COMMUNITIES LEAP
U.S. DEPARTMENT OF ENERGY

Introduction to Local Policy and Program Approaches for Electrifying and Decarbonizing Existing Buildings

Introduction

Electrification refers to the adoption of technologies powered by electricity in place of natural gas or other fossil fuels. For residential and commercial buildings, this generally refers to appliances and equipment used for space heating, water heating, cooking, and clothes drying.[1] Electrification can happen in new buildings constructed without any gas lines, or it can refer to replacing natural gas/fossil fuel-based appliances and equipment in existing buildings with electric alternatives.

Building electrification—when combined with efficiency upgrades and increasingly clean electricity generation on the grid—has the potential to reduce building energy consumption, reduce greenhouse gas emissions, reduce utility bill costs, improve indoor air quality, and support local quality jobs.[2] However, how building electrification will impact a community or household locally is influenced by many factors, including the building construction quality (e.g., insulation, air sealing, electrical system, windows and doors, etc.), the local climate, utility rates and electricity generation mix, as well the details of programs and policies that exist at the local, regional, state, and even national level. As of 2023, more than 100 local or state governments have adopted policies and programs to support building electrification and decarbonization.

This document presents a framework for categorizing and understanding different policy and/or program approaches that have been used by communities to support community-scale electrification of existing buildings, illustrated with examples from communities across the United States. The examples reflect a wide array of policies and programs, including those that apply to different building stocks (e.g., residential/commercial), certain segments (e.g., single family/multifamily, large/small buildings), and different owner types (e.g., municipal buildings/privately owned buildings/deed-restricted affordable housing).

Every community is different, and a policy or program that works in one location may not have the same impact in another. Therefore, this document is not intended to offer an exhaustive list of policy and programmatic approaches or examples, nor does if offer any commentary or analysis of the efficacy of the examples described.[3] Instead, it presents a menu of approaches that municipalities can review and assess for relevance to their local goals and resources.

Overview of Implementation Approaches

Regardless of the type of buildings or equipment considered, there are two main categories of approaches that communities have taken to increase electrification of existing buildings, though many use a combination.

- **Approaches that *require that building owners* take certain actions to meet energy or electrification standards.** Regulatory approaches such as building performance standards are typically implemented through changes to the building or municipal code, and can be triggered by different scenarios, for example, when pulling related building permits, when equipment needs to be replaced, or when applying for business or rental licenses.
- **Approaches that *encourage, but do not require*, building electrification or decarbonization upgrades.** They can be implemented through programs, partnerships, or even building code changes. Examples include creating building energy benchmarking or disclosure requirements, electrification readiness requirements, or establishing incentives, funding, financing, or partnerships to make upgrades more cost effective and beneficial to the local economy.

1 Allison Moe and Patrick Gibbs, 2023. "Equitable Electrification Analysis for Existing Buildings in Richmond, CA." https://www.nrel.gov/docs/fy23osti/86954.pdf.
2 "Beneficial Electrification Toolkit," Environmental and Energy Study Institute. https://www.betoolkit.org/
3 Building electrification policy and programming is relatively new in the United States, and we have yet to fully understand the long-term impacts of specific policies or programs.

Examples of Goals and Implementation Strategies

The following table provides examples of policy and program solutions enacted by municipalities to address potential community goals around electrification and decarbonization of existing buildings. Most examples relate to residential buildings; however, approaches can be relevant to commercial buildings as well. The table is organized according to specific goals that communities may have regarding the potential impacts of electrification policies or programs. These goals are:

1. Community-wide electrification will reduce overall energy consumption and will not exceed the current electric utility grid's capacity.
2. Community-wide electrification will result in decreases or minimal increases to annual average resident utility bills, especially for low- to moderate-income households.
3. Electrification measures will be cost-effective for households over the life of the measures.
4. Landlords will pursue electrification of rental housing units, including both deed-restricted and naturally occurring affordable housing.
5. Buildings will be, or will have access to resources to become, electrification-ready by addressing required repairs or upgrades.
6. Electrification investments will have positive local employment/economic development impacts.
7. Electrification upgrades will improve indoor air quality for residents.
8. Community residents, including at-risk or underserved populations and households, will understand the requirements, opportunities, and benefits of electrification.

Sources used to identify example approaches are listed on the last page of this document.

Implementation Strategies Taken by Communities	Specific Examples
Goal 1. Community-wide electrification will reduce overall energy consumption and will not exceed the current electric utility grid's capacity.	
1a. Encouraging or requiring building envelope improvements in conjunction with electrification upgrades. This can be achieved through building code amendments, energy benchmarking or disclosure requirements, incentives, or other partnerships.	• City of Encinitas, California's, building code requires that any residential additions/alterations valued at $50,000 or more must choose from a menu of energy efficiency and electrification measures or meet a minimum Home Energy Score rating. The Home Energy Score is required, but how it is met is left up to the homeowner. • City of Boston, Massachusetts', energy benchmarking policy requires annual reporting of energy and water use to the city for nonresidential buildings larger than 20,000 square feet, multifamily residential buildings with 15 or more units, and buildings owned by the City of Boston or the Boston Housing Authority. • City of Philadelphia's Building Energy Performance Program requires owners of existing non-residential buildings 50,000 square feet or larger to either conduct "tune-ups" of their buildings, including envelope and mechanical systems. They can also certify their high performance or request an exemption under certain conditions. • City of Austin, Texas', energy disclosure policy requires an energy audit to be done and provided to potential buyers when selling a residential property that is at least 10 years old and has fewer than four units. Owners or managers of multifamily buildings with five or more units must conduct energy audits for buildings that are 10 years or older and make them available to current and potential renters. • City of Sacramento, California, invested in the XeroHome tool for city residents to conduct an informal energy audit of their home to estimate what different upgrades or upgrade combinations might cost and how they might impact utility bills. • The Weatherization Assistance Program provides federally funded energy retrofit services for low-income households.
1b. Encouraging or requiring higher efficiency electric appliances and equipment to maximize electricity savings.	• California's Building Energy Efficiency Standards establishes minimum efficiency requirements for heat pumps and other appliances, and all standards are required to be cost-effective. • City of Boulder, Colorado's, Smart Regs program requires an inspection and evaluation using a menu of options for property owners to meet energy requirements with higher points for heat pumps and higher points for higher efficiency heat pump models.

Implementation Strategies Taken by Communities	Specific Examples
Goal 2. Community-wide electrification will result in decreases or minimal increases to annual average resident utility bills, especially for low- to moderate-income households.	
2a. See all approaches under Goal 1 above. Any effort that reduces energy consumption can also be expected to decrease or minimize increases in utility bills.	
2b. Prioritizing electrification for homes or buildings that already have air conditioning systems.[4]	• Town of Portola Valley, California, requires homeowners to install an electric heat pump, providing both space heating and cooling instead of replacing or installing air conditioners.
2c. Connecting at-risk residents with existing utility bill support programs, or funding new ones.	• The Low-Income Housing Energy Assistance Program (LIHEAP) provides federally funded utility bill financial assistance to low-income households across the United States. *NOTE: Contact the local utility and social service agencies to identify additional local programs.*
Goal 3. Electrification measures will be cost-effective for households over the life of the measures.[5]	
3a. See all approaches under Goals 1 and 2 above. Any effort that reduces energy consumption and helps reduce utility bills will help improve overall cost-effectiveness of measures.	
3b. Encouraging or requiring cost comparisons between fossil fuel and electric appliances.	• Town of Minturn, Colorado, requires building owners to obtain and submit an electrification retrofit bid when applying to the town for a permit to replace a gas-fired furnace or traditional air conditioning/condensing unit. • All provisions in California's Building Energy Efficiency Standards are required by state mandate to be cost-effective.
3c. Funding additional rebates or grants to reduce the upfront cost of electrification measures (for all or specifically for low- to moderate-income households).	• City of Albany, California, offers rebates for heat pump/air conditioning systems and electrical panel upgrades, with higher incentive amounts for moderate- and low-income households. • The Burlington, Vermont, Electric Department (municipally owned utility) funds rebates that can cover up to 75% of the installed cost of a heat pump space heating system. • Portland, Oregon, Clean Energy Community Benefits Fund provides grants for energy and electrification upgrades, as well as workforce and contractor training.
3d. Coordinating with utility to develop on-bill financing for electrification upgrades.	• The Roanoke Cooperative utility in North Carolina offers on-bill financing for building envelope and heat pump electrification upgrades through their Upgrade to Save program.
3e. Offering economic hardship exemptions to building code electrification requirements.	• City and County of Denver, Colorado, requires heat pumps for space and water heating in large commercial and multifamily buildings when it is at or near cost parity with like-for-like gas appliances.
3f. Hiring someone or contracting with an entity to coordinate and maximize incentives and rebates for households.	• City of Berkeley, California's, Just Transition Residential Electrification Pilot Program sought a qualified firm or firms to manage their low-income residential electrification program, including coordinating all rebates. • City of Ithaca, New York's, Green New Deal partnered with funders and financing organizations to raise capital, has provided city funding, and is coordinating implementation through a single agency to support its goal of decarbonizing all existing buildings in the city. • New York City's ElectrifyNYC program provides free energy audits, plus assistance finding contractors and navigating rebates for solar PV systems, electric heat pumps, and weatherization upgrades for homeowners

4 Research indicates that heat pumps can be more cost effective for households using them as a replacement for both gas furnace and traditional central air conditioning systems. https://www.clasp.ngo/research/all/3h-hybrid-heat-homes-an-incentive-program-to-electrify-space-heating-and-reduce-energy-bills-in-american-homes/. However, communities will need to assess if there are any equity considerations regarding which households already have access to cooling and which do not. The effectiveness and equity of this approach may vary by community.

5 "Cost-effective" in this context generally means that expected utility bill savings over the lifetime of the measures will meet or exceed either the total or incremental upfront investment. However, local communities may have different definitions.

Implementation Strategies Taken by Communities	Specific Examples
Goal 4. Landlords will pursue electrification of rental housing units, including both deed-restricted and naturally occurring affordable housing.[6]	
4a. Focusing holistic efforts and resources towards multifamily affordable housing.	• City of Denver, Colorado's, electrification policy offers additional funding and services to "Equity Priority Buildings," which include deed-restricted and naturally occurring affordable housing.
4b. Adopting an equity framework or tenant protections to support any new requirements or incentives.	• California Energy Commission's Equitable Building Decarbonization Direct Install Program Guidelines include requirements to minimize rent increases or evictions. • City of Berkeley, California's, Electrification Strategy includes "Equity Guardrails" and tenant protection recommendations.
Goal 5. Buildings will be, or will have access to resources to become, electrification-ready by addressing additional repairs or upgrades that may be needed to make electrification upgrades possible.[7]	
5a. Encouraging or requiring buildings to prepare for future electrification, without requiring the electrification measures themselves.	• City of Cambridge, Massachusetts, requires that any natural gas, fuel oil, or propane appliance installations also provide dedicated branch circuits in electrical panels.
5b. Developing programs to minimize the need for, or provide funding to offset, electric service panel upgrades.	• City of Piedmont, California, offers rebates for service panel upgrades, in addition to heat pumps, heat pump water heaters, and mini-split heat pumps. Rebate levels are doubled for low- to moderate-income households. • State of Minnesota established a grant program to provide financial assistance to residential property owners to upgrade their service panels to either higher amperage or a smart panel.
5c. Funding, coordinating, or establishing partnerships with organizations or companies that provide general home repair services to support electrification or related measures.	• The nonprofit Brothers Redevelopment, Inc. in Denver, Colorado, coordinates with multiple cities and counties in the Denver metropolitan area to provide free health and safety upgrades to the homes of low-income residents. Most programs are funded by local Community Development Block Grants. • A Weatherization Assistance Program in Wisconsin partnered with the local Habitat for Humanity affiliate to resolve health and safety issues, allowing more homes to be eligible for energy upgrades.
Goal 6. Electrification investments will have positive local employment/economic development impacts.	
6a. Including quality labor standards (including prevailing wage), equitable hiring policies, and/or hiring preferences for local workers in new programs created.	• California Energy Commission's Equitable Building Decarbonization Direct Install Program Guidelines include labor standards. • City of Berkeley, California's, Just Transition Residential Electrification Pilot Program includes labor standards and local hire provisions. • NOTE: Examples and sample policy language available in this 2020 report published by the Blue Green Alliance (not specific to building electrification).
6b. Offering contractor training and capacity building programs.	• Boston, Massachusetts, Contractor Academy trains and supports minority-owned contractors to prepare them to better compete for and win bids for energy efficiency and clean energy projects. • In Chicago, Illinois, Elevate ran a series of Contractor Accelerators to support minority-owned contractors.

6 Research suggests landlords that do not pay for utilities (utilities paid by renters) may avoid un-required electrification or other energy upgrades, or may pass-on electrification costs to renters if required to upgrade.

7 A secondary goal is to make electrification easier, in order to minimize unpermitted upgrades which could have negative health and saving implications. See page 12: https://www.bayren.org/sites/default/files/2021-11/ee-and-electrification-white-paper_final_12.28.2020.pdf

Implementation Strategies Taken by Communities		Specific Examples
6c.	Incentivizing local contractors to join preferred vendor lists for electrification and other energy programs.	• City of Piedmont, California, and City of Albany, California, both offer contractor signing bonuses to local contractors who register to help administer electrification rebate programs.
6d.	Coordinating with local labor unions, workforce agencies, and/or community-based organizations to manage workforce efforts related to an electrification program.	• City of Berkeley, California, awarded contracts to the Construction Trades Workforce Initiative and Rebuilding Together East Bay North to ensure that their Just Transition residential electrification program would place traditionally under-represented in the jobs created by their investments. • City of Ithaca, New York, contracted with the nonprofit BlocPower to manage financing, implementation, and job training to meet the city's electrification goals.
Goal 7. Electrification upgrades will improve indoor air quality for residents.		
7a.	Requiring or incentivizing improvement of ventilation standards through any of the approaches described earlier in this document.	• New Buildings Institute Existing Buildings Decarbonization Model Code addresses increased ventilation related to energy and envelope projects in existing buildings. • Coordinate with local Weatherization Assistance Program agency, which requires health and safety measures as part of any envelope or efficiency improvements for low-income households.
7b.	Coordinating with local health agencies to support programs linking building upgrades with health improvements.	• Bay Area, California Healthy Homes Initiative provides home energy assessments, retrofits, and indoor air monitoring for multifamily buildings and high-risk asthma patients. • In North Carolina, Blue Cross Blue Shield partnered with the local Weatherization Assistance Program to fund health and safety repairs that align with or support energy efficiency measures.
Goal 8. Community residents, including at-risk or underserved populations and households, will understand the requirements, opportunities, and benefits of electrification.		
8a.	Prioritizing equitable engagement with residents and business owners to educate them on new programs or policies.	• City of Berkeley, California's Electrification Strategy and City of Sacramento DRAFT Building Electrification Strategy addresses the need for the city to build trust, lead by example, and ensure equitable benefits in their electrification approaches.
8b.	Implementing a neighborhood-based approach to prioritize upgrades in key at-risk locations.	• City of Minneapolis, Minnesota, designated "Green Zones" for increased city clean energy investment in neighborhoods that have historically faced environmental harms. • City of San Jose Electric Homes program is focusing electrification of homes in specific low-income and disadvantaged neighborhoods within the city.
8c.	Developing an engagement program with multifamily building owners/managers.	• City of Thornton, Colorado, runs a Multifamily Community Managers partnership program run by the City Housing Division and Police Department that organizes quarterly meetings with property managers to share resources and requirements, and to build trust.

Conclusions and Considerations

This document illustrated the wide variety of approaches that communities across the country are taking to promote and support existing building decarbonization and electrification. However not every approach shared in this document will be realistic, relevant, or appropriate for every community; each community has its own unique circumstances, needs, goals, challenges, and resources that will help determine which approaches make the most sense.

As more communities look to electrification and decarbonization strategies as a way to address issues ranging from health disparities to energy burden to climate resilience, this document can offer examples to help those communities think creatively about the solutions that are right for them.

References and Resources

The following resources were used to help identify programs and policies described as examples in Table 1 of this document.

Bastian, H., and C. Cohn. 2022. *Ready to Upgrade: Barriers and Strategies for Residential Electrification.* Washington, DC: American Council for an Energy-Efficient Economy. www.aceee.org/research-report/b2206.

Building Electrification Institute Cities, https://www.beicities.org/cities

Blue Green Alliance. 2020. State-Based Policies to Build a Cleaner, Safer, More Equitable Economy. https://www.bluegreenalliance.org/wp-content/uploads/2020/07/StatePolicyToolkit_Report2020_vFINAL.pdf

California Energy Codes & Standards – Statewide Reach Codes Program, https://localenergycodes.com/content/reach-codes/electric-ready

Database of State Incentives for Renewables & Efficiency. https://www.dsireusa.org/

Jarrah, A., and K. Tanabe. 2022. Energy Equity for Renters: A Toolkit to Expand Energy Efficiency and Preserve Affordable Housing. Washington, DC: American Council for an Energy-Efficient Economy. https://www.aceee.org/toolkit/2022/11/energy-equity-renters-toolkit

Mayor's Toolkit for Energy Efficiency. https://www.aceee.org/toolkit/2020/06/mayors-toolkit-energy-efficiency

Smart Policies to Improve Your City's Rental Housing Energy Performance: http://rmi.org/wp-content/uploads/2018/05/Better-Rentals-Better-City_Final3.pdf

York, D., C. Cohn, D. Morales, and C. Tolentino. 2022. *Building Decarbonization Solutions for the Affordable Housing Sector*. Washington, DC: American Council for an Energy-Efficient Economy. https://www.aceee.org/research-report/u2204

Zero Emission Building Ordinances database, https://buildingdecarb.org/zeb-ordinances

EXAMPLES OF RESOURCES FOR AMENDING BUILDING CODES

- Building Energy Code Technical Assistance is available for free through the U.S. Department of Energy
- The New Buildings Institute has published model code language for energy efficient building retrofits
- A coalition of California Bay Area communities published Model Energy Reach Codes, including existing building electrification ordinances

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