affordable housing provider out of the three interviewed mentioned it as a program they regularly take advantage of, which means there could be barriers to the program that should be further explored, but also opportunities for providers who have not utilized the program yet. Because this program offsets the overall amount of electricity used by tenants, it could potentially reduce utility costs for tenants, especially if the electrification measures are more energy efficient than previous appliances. One affordable housing provider mentioned that

[88] Kevin Novan, Aaron Smith, and Tianxia Zhou, "Residential Building Codes Do Save Energy: Evidence from Hourly Smart-Meter Data," *The Review of Economics and Statistics* 104, no. 3 (May 9, 2022): 483–500, https://doi.org/10.1162/rest_a_00967.
[89] "Multifamily Weatherization: Opportunities and Challenges | National CAP."
[90] Bastian and Cohn, "Ready to Upgrade: Barriers and Strategies for Residential Electrification."
[91] "SOMAH Program Handbook | SOMAH."

reducing tenants' utility payments helps with collecting rental payments because tenants then have more cash flow.

3. Building Level Opportunities

In terms of when to complete the upgrades for projects, one affordable housing provider mentioned that when they have unlocked funding for separate upgrades, such as air filtration upgrades, they use this as an opportunity to complete additional energy retrofits. However, if there are immediate health and safety concerns that require investment in the building, staff from another affordable housing provider mentioned these are not usually paired with energy retrofits because funding takes time to unlock and health and safety upgrades are immediately needed. An example of this is mold remediation. In general, two affordable housing providers mentioned that they try to complete all large upgrades to buildings at one time so that they don't have to invest as much money or bandwidth into projects again.

One affordable housing provider mentioned that they are moving towards including AC on projects in places like Richmond due to rising temperatures, when previously they did not include it. Of the 15 affordable housing developments interviewed in Richmond, only four currently have central air conditioning. Because of the increase in the amount of energy needed when AC is added, it is vital that electric systems such as air source heat pumps are used so that as the energy sources that make up electricity generation become more and more renewable, AC systems can be implemented without increasing greenhouse gas emissions. Although the addition of AC will provide increased resilience to the increased heat due to climate change, adding air conditioning may come with larger utility costs for the tenants. For tenants in deed restricted affordable housing, it is important that the utility allowance for air conditioning is adequate to cover the cost of air conditioning as temperatures rise and heat waves become more prominent.
In terms of completing energy retrofits, another opportunity is that an energy program administrator stated that for low income programs, income eligibility checks are not difficult to complete as property managers/owners provide the rent roll information including tenant incomes pretty readily. This supports the idea that it is worthwhile to have programs that aim to support specifically low income renters without increasing the length of the process.

Another opportunity is that in buildings where the owner pays all the utilities, there is no split cost incentive structure and thus the owner would get the full benefits of completing the energy retrofits. While there are no direct economic benefits to tenants in this situation in terms of reduction in utility payments, there is a benefit of increased comfort if weatherization measures are included and indoor air quality improvements if a gas stove is replaced. In addition, there would be a reduction in greenhouse gas emissions. In order to get affordable housing providers to complete energy retrofits, it would be easier to motivate these buildings where the owner is responsible for utilities to complete energy retrofits.

4. Outreach Opportunities

In terms of opportunities to conduct outreach for existing energy retrofit programs, such as those offered by MCE, BayREN or others, there are several strategies that were mentioned to be successful. The first is leveraging previous relationships, such as reaching out to past participants in incentive programs to ask if they would like to participate through a different development. Leveraging previous

relationships also means asking those individuals to share broadly with their circles the opportunities available through existing incentive programs. It was clear that MCE and BayREN have strong relationships with some affordable housing providers or with some City governments or housing authorities. Increasing the personal relationships between the City and affordable housing providers/building owners or between energy program administrators with affordable housing providers/building owners in Richmond is a great opportunity for the City to help with ensuring the existing incentives are being utilized in Richmond.

The City has an opportunity to act as the connection point between affordable housing providers/owners in the City and the energy programs existing in the region. Personal relationships also go hand in hand with word of mouth communication as a way to increase uptake in existing energy retrofit programs. In terms of communication between energy program administrators and affordable housing providers, multiple affordable housing providers were familiar with MCE resources and incentives for energy retrofits. This is a good sign and means that the word of mouth communication as well as direct targeted outreach towards affordable housing providers is helpful.

For programs such as Rising Sun's program where tenants can make upgrades, other outreach opportunities include tabling at existing events, libraries, and senior centers, essentially reaching people where they already are.

MCE also mentioned that outreach webinars are useful to detail their services to stakeholders like affordable housing providers. In addition, hiring communication firms was mentioned by MCE as a useful method of methodically increasing communication to stakeholders especially to avoid any staff capacity issues with employees balancing several tasks.

As mentioned, a method of outreach for energy program administrators is working directly with county governments and housing authorities to complete upgrades. While this wouldn't work in Richmond due to the fact that RHA is disposing of its properties, in other cities or counties with large housing authorities, this is a great way to reach a large supply of multifamily affordable housing that is in need of an energy retrofit.

C. Challenges

The following section details the challenges identified through interviews. They are categorized into staff and organizational capacity, staff and organizational communication, electrification readiness, funding challenges, utilities and utility payments, permissioning between landlords and tenants, property decision making, supply chain issues and workforce capacity.

1. Staff and Organizational Capacity

There were uneven staff capacity challenges mentioned across organizations. One agency responsible for retrofits stated that they could not keep up with their existing pipeline, and thus did not have time to do outreach or work on different types of buildings that they are not already focused on, for example larger multifamily buildings. On the other hand, other energy program administrators have staff capacity and funding to work on more properties and encourage more outreach. Thus, the reallocation of resources across agencies/organizations doing different types of energy retrofits would be helpful.

However, these resources are allocated at the federal and state levels so these staff capacity issues will remain until those larger systems are changed.

Another staff capacity challenge is the burden of bureaucracy of existing programs, such as the Solar on Multifamily Affordable Housing (SOMAH) program, which is a program that is useful to both affordable housing providers and tenants as it provides funding to affordable housing providers to install solar on multifamily buildings and requires it to offset the costs of utilities for tenants. One affordable housing provider mentioned that they started taking advantage of this program only in recent years as one team member was an advocate of using the program and navigated the complexity to utilize the program. The other affordable housing providers I spoke with did not mention utilizing this program at all. The affordable housing provider utilizing this program also mentioned that the time that is taken in the bureaucratic process is not necessarily taken up by the time it takes to understand and enroll in the program but the time it takes to pair the affordable housing provider/customer with technical assistance to complete the project.

Another observation from an organization was that the smallest multifamily buildings were the most difficult to dispose of and sell to other affordable housing providers. This was due to the fact that it is often not cost effective to provide services to these small size buildings, and that is why new affordable housing developments are much larger buildings. Buildings with less than 10 units are often too small to have their own property management staff and thus would require time from existing employees at other properties. Conducting upgrades and energy retrofits could be an opportunity to reduce the amount of maintenance staff capacity needed to maintain the building if it is possible to secure financing to conduct retrofits for smaller buildings.

Another finding in speaking with organizations that work closely with tenants was that they are more focused on rent stabilization and anti-eviction work and while energy justice is a component of housing stability, they are not deeply steeped in the specifics of weatherization and energy retrofit projects but support the potential benefits to tenants in terms of comfort in the home and potential reduced utility costs. In speaking to these organizations, they were very supportive of weatherization, energy efficiency, and electrification measures as long as utility payments don't increase as a result.

2. Staff and Organizational Communication

Another challenge that was clear in interviews was the lack of communication between energy program administrators, government agencies, and affordable housing providers. For example, one of the energy program administrators was not familiar with current City staff in Richmond. Due to the fact that the jurisdiction of these energy programs is across the Bay Area, it shows the importance of City staff being proactive and forming a relationship with energy program administrators in order to direct projects towards buildings in Richmond.

3. Electrification Readiness

Some challenges related to pre-electrification that were mentioned were deferred maintenance, electrical panel sizing, removing gas infrastructure, solar installation, and mold remediation.

In terms of deferred maintenance, this is a major challenge, especially in Richmond because the majority of renter-occupied buildings in the City were built before 1970 and many require larger scale building retrofits before electrification can effectively be done. There is also a severe lack of funds available for

deferred maintenance upgrades. One energy program administrator mentioned that if they were able to, they would provide a great deal of funding for deferred maintenance. However, this would require a great deal of funding because deferred maintenance upgrades have significant costs. The same energy program administrator also mentioned that a large concern of providing deferred maintenance funds is that for non-deed restricted affordable housing, pouring money into deferred maintenance would result in increased rents for tenants in naturally occurring affordable housing.

Another large concern prior to electrification is the size of the electrical panels. For many buildings, the electrical panel needs to be resized in order to electrify the building because the current electrical panel is not sized for the amount of electricity use that will need to be added. This can be very expensive for the building owner. In some specific cases of some large scale rehabilitation and adaptive reuse projects, especially if converting from a larger commercial or industrial use to a smaller residential one, the electrical panel size may not need to be resized. This was the case for one of the developments that two of the affordable housing developers were working together on.

Another component of electrical panel sizing is that because Richmond is located in a temperate area and most multifamily affordable housing buildings in the City do not currently have air conditioning and do not allow for window unit air conditioning, the addition of air conditioning with air source heat pumps may result in a much greater added electricity usage. When air source heat pumps are installed in existing developments, they provide both heating and cooling and thus the use of electricity in the overall development will go up more than even the amount that was previously used for heating because now tenants are using more energy overall. This could potentially be offset by an increase in efficiency of the systems, but by electrifying, developments are also necessarily adding air conditioning which may result in resizing required for the electrical panels.

Another pre-electrification challenge mentioned is removing gas infrastructure. The cost of removing gas infrastructure for a rehabilitation or retrofit of a building can be very high as mentioned by one affordable housing developer. One useful reason to remove gas infrastructure is that the cost of maintaining gas infrastructure will become more expensive over time as all development moves towards electric construction. However, this is a challenge for energy retrofits.

A final pre-electrification challenge mentioned is the timing of installation of solar panels. If the solar panels on the building are built before the building is considered for electrification, the electrical panel would still need to be resized for electrification of the building because the solar will then not be offsetting any of the amount of new electricity that will need to be utilized. If electrification is pursued before solar, figuring out the uses and then adding in solar panels would be the best practice to reduce the overall costs of the retrofit. Currently, many solar installations on multifamily buildings are used to offset the common area costs for affordable housing providers, not the utilities for tenants. This is not the case where SOMAH is utilized.

Because Richmond is in a temperate climate many buildings, especially those built before 1978, were built before insulation was required by the California Building Code[92]. It was mentioned by one interviewee that there are concerns that this makes buildings more prone to developing mold. Lack of

[92] Novan, Smith, and Zhou, "Residential Building Codes Do Save Energy."

insulation was identified as an independent risk factor for reported mold[93]. It was mentioned by one affordable housing provider that mold is not really a driver for sustainability efforts because of the immediate health and safety concern of mold remediation. When mold remediation needs to occur, it was mentioned by this affordable housing provider that properties do not generally wait to apply to combine other existing funding sources for weatherization or electrification. It was mentioned that there are no specific incentives available for combining weatherization and mold remediation potentially due to this reason.

4. Funding Challenges

One of the main challenges towards implementing energy retrofits is the amount of funding needed to do these upgrades. When inquiring with energy program administrators and affordable housing providers about the average amount of project cost that rebates usually cover, some affordable housing providers and energy program administrators stated that it is not possible to say as it depends on the project while others stated that the incentives generally cover up to 80-85% of costs. The installation of solar can also be very expensive for developments to invest in at the time of construction, as noted by one property manager in the survey who stated that they were waiting for the investment of the development to be recovered before investing in solar installation. This is why programs such as SOMAH are so helpful for buildings to take advantage of. In addition to the amount of funding, the timing of funding programs is also a challenge as mentioned by one affordable housing provider. Specifically, sometimes affordable housing providers may attempt to combine multiple incentive programs but the timeline of applying for funding for both programs may be different and one program may be sunsetting as another becomes available. It was mentioned by one affordable housing provider that one element of weatherization that they found was not well incentivized financially is the modernization of windows.

One financial challenge of completing energy retrofits is that each building is usually its own limited partnership and thus the finances of each building are separate, meaning the amount of capital available for a project is based on the funds available for that building. It was mentioned by one affordable housing provider that in very few cases, if needed the corporate owner could extend a loan to a property. If this does occur, the property would need to pay back the corporation over time.

Another financial constraint that was mentioned is that labor costs change by geography so in more remote parts of Marin County for example, labor rates are higher than in other parts of the Bay Area. While this shouldn't affect Richmond a great deal, it is important to note that this is a factor to consider.

[93] Philippa Howden-Chapman et al., "Risk Factors for Mold in Housing: A National Survey," *Indoor Air* 15, no. 6 (2005): 469.

5. Utilities and Utility Payments

There were challenges identified with both utilities and utility payments in the interviews. Multiple organizations mentioned the Ratio Utility Billing (RUBS) program, which is a third-party platform used by some multifamily property managers that estimates utility payments for units that are not metered based on their general size. The organizations mentioned concerns of why this system may be inequitable. The first is that the RUBS program estimates have a tendency to be inaccurate and thus can be causing families to pay higher utilities than they are using. In addition, the RUBS payments are handled by a third party not property management and thus it may be difficult to get in contact in the case of any disputes. Richmond has addressed this issue through policies that state that for tenants to pay utilities at all, utilities must be individually metered. This way the utility payment amount is accurate. However, there may be cases where buildings are not following this rule. In that case, the tenants can file a petition. However, this process can be time consuming and difficult for tenants to take on.

Two organizations spoke about PG&E and their role in energy retrofits. It was mentioned that PG&E is slow in coming out to complete inspections on properties, which increases the overall time of completing energy retrofits.

6. Permissioning between Landlord and Tenants

Another major challenge of energy retrofits in multifamily affordable housing in Richmond has been the permissioning between landlords and tenants. It was mentioned by interviewees that it goes in both directions. For example, for a building-wide upgrade, it is important to gain residents' trust to make sure that they are aware that the retrofit will not impact them negatively. Sometimes this process may especially be difficult if the service is seen as an inconvenience. It was mentioned by staff at Eden and CHDC that when completing major rehab/retrofits, temporary relocation of tenants is required if it takes more than 8 hours in one day. Completing this relocation requires a great deal of careful tenant management to ensure tenants are not upset and staff capacity. In terms of communication the other way around, it was mentioned that tenants often opt out of programs such as Rising Sun's free energy efficiency improvements because they believe the upgrades require landlord approval, even though they do not. This is a reasonable assumption to make because many other upgrades do require landlord approval. Overall, the process of communication between landlords and tenants was noted as a key challenge in completing energy retrofits at a faster pace.

7. Property Decision Making

Another challenge of multifamily energy retrofits is the difficulty of decision making within the different players within the ownership of a building. There are often multiple decision makers in this process, from the sustainable building leads at the affordable housing provider to the different owners within the ownership entity of a building, which usually includes the affordable housing provider as well as affordable housing investors, who have decision making ability on how to raise and spend money for the building specifically, as each building has its own funding. It was mentioned that getting approval from

investors could be challenging, for example in cases where the solar installation doesn't go with the intended design of buildings for the investor.

In terms of outreach to buildings to complete energy retrofits, another challenge is that those who are easily contacted by the City through calling the building, the property management of the buildings, are not those that have decision making abilities. Affordable housing providers hear of the incentives from other sources but in the case there is a new incentive that the energy program administrator or City wants to tell each development in Richmond about, the City should have specific contacts at each of the affordable housing providers in the City. Because the decisions are made mostly at the affordable housing provider level, it would be useful for the City to have these contacts at the affordable housing providers. While the energy program administrators are conducting outreach, their area of service is the whole Bay Area and thus having the City putting the effort into making the relationships and connections between programs and buildings in the City is a useful function.

Another finding through interviews was that property management does not work on selecting contractors so any outreach regarding lists of contractors working on these issues from the City should be directed to the affordable housing providers themselves. Property management is responsible for only access for site visits and coordination with contractors completing jobs. Another challenge of energy retrofits was that energy retrofits can increase the workload of property managers.

8. Supply Chain Issues

Another challenge raised by interviewees completing energy retrofits was supply chain issues. It was mentioned by staff at two interviewees that they faced challenges with acquiring electrical switches and induction stoves. Staff from Another affordable housing provider did mention that the biggest supply chain issues were with the global shipping delays that occurred due to the COVID-19 pandemic but that in general, they were not common in this line of work.

9. Workforce capacity

While most interviewees stated that they did not experience challenges related to finding contractors to do electrification work, they did mention that some related fields did not have as much experience related to electric appliances. Specifically, it was mentioned by staff at one affordable housing provider that plumbers have had difficulty with heat pump water heaters.

VIII. Recommendations for City of Richmond to Increase Energy Retrofits in Multifamily Affordable Housing

Utilizing information from interviews with affordable housing providers, government agencies, energy program administrators, and nonprofit organizations, surveys of utility payment structure and fuel source of appliances in affordable housing developments in Richmond, building permit analysis, literature review, and funding source information, I have developed several recommendations. The following ideas are organized in terms of short-, medium- and long-term programs. Short term programs are programs the City can implement immediately with little staff capacity or funding requirements. Medium term programs are programs that could be funded through upcoming federal funding, including the $160,550 formula grant provided by Energy Efficiency and Conservation Block Grant (EECBG) funding or the $400,000 Buildings Upgrades Prize award. In addition, the City has some funds from the Chevron Environment and Community Investment Agreement and Transformative Climate Communities funding that could supplement federal funds received. Not all the medium-term programs listed below can be completed as funding is limited but these are some recommendations of programs that could be implemented if funding is secured. Long term programs and policies would require a great deal of stakeholder input and context specific research before implementation in addition to funding and staff capacity needs.

Recommendations below are organized in order of most effective and actionable. Staff capacity required to apply to funding sources are not included in the staff capacity estimates of the programs. This is the staff capacity needed to develop and implement the program. It is assumed that staff would apply to the funding sources regardless of the program type.

A. Short Term Programs

1. Conduct targeted outreach to existing multifamily affordable housing buildings for energy retrofits and multifamily solar based on Building Stock Analysis: Candidates for Electrification and Solar Installation analysis

Using the Candidates for Electrification and Solar Installation analysis which utilizes building permit data, building characteristics, and survey responses to determine which buildings would be good candidates for electrification and solar, the City can conduct targeted outreach. This could be done through emailing key contacts at affordable housing providers mentioning that their building would be a good candidate for electrification or solar installation and setting up meetings to discuss incentive programs for energy retrofits such as the BayREN, MCE, LIWP, and SOMAH programs. This will also help with building relationships with the affordable housing providers as well.

Staff Capacity Requirements:
~10 hours every 6 months (to conduct initial outreach, for follow up 6 months later)

Funding:
None
Implementation Timeline:
Short Term, can be immediate

2. Attend existing meetings with property managers to present about energy retrofit resources

Currently, there are meetings hosted by RPD with affordable housing property managers. The City Manager's Office, Economic Development department should begin attending these meetings to present about energy retrofits funding and resources that affordable housing providers can take advantage of. In addition, at each meeting there could be guests brought in from the various incentives programs such as representatives from MCE, BayREN, SOMAH or LIWP programs or representatives from DoE to speak about multifamily weatherization and upcoming federal funding. This would also help the Economic Development department staff maintain accurate partners with the affordable housing owners in the City. While these meetings are normally with property managers, City staff could invite the appropriate building ownership staff from the affordable housing providers once every six months or so. During the meetings, the affordable housing providers could also speak to each other about their successes and challenges issues related to energy retrofits. For example, only one affordable housing provider mentioned utilizing the SOMAH program. By facilitating these conversations, the City could both encourage sharing between affordable housing providers and also share additional resources or contacts that could support affordable housing providers with the issues they are currently facing. In these meetings, the City could also share the profile of buildings in Richmond that they believe would benefit the most from participating in the existing energy retrofit programs.

Staff Capacity:
~5 hours a month including time preparing for and attending meetings, potentially up to ~10 hours a month when affordable housing providers are invited
Funding Required:
None
Implementation Timeline:
Short term, can be immediate

3. Keep City website up to date on specifically multifamily programs and newsletter on energy programs applicable in Richmond for tenants and affordable housing providers

City staff could maintain a website with up to date information on specifically multifamily programs, one for tenants and one for owners on energy retrofit programs

that are applicable in Richmond. The website currently only includes information on a range of programs applicable to single family homeowners or residents. Contact information for City staff could be provided to provide more detail about the programs. This could especially help both tenants and owners understand the timeline and next steps that come after applying for programs.

On this website for affordable housing providers could be instructions on how to apply for the LIWP, MCE, BayREN, and SOMAH programs. All four programs are run by the same implementer. Incentive layering will be completed by the implementer for energy retrofit projects so the developer should apply to at least one of the LIWP, MCE, or BayREN programs. SOMAH provides solar, which none of the other programs provide. On this webpage can be a summary of upcoming federal funding available to affordable housing providers for energy retrofits.

On the webpage for tenants there could also be resources for the Green House Calls program and the CARE and FERA programs. The CARE and FERA Programs provide up to a 20% discount on utilities for qualifying residents. For tenants of multifamily buildings, residents cannot complete applications online and must fill out a form and mail it to PG&E. The City could support this process by providing the link on the website to the form to print it out and also have printed copies of the application to keep at the front office. This reduces the barriers of searching for the right form and printing it out.

In addition, the City of Boston has a newsletter called the Retrofit Resource Hub Newsletter that the City could adopt which would send out monthly or quarterly emails to property owners about resources on retrofits. The resources available on the City's website would also be highlighted in this newsletter.

Staff Capacity Requirements:
Estimated Time: ~10-12 hours to develop initial materials, 4 hours/month to update after
Notes: Could utilize monthly reporting from NREL on federal programs to inform the newsletter and update local affordable housing providers about programs.
Funding Requirements:
None
Implementation Timeline:
Short Term, can be immediate

4. Form relationships with and work closely BayREN to take advantage of new initiatives

The BayREN energy retrofit incentives system has been recently updated. This is an opportunity for the City to form relationships with BayREN staff and recommend buildings that would provide the most benefits to tenants to utilize the incentives.

Because BayREN serves the whole Bay Area, forming relationships with BayREN would allow for Richmond buildings to be early in the pipeline of these new projects. The City could coordinate with BayREN and other agencies for buildings that would be good candidates based on analysis of building appliances, age, etc.

Staff Capacity Requirements:
4 hours for initial outreach and meetings, 1 hour every six months or so to stay up to date
Funding Requirements:
None
Implementation Timeline:
Short Term, can be immediate

5. Stay connected with MCE staff and connect them with affordable housing providers interested in MCE incentives

MCE's rebate programs provide a large percentage of financing for projects and connecting building owners with MCE staff would ensure more buildings in Richmond take advantage of these programs. Staff should have meetings with MCE staff at least every six months to keep up to date on programs as timelines of programs may be changing and some programs may be ending and others may be starting. The affordable housing providers interviewed were generally familiar with the incentives available from MCE but some had not put in the effort to apply to the initiatives. Having these meetings would make it easier to connect affordable housing providers interested in energy retrofits with relevant MCE programs.

Staff Capacity:
~3 hours every 6 months including time setting up, preparing for and attending meetings
Funding Required:
None
Implementation Timeline:
Short term, can be immediate

6. Support Richmond energy contractors in becoming part of BayREN contractor tool

It was mentioned by an affordable housing provider that a useful tool for affordable housing providers would be if the City provided a list of local contractors, especially Minority and Women Owned (MWB) contractors in the City who they should contract for energy retrofit projects. Developing this list would be helpful for the City to increase local and diverse employment in these types of projects and would also make it easier

for affordable housing providers to utilize MWB contractors in their work. However, creating a list of contractors may introduce liability for the City and would require a great deal of staff capacity to vet contractors. Thus the City can take advantage of BayREN's contractor search tool which can be found here and support local contractors in becoming a part of this list: https://www.bayren.org/find-energy-professional. Only two Richmond contractors are listed there now. The City can work with BayREN to understand the process of how contractors can get on the list. The City can direct contractors, especially MWB Contractors in Richmond to follow the procedure to be placed on BayREN's contractor search list.

Staff Capacity:
~4 hours to meet with BayREN and determine the process for contractors, ~10-20 hours developing outreach materials (including pulling business licenses and emailing contractors) to tell local contractors about the BayREN contractor list.
Funding Required:
None
Implementation Timeline:
Short term, can be immediate

7. Collaborate with non-profits such as with Rising Sun to provide credibility

Organizations like Rising Sun, which provides free energy efficiency rebates to tenants without landlord approval through the Green House Calls program, mentioned the huge benefit they receive in partnering with the City to conduct outreach. It allows for residents to understand that the program is real and truthfully free for them. Because of the City's involvement, tenants are most likely to trust that their landlord does not need to provide approval for these upgrades. The City has often partnered with organizations like Grid Alternatives to support mailer outreach. The City could consider sending out a mailer to conduct outreach to low income tenants for the Green House Calls program with Rising Sun.

Staff Capacity:
~20-30 hours for each mailer campaign
Funding Required:
$1000-5000 depending on scale of mailers/outreach
Implementation Timeline:
Short term, can be immediate

8. Track federal and state programs and funding sources through the IRA, IIJA as well as through agencies such as DoE, HUD, CSD, CEC, HCD, CPUC, and other federal and state level agencies

Through the City's existing contract with NREL through the CLEAP project, the City will be provided with monthly updates of federal funding through the end of the CLEAP project. After the contract is completed, the City could understand the sources utilized by NREL to compile resources and utilize the format of the monthly updates to continue tracking programs. By tracking news and programs related to new energy retrofit funds, City staff would be well equipped to access resources. By focusing on identifying relevant contacts or technical assistance services provided by CEC, HCD, CPUC, and specifically how to reach out about accessing funding for programs, the City could form relationships that would help affordable housing providers when they face challenges related to accessing programs. On a state level, the California Housing Partnership provides information on California sustainable housing programs and maintains the Green Energy Home Energy Efficiency Network, which convenes mission driven affordable housing providers to focus on increasing clean energy and conducting energy retrofits in existing buildings. The City could join this network to stay up to date on upcoming California energy retrofit programs.

Staff Capacity Requirements:
None until after completion of CLEAP contract. After completion of contract, ~6-8 hours/month.
Funding Requirements:
None
Implementation Timeline:
Short Term, can be immediate

B. Medium Term Programs

The following programs and policies are programs that could be funded through upcoming federal funding, including the $160,550 formula grant provided by EECBG funding or the $400,000 Buildings Upgrades Prize award that is due on July 1. In addition, the City has some funds from the ECIA and TCC funding that could supplement federal funds received. The programs listed below cannot all be completed as funding is limited but these are some recommendations of programs that could be implemented if funding is secured.

1. Develop One Stop Shop: Appoint City point person on energy retrofit programs

The City can appoint a member of City staff as the point person on all weatherization, energy efficiency, electrification, and solar programs and policies. This person would be

responsible for forming relationships with MCE, BayREN, and AEA, which are the administrators of energy retrofit programs. This person would also form a strong understanding of the State programs such as the LIWIP and SOMAH programs and provide support to affordable housing providers in the City by connecting them with the program. They would also stay up to date on state and federal legislation and funding for upcoming programs. They would form relationships with affordable housing providers in the City to ensure they are aware of the programs. All the tasks listed in the short term programs section could be taken on by this individual and having an individual focused on these tasks could ensure they are completed. In addition, they could be responsible for leading the funding applications for upcoming federal funding programs. This individual could work on both single family and multifamily energy retrofit programs.

Staff Capacity:
1 Full-Time Equivalent (FTE) to implement program
Funding Required:
~$140,000/year (pay benefits). Potential funding source: Buildings Upgrades Prize ($400,000), Transformative Climate Communities ($?)
Implementation Timeline:
Medium term, within the next 1-2 years. Application due July 1 for Buildings Upgrades Prize.

2. Partner with MCE to develop Healthy Homes Program

The City could also apply to this funding by proposing a program similar to the Marin County Green & Healthy Homes program. This program provided health and safety improvements alongside energy retrofits provided by MCE in Marin County. One example is installing railing in bathrooms for senior residents.[94] The program has now sunsetted and is no longer available in Marin County. However, MCE has experience implementing this program and it may be possible to recreate this program for the City of Richmond without needing to develop completely new program guidelines. Establishing a program like this in Richmond would really move the needle forward towards improving health outcomes in the City which has high asthma rates and poor air quality.[95] In addition, studies have shown that the primary concern of residents in terms of energy retrofits are energy affordability, reliability, and the health and safety of their homes.[96] Combining health and safety improvements with energy retrofits would

[94] "Marin County Green and Healthy Homes Initiative. Marin Clean Energy.," accessed May 18, 2023, https://www.greenandhealthyhomes.org/wp-content/uploads/LATESTGHHI-Marin-Packet.pdf.
[95] California Office of Environmental Health Hazard Assessment, "CalEnviroScreen 4.0," October 2021.
[96] "Equitable Building Electrification: A Framework for Powering Resilient Communities - The Greenlining Institute" (Greenlining, October 2019), https://greenlining.org/publications/equitable-building-electrification-a-framework-for-powering-resilient-communities/.

also meet several goals in the City's Climate Action Plan and Health in All Policies plan as well.

Staff Capacity Requirements:
~20-40 hours to develop guidelines, none to implement, if the program is operated by MCE or AEA
Funding Requirements:
Buildings Upgrades Prize ($400,000), supplemental funds from ECIA and TCC
Implementation Timeline:
Medium term, within the next 1-2 years. Application due July 1 for Buildings Upgrades Prize.

3. Streamlining on Permitting

One strategy that could motivate affordable housing providers to conduct energy retrofits in Richmond specifically is by providing a streamlined permitting process for weatherization, energy efficiency, or electrification measures. The City of Seattle has created a similar program which shortens the time it takes to obtain a construction permit if a green building standard is met.[97] While this is for new construction, a similar incentive could be utilized for retrofits. The Department of Energy's SolarApp Plus program provides automated permitting for municipalities for solar projects. The City of Richmond is enrolled in and utilizing this program. While this type of program does not currently exist for energy retrofits, the City could utilize funding from the EECBG formula grant to develop an RFP for a consultant to research and develop a streamlined permitting process for energy retrofit projects. If needed, additional funding from the TCC program or potentially the ECIA funding could be utilized.

Staff Capacity:
None to research the program, ~10-20 hours needed to develop RFP
Funding Required:
Flexible, $160,550 EECBG Formula Grant and potentially ECIA and TCC if needed
Implementation Timeline:
Medium term, within the next 1-2 years

4. Provide gap financing for multifamily retrofit projects in collaboration with MCE

This is a program that was previously implemented by the City called Energize Richmond. The Energize Richmond program covered both multifamily and small business energy efficiency upgrades. The program has since ended and it was explored by the City in 2021 to restart the multifamily program and meetings were conducted

[97] Nick Henner, "Mayors' Toolkit for Energy Efficiency," June 18, 2020, https://www.aceee.org/toolkit/2020/06/mayors-toolkit-energy-efficiency.

with MCE staff. However, the program was never launched. This program could be created pretty quickly, due to the fact that agreements with the MCE team have already been developed from the past program. Because the City's funding is flexible and is not subject to the same CPUC requirements that MCE is subject to, the gap financing could go towards any gap in funding up to a certain amount per unit (for example $1000/unit) to cover the cost of the energy retrofit. If this gap funding could be managed by MCE's energy program implementer, AEA, this program could function with little to no staff capacity required by the City after initial set up. This program could be created with the use of EECBG funds supplemented with ECIA and TCC funds.

Staff Capacity:
~20-40 hours needed to develop the program and get all agreements completed
Funding Required:
$160,550 EECBG Formula Grant and at least $140,000 from ECIA and TCC to be effective
Implementation Timeline:
Medium term, within the next 1-2 years

5. Provide Additional Funding for the Richmond Community Foundation Connects Net Zero Energy Homes Program

The City could partner with Richmond Community Foundation Connects to showcase the innovative approach taken, financed by the Social Impact Bond, to rehabilitate, retrofit and electrify abandoned homes in Richmond and sell them to first time homebuyers. While this program is currently geared towards single family homes, with funding from the Buildings Upgrades Prize, the City could expand this program to duplexes or smaller multifamily buildings.

Staff Capacity:
None to implement the program as RCF would implement
Funding Required:
Buildings Upgrades Prize ($400,000)
Implementation Timeline:
Medium term, within the next 1-2 years

6. Provide funding for workforce training programs such as Rising Sun or RichmondBUILD

The Rising Sun Opportunity Center builds career pathways in the climate and resilience fields. For example, the Climate Careers program trains local youth to provide free energy efficiency programs for tenants and homeowners through the Green House Calls program. Through additional funding, Rising Sun could expand the Climate Careers program or Opportunity Build, the industry certified construction training program. Another avenue is to partner with and provide funding to RichmondBUILD, a public-

private partnership program in the City that develops talent in the construction and renewable energy fields. In order to maintain equity in the process for which organization receives funding, the City could release an RFP for energy retrofit related training programs (and can also encourage partnerships) and provide funds through selecting a proposal.

Staff Capacity:
~20-30 hours to release RFP and select program
Funding Required:
Buildings Upgrades Prize ($400,000), EECBG Formula Grant ($160,550), TCC and ECIA funds
Implementation Timeline:
Medium term, within the next 1-2 years

7. Expand funding for deferred maintenance for multifamily affordable housing buildings

The City currently provides funding through ECIA funding and a contract with GRID Alternatives to conduct roof upgrades and electrical service panel upgrades before installing solar on single family homes. The City could expand funding for this through ECIA funding for multifamily buildings to incentivize energy retrofits and solar installation on multifamily buildings. One challenge of this idea is that GRID alternatives currently only works on single family buildings in Richmond and it may be a challenge to extend their contract to provide services to multifamily buildings. It could be suggested that these upgrades are limited to multifamily buildings with five units or less to make this change easier.

Staff Capacity:
~15-20 hours to update GRID Alternatives contract, none to implement the program as GRID would implement
Funding Required:
Buildings Upgrades Prize ($400,000), EECBG Formula Grant ($160,550), TCC and ECIA funds
Implementation Timeline:
Medium term, within the next 1-2 years

8. Funding for dehumidifiers in old multifamily affordable housing

The City could support residents that live in older buildings without insulation by contracting with a vendor to provide services to conduct home inspections for ventilation and provide tools like dehumidifiers to tenants in multifamily housing units that have poor ventilation. This may be challenging though in that developers want to conduct whole building energy retrofits and this would only address one component of

the overall building in terms of increasing health outcomes, comfort, and reducing greenhouse gas emissions in the home.

Staff Capacity:
~20 hours to develop RFP for vendor, ~5-10 hours a month to coordinate with vendors providing tenants with dehumidifiers.
Funding Required:
EECBG Funds ($160,550) AND/OR Buildings Upgrades Prize ($400,000)
Implementation Timeline:
Medium term, within the next 1-2 years

9. Create Home Energy Score Program for Selling Homes (for duplexes/triplexes/SFHs)

Portland, Oregon has a policy that states that homes receive a "Home Energy Score" when a property is sold, which helps new homebuyers consider energy efficiency as a component of their decision.[98] The Home Energy Score was developed by DOE and thus is a recognizable and credible score provided to new potential homeowners. While this policy doesn't apply strictly to large multifamily affordable properties, it could be applicable to duplexes or triplexes. This is similar to a unique idea that was generated through interviews to create a requirement that those who buy and sell homes simply to make a profit should be required to conduct energy retrofits before selling homes. This program could be implemented for all new home sales or just for sales within two years of purchase (i.e. focused on those who are interested in buying and selling homes for a profit instead of making a home or investing in the property as a rental property).

Staff Capacity:
~50 hours or so to develop and pass an ordinance, including stakeholder engagement, to include Home Energy Score as a score for all properties when sold.
Funding Required:
None
Implementation Timeline:
Medium term, within the next 1-2 years

10. Provide technical assistance and support for multifamily weatherization

The weatherization program in Contra Costa County mostly focuses on weatherization of single family homes. City staff could develop expertise in or hire a contractor with expertise in multifamily weatherization to provide support for and increase multifamily weatherization for affordable housing buildings in the City. The City should conduct several meetings with weatherization program staff to understand their needs before moving forward with this. In addition, weatherization programs will have a large influx

[98] Henner.

of funds due to funding from the IIJA so providing this technical assistance/extra staff capacity could ensure that weatherization program staff have the needed support to scale up the program. While this effort would need to be coordinated with the County, having this expertise in the City could allow for the Weatherization Program staff at the county to have fewer barriers to entry to conducting multifamily weatherization.

Staff Capacity:
~20 hours to set up RFP and select contractor to provide technical assistance for multifamily weatherization
Funding Required:
EECBG Formula Grant, and ECIA/TCC funds. Funding amount unclear.
Implementation Timeline:
Medium to Long term, within the next 2-3 years. Will require time to shift work of weatherization programs towards multifamily since single-family weatherization is currently taking up all staff capacity.

11. Revolving Loan Fund (for small businesses)

The City has a revolving loan fund that is operated by Community First Lending that is primarily for the purpose of supporting local small businesses in the City. While this would not apply to multifamily affordable housing, accessing the revolving loan fund for energy retrofits could be a benefit for small businesses. These are the applicable uses for the revolving loan fund, according to the Community First Lending website:

- Working capital—for the costs of business operations
- Machinery/equipment—for the acquisition of machinery and equipment
- Fixed assets—for leasehold improvements, renovation, expansion of a structure, or purchase of fixed assets
- Facade improvements—for improving the exterior appearance of a business

Energy retrofits could fit into the category of machinery/equipment and fixed assets. With an infusion of funding into the revolving loan fund through funding from the ECIA, TCC, or EECBG, or Buildings Upgrades Prize funds, the revolving loan fund could be expanded as well and some money could be earmarked to be used towards energy retrofits.

Staff Capacity:
~20 hours to work with Community First Lending (CFL) to incorporate energy retrofits explicitly into funding opportunities, none after as it would be managed by CFL
Funding Required:
Funding amount unclear. Could range from $100,000-$500,000. Could utilize Buildings Upgrades Prize, EECBG formula grant, ECIA, or TCC funds
Implementation Timeline:
Medium term, within the 1-2 years

C. Long Term Policies and Programs

Below are policies the City could consider to increase the amount of energy retrofits in multifamily affordable housing in the City. These policies would include a great deal of stakeholder input and context specific research before implementation in addition to funding and staff capacity needs.

1. Develop energy benchmarking and transparency policy for multifamily properties

Many cities in the US, including many close to Richmond such as Berkeley and San Francisco, have developed benchmarking transparency requirements in which owners of large commercial and multifamily buildings are required to publish their energy usage data. The benefits of this program for property owners is that it helps identify energy and cost saving opportunities and for tenants increases consumer awareness of energy efficient buildings and provides more options to search for buildings that are more energy efficient.[99] Implementing this policy could also help the City collect more data for potential incentive programs in the future and to apply for federal and state funding to create these incentives.

Staff Capacity: High, would need to conduct stakeholder engagement and research to develop ordinance
Funding: Potentially would need to hire staff to maintain compliance of the program.
Implementation Timeline: Long term, 2-5 years (could be shorter depending on staff capacity available)

2. Create Rental Property Efficiency Standard

The City of Boulder in Colorado developed a SmartRegs policy which requires all long term licensed rental properties to meet specific minimum energy efficiency standards before being able to receive rental licenses.[100] Fees are collected for noncompliance and the program is funded by the City's Climate Action Plan.[101] This regulation could be implemented for all rental properties in the City with a delayed deadline for compliance for multifamily buildings. Although this would favor newer buildings over older buildings, the energy efficiency standards could be set in a way to provide more leeway and a longer compliance timeline for older buildings as energy efficiency upgrades may take longer to complete.

[99] "Commercial and Multifamily Building Energy Benchmarking, Transparency, and Labeling in US Cities" (ACEEE, October 2018), https://www.aceee.org/sites/default/files/pdf/topic-benchmarking.pdf.
[100] Alisa Petersen and Radhika Lalit, "BETTER RENTALS, BETTER CITY," n.d.
[101] Henner, "Mayors' Toolkit for Energy Efficiency."

Staff Capacity: High, would need to conduct stakeholder engagement and research to develop ordinance
Funding: Unclear.
Implementation Timeline: Long term, 2-5 years (could be shorter depending on staff capacity available)

3. Research outcomes of requiring electrification of buildings over the size of 25,000 square feet

Cities like Boston, New York, St Louis, Denver and others have recently passed Building Performance Standards that require electrification of existing buildings. Because this is difficult for many small buildings to achieve in terms of financing, the requirements apply to larger buildings with different timelines and requirements for commercial and market rate multifamily buildings when compared to multifamily affordable housing. The City can support financing for multifamily affordable housing buildings as well to complete these electrification upgrades. This policy would take a great deal of time to conduct stakeholder engagement to ensure that the outcomes are equitable and costs are not passed on to residents, especially low income tenants. In addition, Richmond is a much smaller City than others that have passed these ordinances and there may be adverse outcomes to implementing this requirement.

Staff Capacity: High, would need to conduct stakeholder engagement and research to develop ordinance
Funding: Potentially would need to hire staff to maintain compliance of the program. Could be additional other costs as well.
Implementation Timeline: Long term, 2-5 years (could be shorter depending on staff capacity available)

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X. Appendix A: Acronyms

Acronym	Full Version	Description
AEA	Association for Energy Affordability	Energy program administrator
BayREN	Bay Area Regional Energy Network	Regional energy network
BUILD	Building Initiative for Low Emissions Development	California program for new all-electric construction for low income buildings
CARE	California Alternate Rates for Energy	California utility assistance program
CEC	California Energy Commission	State agency
CLEAP	Communities Local Energy Action Program Pilot	DoE pilot funding that provides NREL technical assistance to communities to develop electrification strategy. Received by Richmond.
CPUC	California Public Utilities Commission	California agency
CSD	California Department of Community Services and Development	State agency
DoE	Department of Energy	Federal agency
ECIA	Chevron Modernization Project Environmental and Community Investment Agreement	Agreement between City of Richmond and Chevron
EECBG	Energy Efficiency Community Block Grants	Federal grant

Acronym	Full Version	Description
ESAP	Energy Savings Assistance Program (PG&E)	Energy efficiency program through PG&E
FERA	Family Electric Rate Assistance Program	California utility assistance program
GRPP	HUD Green and Resilient Retrofit Program	Federal program in development
HCD	California Department of Housing and Community Development	State agency
HUD	Department of Housing and Urban Development	Federal agency
IIJA	Infrastructure Investment and Jobs Act (IIJA) (AKA Bipartisan Infrastructure Bill)	Federal bill
IRA	Inflation Reduction Act	Federal bill
LIFT	Low Income Families and Tenants Program (MCE)	Rebate program through MCE
LIHEAP	Low Income Home Energy Assistance Program	Federal utility assistance program
LIHTC	Low Income Housing Tax Credit	Federal housing development program
LIWP	Low Income Weatherization Program (CA)	State weatherization program, has a specific multifamily component
MCE	Marin Clean Energy	Richmond's Community Choice Aggregation program
MFES	Multifamily Energy Savings Program (MCE)	Rebate program through MCE

Acronym	Full Version	Description
PG&E	Pacific Gas and Electric	Bay Area uility
RHA	Richmond Housing Authority	Richmond's Housing Authority
RUBS	Ratio Utility Billing	Third party utility payment system
SEM	Strategic Energy Management (SEM)	Energy efficiency program through MCE
SOMAH	Solar on Multifamily Affordable Homes Program	State solar program for multifamily affordable housing
TCC	Transformative Climate Communities	California large grant program, received by Richmond and partners in 2022
WAP	Weatherization Assistance Program	Federal weatherization program

XI. Appendix B: Building Permit Analysis

The building permit analysis spreadsheet can be found here: https://docs.google.com/spreadsheets/d/1rcRMWLWWbE-v2INRnkuVgUv6JMsx4r_g/edit?usp=share_link&ouid=100591719608148440833&rtpof=true&sd=true. The access for this link is limited to those who's emails were shared on the spreadsheet. This information is kept private for City staff with access to the link due to mentioning specific developments.

XII. Appendix C: Richmond Multifamily Affordable Housing Energy Survey Questions

The full survey can be found here: https://docs.google.com/forms/d/e/1FAIpQLScJ_BxG4PPQfC7nQYXB7QAndXIQqKCWyt83bAUMbYGe8_unhQ/viewform.

XIII. Appendix D: Affordable Housing Developments Spreadsheet

This updated affordable housing development spreadsheet can be found here: https://docs.google.com/spreadsheets/d/1lXWygkNMVCnpU5seTAPJ1NrBvHnuGx3o/edit?usp=sharing&ouid=100591719608148440833&rtpof=true&sd=true. The access for this spreadsheet is currently limited to those who are added. This is because it includes contact information and should be verified by the City. However, once the City reviews this information and uploads it to Transparent Richmond to replace the existing Affordable Housing Developments spreadsheet, it will become public information.

XIV. Appendix E: Sample Interview Questions

Below are the questions that were developed for the interviews with affordable housing providers, nonprofits, government agencies, and energy program administrators. These questions were used as a starting point. Not all the questions apply to every organization and in some interviews, questions were asked based on the ongoing conversation. However, these questions served a guide for the interviews.

Multifamily Affordable Housing Energy Retrofit Experience Interview Questions

1. What is a recent energy upgrade/retrofit project your building has completed (hot water system replacement, solar, etc)?
    a. What motivated your decision to do so?
    b. Did you use any local, regional, or state rebates?
        i. If yes, were there any obstacles to using those?
        ii. If not, did you try?
            1. If yes, what prevented you from using them?
    c. What was the process for accessing financing for energy retrofits? How were these financed?
    d. Did you work closely with any city/county/regional government agencies for this project? Who are your main contacts if you are looking for information on government funded programs?
    e. What was the role of the property manager and building maintenance supervisor in coordinating this renovation/installation? Was there sufficient staff capacity available to support this project?
    f. What was your experience permitting at the City for this project? What is your perspective of approaching the permitting system?
    g. What challenges did you have in this process? Were there any adverse effects as a result of this project for property owners, managers, or tenants?
2. Have you ever worked with the Weatherization Assistance Program, CA Low Income Weatherization Program, Solar on Multifamily Affordable Housing, or other available programs?
3. Have you had trouble finding contractors that have capability of completing electrification or other upgrades?
4. What do you see as the benefits to your building by completing energy retrofits?
    a. Do you see financial benefits for the owner in the long term?
    b. Do you see financial benefits for the tenant in the long term?

5. When in your timeline and capitalization cycle do you see your building investing in additional energy upgrades? Which types?
6. Are there weatherization and electrification upgrades you have ultimately decided not to complete? Were there particular obstacles that prevented you?
7. Is there an amount of “gap” financing that would make it worthwhile to you? What challenges have you faced when trying to access financing for energy retrofits?
8. Is there anything the City could do to support you in completing additional weatherization and electrification upgrades?