

Rewiring America’s Electrification Policy Menu for Local Leaders

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Introduction

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Rewiring America's Electrification Policy Menu for Local Leaders enumerates the abundant policy options for local governments to electrify buildings in their jurisdictions.

Building electrification enables communities to reduce pollution in their homes and workplaces while cutting energy costs. Local leaders without the federal power of the purse or the jurisdiction of state legislators may wonder how they can help their residents take advantage of efficient electric

technologies that can make their lives better. Happily, local officials have many tools at their disposal, which can be grouped into three categories (see below). The policy approaches in this guide are high-impact, proven to be successful, and use tools familiar to local governments.

- 1 Updating **local rules** that govern how clean and efficient new buildings must be, when and where new fossil fuel infrastructure can be built, and how easy it is to get a permit for building upgrades. By improving and streamlining local codes, standards, permitting, and zoning laws, local leaders can have a big impact on accelerating their communities' transition to an electric future.
- 2 Setting up or expanding **financial mechanisms** that can help community members and local government entities reduce the total or upfront cost of converting to electric systems and appliances.
- 3 Exercising **local leadership** by setting out clear goals, leading by example, and preparing the local workforce, sends a signal to market players that the community is a place that welcomes electrification.

Seeing the System Clearly

The existing policy and regulatory environment may seem neutral, but it is far from it. Existing rules and practices often create friction for homeowners who are excited to electrify, while greasing the skids for fossil fuel dependence in homes. Local leaders can take strides towards reversing these perverse incentives, smoothing the pathway for their residents to electrify their homes — improving their indoor air quality while reducing their climate impact.

→ Electrification faces friction

- Contractors are not always familiar with heat pump systems or electric appliances and often steer customers away due to outdated information (i.e. the myth that heat pumps can't work in cold climates, or that gas stoves provide better control than induction).
- Building codes often don't require electric capacity conducive to electrification, making it more expensive for residents to choose electric appliances later.
- Building codes require electrical panels to meet the above-maximum load, sometimes requiring a costly upgrade when a resident wants to go electric, even if this is not necessary with proper load management.
- Permitting requirements add cost and time to electrification.
- Electric appliances may have a higher upfront cost than fossil fuel-powered options.
- It might be hard for individuals to navigate the various programs and offerings that could help lower the costs of electrification.

→ Fossil fuels get too much grease

- Fossil fuels are often the default option for developers and contractors.
- Building codes, zoning codes, and new construction land-use planning encourage fossil fuel-powered appliances and continue to reinforce gas hook-ups.
- Customers have little insight into a building's true performance before making choices such as purchasing, renting, or buying appliances.

SECTION 1: LOCAL RULES

Local decision makers often have the authority and ability to write local rules governing building codes, performance standards, permitting, and zoning. All of these rules can impact the level of friction or grease that electric buildings face compared to fossil fuels.

1. Update Building Codes for New Construction and Renovations

Building codes are laws that set the minimum requirements for how buildings should be constructed, including their structural systems, plumbing, heating, ventilation, and air conditioning.

The most widely recognized and followed model building codes are published by the International Code Council (ICC). The main ICC codes are the International Building Code (IBC), International Existing Building Code (IEBC), and International Residential Code (IRC), which serve as the foundation and coordinate with other codes. Along with specific codes for fire safety, plumbing, and mechanical systems, they create a comprehensive set of rules. Model building codes themselves do not have the force of law but need to be explicitly chosen and adopted by the Authorities Having Jurisdiction (AHJs), that is, via legally enforceable state law or local ordinance and accompanying regulations.¹ Amending building codes can ensure new buildings have efficient systems, and new standards can be enforced by local jurisdictions.² The following building and energy code policies all promote electrification:

- The best way to implement building codes that prioritize electric usage is by adopting all-electric building codes (section a, below). These codes require new buildings to be designed and constructed using electric heating, appliances, and water heating systems.
- Electric-ready building codes (section c) and EV Infrastructure Building Codes (section e) make it

easier and more affordable to electrify buildings and support electric vehicles, although they don't automatically ensure building electrification without additional measures.

Localities can apply for IRA funds administered by DOE to provide resources to update their building codes. The IRA will provide \$1 billion to support state and local governments to adopt updated building codes until September 2029.³

→ a. All-Electric Building Codes for New Buildings and Renovations

All-Electric Building Codes require all newly constructed buildings to be equipped with electric space heating, hot water heating, and efficient electric appliances like induction stoves and electric clothes dryers. These building codes exclude gas piping and other fossil fuel infrastructure. These codes can also require renovations, remodeling, or equipment replacements to be all-electric.

Requiring new buildings to be all-electric should be a straightforward step towards electrification, given that there is often no up-front cost to all-electric new construction compared to building with both wires and gas pipes. But unfortunately, a recent Ninth Circuit decision, *California Restaurant Association v. City of Berkeley*, held that federal law preempts states and local governments from prohibiting the use of natural gas appliances in new buildings. Unless the Supreme Court of the United States overturns this decision, all-electric building codes are not an option in the Ninth Circuit, which includes Alaska, Arizona, California, Washington, and Hawaii. Other localities outside of these districts may still

pass all-electric building codes. And all state and local legislators may still pursue other policies, including electric-ready building codes, stretch codes, and performance standards for buildings and appliances. See more information in the Berkeley example below.

Examples of Local Jurisdictions with Electric Vehicle Building Codes

Montgomery County, Maryland [passed legislation](#) in 2022 requiring new construction and major renovations of residential, commercial, industrial, and public buildings to be all-electric and to be equipped with electric hot water systems, heat pumps for space heating and cooling, and electric stoves. The bill does not itself create the all-electric standards but orders a process and framework for the county executive to issue these standards as well as inclusions and exemptions. The legislation requires the all-electric standards to be developed in cohesion with the next building code adoption cycle and to be issued by January 1, 2024. The new building standards kick in no later than December 31, 2026, with the option for the county executive to move more quickly for most building types.

In October 2022, the **Town of Portola Valley, California** [adopted an ordinance](#) requiring all new construction to be all-electric in commercial, industrial, institutional, public/municipal, and multi-family and single-family residences and during residential remodel projects, requires that upon placement/upgrade to an electrical panel and/or AC unit, that panels are upgraded to accommodate new electric loads, and that a heat pump be installed instead of A/C. This ordinance stands out for its application to equipment replacements, not just new construction. There are currently only two other municipal ordinances with all-electric requirements for equipment replacements. The Town's reach code was filed with the California Building Standards Commission and the California Energy Commission.⁴

In 2019, **Berkeley, California** became the first city to require all-electric new residential and commercial buildings through [Ordinance No. 7672-N.S.](#), which amends the Berkeley Health Code. The ordinance also establishes energy use and energy efficiency standards for furnaces, stoves, and other appliances and complements other actions Berkeley has taken, including a 2019 reach code for new construction.

In April 2023, the Ninth Circuit invalidated the Berkeley local ordinance in *California Restaurant Association v. City of Berkeley*. This lawsuit was supported and financially backed by the fossil fuel industry in an attempt to keep households reliant on fossil fuels. The court held that the federal Energy Policy and Conservation Act (EPCA) took precedence over the local ordinance. The U.S. Department of Energy, which is tasked with implementing the federal EPCA, supports Berkeley's policy and disagrees with the 9th Circuit's interpretation of this law.

This decision may impact other state and local regulations in the Ninth Circuit's jurisdiction, including in California and Washington. Other Circuits, and potentially the Supreme Court, may take a different view. Berkeley is allowed to continue enforcing its law until appellate decision (until it is officially instructed to do so by the district court), but the 25 or so other cities within the 9th circuit who have ordinances modeled on Berkeley's gas prohibition are at risk if they try to enforce them. Local reach codes (see more in section c, below) are allowed by Part 11 of the California Building Code which sets out a Green Building Code, that is voluntary and flexible, requiring the local jurisdiction to make a finding that these amendments are necessary for climate reasons, but does not have a cost-effectiveness requirement. Ongoing lawsuits could establish a potentially important precedent for future municipal regulatory actions, pending court rulings.

Policyholders May Cautiously Use These Approaches to Pass Electrification-Friendly Codes and Avoid Preemption⁶

1. Use an emissions standard or building performance standard approach (see the section on building performance standards).

2. Ensure the code meets the “7-Factor Test:”

- A builder can fulfill a building’s energy consumption or conservation objective by selecting items with combined energy efficiencies that meet the objective, according to the code.
- The code doesn’t mandate that Covered Products exceed federal energy efficiency standards, unless they receive a waiver from the secretary of energy.
- Compliance options in the code are based on a “one-for-one equivalent energy use or equivalent cost basis.”
- The code sets the baseline building design using covered products that don’t exceed federal standards, unless a waiver is granted by the secretary of energy.
- The code includes at least one optional combination of energy consumption-related items that don’t surpass federal standards for any covered product (provided that the code offers such combinations).
- The code expresses any energy target as the total energy consumption for the entire building.
- The code employs test procedures from EPCA to assess the energy consumption of covered products.

Despite the *Berkeley* decision, municipalities in other states continued to adopt all-electric building ordinances. In June 2023, the Village Board of **Oak Park, Illinois** passed an all-electric new construction ordinance, which has been incorporated into their building code. This landmark decision establishes Oak Park as the first municipality in Illinois, as well as the entire Midwest region, to enact such an electrification ordinance. This follows the adoption of a benchmarking ordinance approved in February 2023. Effective January 1, 2024, the new ordinance encompasses both residential and commercial buildings in Oak Park. Unlike most municipalities in Illinois, which adhere to the state-wide energy code as a minimum requirement (and maximum for low-rise residential structures), Oak Park has the authority to implement more stringent energy codes. Presently, Illinois operates under the amended 2018 International Energy Conserva-

tion Code (IECC) and is in the process of adopting the 2021 IECC. Additionally, the Village has shown keenness to adopt the Illinois Stretch Code once it becomes accessible.⁷

→ b. Electric-ready Building Codes for New Buildings

Electric-ready building codes require that new buildings have the necessary electric service, breakers, wiring, and plugs to easily give the option to use all-electric appliances, but leave open the choice for developers to equip the building with gas-fired appliances or electric. These codes give more flexibility, but may result in developers becoming more familiar with all-electric construction and choosing to go that route, especially if more people prefer an electric lifestyle.

Examples of Local Jurisdictions with Electric-Ready Building Codes

In April 2023, **Boston** adopted Massachusetts' [Stretch Energy Code](#) to limit the use of fossil fuels in new buildings and prepare new buildings for electrification. The ordinance requires all new buildings that have fossil-fuel systems and appliances to install solar panels and supplementary wiring that can accommodate electrification. The objective of this regulation is to prepare for future conversion to electric end uses and aim for the majority of new construction to be all-electric. Earlier in 2023, Brookline and [Watertown](#) were the first municipalities to approve the code, and since then, Boston has followed suit and become the largest city in Massachusetts to adopt the code.⁸

The **Chicago** City Council passed the [Energy Transformation Code](#) in September 2022 to advance the City's decarbonization commitments. One of its major requirements is for most new buildings to be built with the electrical capacity and wiring necessary to accommodate all-electric appliances for cooking, clothes drying, and water heating. These electric-ready buildings make it so when upgrades to appliances occur, there will be no need to alter walls or upgrade the electrical service. According to the Chicago Mayor's Office, the code was estimated to result in approximately **40%** improvement in energy efficiency for residential and commercial buildings compared to their 2001 ordinance. This is due to the inherent efficiency of modern electric appliances, even compared to the most efficient gas appliances.

→ c. Stretch/Reach Codes

Stretch codes, also known as "reach codes," allow municipalities to exceed their state's base building and energy code in terms of efficiency and electrification. Localities can either opt-in to their state's "stretch codes" which are more aggressive than the state's base code or adopt their own stronger code if the state allows. This results in buildings that achieve higher energy savings. Stretch codes allow local jurisdictions to exercise leadership without forcing reluctant cities to go electric.

Examples of Local Jurisdictions with Stretch Codes

California allows local jurisdictions to implement stricter energy efficiency ordinances that surpass the Building Energy Efficiency Standards *as long as* they are both cost-effective and compliant with the energy consumption limits set by Title 24. The Energy Commission and Building Standards Commission (BSC) are responsible for approving and enforcing these local ordinances that require new mid-rise residential buildings to exceed the minimum state requirements and evaluating and reporting on their performance every three years. The state's most recent report found that, for mid-rise multifamily buildings, considering both upfront costs and operational costs for both mixed-fuel and all-electric scenarios, the stretch codes resulted in overall savings.⁹ [The Statewide Reach codes program](#) is funded by investor-owned utilities and does cost-effectiveness studies for each locality in California by climate zone, removing a barrier for localities adopting reach codes, ensuring they comply with Part 6 of model state code requiring cost-effectiveness. California's newest state code went into effect Jan 1, 2023 so cities updated their local reach codes to align.

In California, Peninsula Clean Energy (PCE), Silicon Valley Clean Energy (SVCE), East Bay Community Energy (EBCE), **Alameda County, Santa Clara County and the San Mateo County Office of Sustainability** (OOS) joined together to develop building and transportation electrification reach codes for localities within their service territories. Peninsula Clean Energy (PCE) will provide San Mateo County jurisdictions a \$10,000 grant to enable their adoption of building and electric vehicle Reach Codes. In addition to the \$10,000, PCE is offering support to local governments in the form of technical assistance from TRC Engineers and DNV-GL for the development of model Reach Codes, facilitation support by the County Office of Sustainability, as well as implementation and adoption support such as consultant participation at Commissions and Council meetings, model staff reports, staff trainings, check lists or other support needs.

In 2021, **San Jose, California** passed its [building electrification ordinance](#). The reach code requires all new low-rise residential buildings (up to three stories) to be built with only-electric systems and appliances. The ordinance also requires new buildings to be designed to accommodate the eventual installation of solar PV and EV charging.

The Massachusetts [Climate Act of 2021](#) required the Department of Energy Resources (DOER) and the Board of Building Regulations and Standards (BBRS) to issue a new municipal [Specialized Opt-in Stretch Code](#) in line with the state's strict carbon pollution reduction requirements. In January 2023, the cities of **Watertown, Brookline, Cambridge,** and **Somerville** voted to adopt the new Specialized Opt-in Code. The updated Stretch Code further emphasizes energy efficiency and electrification. For example, it establishes that at least 20 percent of parking in new multifamily parking lots must have dedicated EV charging.

The Town of **Brookline, Massachusetts** is under the state's [Stretch Energy Code](#) for low-rise residential. This residential stretch code allows applicants to take different paths to energy code compliance depending on the building's energy efficiency features, it does not necessarily restrict the installation of fossil fuel appliances. Additionally, the Town approved participation in a [Fossil Fuel Free Demonstration Program](#) which will likely take effect between January and March of 2024 and will require all new buildings and major renovations to be all electric.¹⁰

→ d. Solar Building Codes, Mostly for New Construction

Solar building codes require new construction to include solar energy systems, or be ready to install solar in the future. Codes can mandate solar, solar plus storage, or solar readiness and apply to residential or commercial buildings, even certain retrofits. Beyond these requirements, cities can streamline permitting timelines (see the section on permitting) and waive fees for solar installers, as well as **adopt zoning codes** (see the section on

zoning) that allow solar energy across all districts.

Examples of Local Jurisdictions with Solar Building Codes

Lancaster, California was the first city in the U.S. to [mandate solar](#) energy systems for new single-family homes, requiring two watts of power per square foot for all buildings permitted in or after January 2014. Superseding local building codes, the California Energy Commission introduced a statewide mandate in Title 24 of the 2019 Energy Code requiring solar for all new single-family homes and multi-family homes under three stories. The [2022 Energy Code](#) updates the California mandate to include a first-in-the-nation solar and storage requirement for new commercial properties like grocery stores and offices.

In 2019, **St. Louis, Missouri** became the first city in the Midwest to adopt a solar-ready requirement for new construction. [The ordinance](#) applies to residential, multifamily, and commercial buildings. It ensures that buildings are provisioned for solar in the design phase, saving households money when they decide to install solar in the future. New buildings must have adequate electrical panel capacity, an electrical conduit to the roof, and unobstructed roof area to house future solar panels.

→ e. Electric Vehicle Infrastructure Building Codes for New Construction

Electric vehicle (EV) infrastructure building codes require parking in new buildings to include the electrical equipment necessary to enable the easy and low-cost installation of electric vehicle (EV) charging stations. Done right, these codes can play a critical role in equitable access to EVs, because they make EV charging accessible to those living in multi-family housing, including renters. EVs are often the first introduction to the benefits of electric machines, and can draw people along the path to electrifying more machines.

Examples of Local Jurisdictions with Electric Vehicle Building Codes

In April 2017, the City of **San Francisco, California** passed an [ordinance](#) requiring new construction projects to include a certain amount of electric vehicle (EV) charging infrastructure, depending on the size of the project. The ordinance amends the city's Green Building Code and Environment Code to establish requirements for the installation of EV charger infrastructure in new buildings and buildings undergoing major alterations.

In April 2020, The **Chicago** City Council approved an [ordinance](#) requiring at least 20 percent of parking spaces to have or be ready for EV charging equipment. This applies to all new construction of residential buildings with five or more units and commercial buildings with 30 or more parking spaces. At least one of the EV-ready spaces in applicable properties must be accessible to people with disabilities.¹¹ One of the major benefits of this policy approach is reducing future costs for electric vehicle supply equipment installations, which are about four times lower compared to retrofitting costs.¹²

In September 2022, **Santa Monica** City Council adopted the [EV Charger Reach Code](#), which amends California's Green Building Code (CALGreen) to increase the number of EV charging stations in new building projects, including multifamily buildings. The new reach code requires at least 60 percent of parking spaces in new building projects to be EV-ready so that they will not require permits for EV chargers. Five percent of the spaces must have EV chargers installed during construction, and an

additional 10 percent of the parking spaces must have the electrical capacity to serve future charging stations. The concept began as part of Santa Monica's Climate Action and Adaptation Plan, which has the goal of reducing carbon pollution by 80 percent [by 2030](#).

→ f. **Require all Air Conditioning Units to be Heat Pumps**

Requiring all air conditioning units to be heat pumps is a change that can be made through a locality's building code.

Examples of Local Jurisdictions Requiring All New Buildings With AC Units to be Heat Pumps

In January 2023, **Aspen, Colorado** City Council passed [Ordinance #1, 2023](#) which adopted the 2021 International Building Codes, along with local building and energy code amendments. Notably, these changes require that all new buildings that are installing air conditioning units install heat pumps to provide both heating and cooling. This is advantageous for a region like Aspen, Colorado that experiences both hot summers and cold winters. The updates also include an expansion to the Renewable Energy Mitigation Program (REMP) and other measures focused on energy conservation, wildfire resiliency, and reducing pollution. The new codes apply to new residential and commercial permits submitted after March 31, 2023. Expedited permit review was added to incentivize all-electric buildings.

2. Building and Appliance Performance Standards for New and Existing Buildings

Building performance standards (BPS) establish specific performance levels that both new and existing buildings must achieve. They can require buildings to reduce either their pollution or their energy use. Strong standards may be costly or

logistically difficult for buildings with fossil fuels to meet, nudging owners toward all-electric buildings. This policy approach can be designed to incentivize the adoption of electric heating and cooling systems, and the installation of rooftop solar. Building performance standards are not at risk of preemption per the Berkeley decision.

→ a. **Building Emissions Standards for New and Existing Buildings**

Building emissions standards regulate the performance of buildings by setting targets or limits on air pollution like greenhouse gas emissions. Emissions standards would not be subject to preemption under the Ninth Circuit’s reasoning in the *Berkeley* case, so local jurisdiction with lower tolerance for legal risk should be safe pursuing emissions standards.

Examples of Local Jurisdictions with Building Emission Standards

New York City’s Local Law 97 was included in the Climate Mobilization Act, passed by the City Council in April 2019 as part of the Mayor’s New York City Green New Deal. Under the law, most buildings over 25,000 square feet will be required to meet new energy efficiency and greenhouse gas emissions limits by 2024, with stricter limits beginning in 2030. The law creates a Local Law 97 Advisory Board and Climate Working Groups to advise the city on how best to achieve these limits. With some exceptions, Local Law 97 covers: buildings that exceed 25,000 gross square feet; two or more buildings on the same tax lot that together exceed 50,000 square feet; and two or more buildings owned by a condo association that is governed by the same board of managers and that together exceed 50,000 square feet. Local Law 97 sets pollution-specific limits based on how buildings are used and the amount of space allocated to each use. The law takes a strategic approach that ensures it is not affected by the preemption consequences mentioned in the *Berkeley* decision.

In 2021, the **New York City** Council passed Local Law 154 becoming the largest city in the United States to establish a prohibition on new fossil fuel hookups in buildings for space and water heating and kitchen stoves. The ordinance requires construction projects to use electric appliances starting in 2023 for some buildings under seven stories and in 2027 for taller buildings, with exemptions for hospitals, commercial kitchens, and laundromats. Local Law 154 prohibits the combustion of “a substance that emits 50 kilograms or more of carbon dioxide per million BTUs of energy in any new building or any building that has undergone a major renovation.” This includes natural gas, fuel oil, coal, and other fossil fuels.

The **Boston, Massachusetts** Building Emission Reduction and Disclosure Ordinance establishes a building performance standard for large commercial and multifamily buildings. The ordinance sets limits on carbon pollution for these buildings, with compliance dates varying based on building size. Building owners who fail to comply with the emissions limits are required to pay a fee and the fees collected are directed to the environmental justice fund, which supports populations disproportionately impacted by climate pollution. This community-led compliance solution replaces the use of traditional carbon offsets, which had been criticized by local community groups as a flawed approach that allows pollution to persist. The policy developed with the input of over 80 local community members and organizations, such as ACE, City Life/Vida Urbana, and Chinese Progressive Association, alongside Clean Water Action.

→ b. Building Energy Standards for New and Existing Buildings

Building energy standards establish requirements or guidelines for energy efficiency measures, systems, and technologies in buildings.

→ Examples of Local Jurisdictions with Building Energy Standards

Montgomery County, Maryland’s Building Energy Performance Standard (BEPS) establishes energy use reduction requirements for buildings larger than 25,000 square feet that ratchet down to interim targets starting in 2028, reaching final targets starting in 2033. With support from NRDC’s City Energy Project and the Institute for Market Transformation (IMT), Montgomery became the first county in the United States to pass a BEPS policy, which builds on the county’s previously established Building Energy Benchmarking policy.

Denver, Colorado passed the Energize Denver Ordinance in November 2021 for buildings 25,000 square feet and larger. The ordinance requires covered building owners to benchmark building

energy performance, and to make such energy performance information publicly available. The key piece to this ordinance is its requirement for covered building owners to address existing building performance through energy efficiency, renewables, and/or renewable heating and cooling (electrification). The city uses three main strategies to reach its climate goals for buildings: a building performance standard with energy efficiency requirements; prescriptive efficiency requirements for small commercial and multifamily buildings; and electrification requirements for space and water heating equipment. Any covered building owner who violates the ordinance or rules or regulations adopted pursuant to the ordinance, is subject to a civil penalty amount of up to seventy cents (\$0.70) per year for each *required kBtu reduction that the owner's covered building fails to achieve in that year*.

→ c. Zero-pollution Standards for Local Appliance Sales

Zero-pollution standards for local appliance sales are guidelines or regulations that require new appliances sold in a certain area to emit little or no pollutants during their operation. These standards can allow a phased approach, giving suppliers, contractors, and building owners time to adjust, while ensuring that, after a certain date, no new gas appliances will be installed in that area

Examples of Local Jurisdictions with Zero-pollution Appliance Standards

In March 2023, the California **Bay Area Air Quality Management District**¹³ passed a zero-pollution standard applying to any new water heaters, furnaces, and other appliances sold. The air district estimates that water heaters and furnaces alone account for 90 percent of in-home gas combustion pollution. Homeowners would be required to replace these appliances starting as early as 2027 based on equipment type, size, and use. For example, water heaters for large residential and commercial buildings would need to be replaced starting in

2031. The new rules will apply only to new appliances and will not mandate immediate replacements, nor will they apply to gas stoves used for cooking. The regulations are estimated to prevent around 15,000 asthma attacks and 85 premature deaths in the region each year.

Examples of Local Jurisdictions with Building Energy Disclosures

The **Minneapolis Building Energy Rating and Disclosure Ordinance** (BERDO) model integrates energy disclosures with code compliance requirements. The 2013 ordinance requires owners of commercial and multifamily buildings over 50,000 square feet to benchmark their buildings' energy usage using the ENERGY STAR Portfolio Manager tool, which calculates an energy score based on consumption, size, and other factors. It requires annual disclosures as early as possible in the real estate transaction (e.g. time of listing rather than the time of sale) to better influence home buyer decision-making. The City of Minneapolis enforces BERDO compliance and invests in information systems to reduce costs and collect key performance data. The Energy Benchmarking Program is intended to spur efficiency improvements and benchmarked buildings get a higher percentage of funding in the city's Green Cost Share grant program. Based on the city's annual scorecards and dashboard the program is on track to help achieve Minneapolis' climate action plan goals.

Seattle, Washington adopted an Energy Benchmarking Law through its municipal code that requires commercial and multifamily buildings over 20,000 square feet to track and report their energy performance annually through the Energy Benchmarking Program. Buildings that perform poorly may be required to make energy-efficient upgrades, including HVAC systems and heat pumps. Every year, the City of Seattle publishes building energy performance data from more than 3,500 of Seattle's largest commercial and residential buildings.

Indianapolis, Indiana adopted the Benchmarking and Transparency Ordinance requiring city-owned

buildings greater than 25,000 square feet and non-city-owned buildings greater than 50,000 square feet to benchmark and report their energy consumption on an annual basis. With support from the American Cities Climate Challenge, this ordinance was developed out of a robust stakeholder engagement process throughout the lockdown of 2020. Despite the stakeholder engagement process looking different from normal, the policy language reflected a number of decisions that stakeholders weighed in on – most notably, the phased-in approach for implementation. This ‘win’ still serves as an exemplary best practice for the City and demonstrates that climate action can take place, even in difficult circumstances.

Honolulu, Hawai‘i has implemented the [Better Buildings Benchmarking Program](#) which mandates annual benchmarking and transparency of energy and water usage for public buildings above 10,000 square feet and commercial and multifamily buildings larger than 25,000 square feet, starting with the largest ones in 2023. The American Cities Climate Challenge supports

this initiative. Given that around one-third of O‘ahu’s carbon pollution comes from the building sector, benchmarking is a crucial step to achieving the city’s climate goal of net-negative emissions by 2045. The program is expected to reduce large buildings’ electricity consumption by almost 7 percent by 2030 and contribute to greenhouse gas emissions reduction on the island.

The **City of Bend, Oregon** has launched the [Home Energy Score Program](#) to promote energy efficiency in homes and provide transparency regarding their energy costs. This program is based on the federal Home Energy Score Program initiated by the U.S. Department of Energy (DOE) in 2012. The DOE developed a standardized methodology and tools for assessing and reporting the energy efficiency of homes. Starting from July 1, 2023, all publicly listed homes in Bend must include a Home Energy Score report, allowing potential buyers to compare the efficiency of different homes and make informed decisions. Homes listed before July 1, 2023, but still active after that date, are exempt from this requirement.

3. Permitting

In many places, building owners or developers must apply for a permit from the local government to build or retrofit a building, including installing a new space heating or cooling system, or water heater. Local governments have the power to change permitting rules — to make them stricter and slower for fossil fuel building construction and retrofits while streamlining and expediting permits for electric building construction and retrofits. Rooftop solar permitting and expedited all-electric building permitting are both essential building decarbonization tools. Permit discounts are an innovative way to incentivize electrification retrofits.

→ a. Streamline and Standardize Electrification Permitting

Expedited all-electric building permitting means

making it faster, easier, and/or less costly to get a permit for electric appliances, electric vehicle charging, and rooftop solar.

Examples of Local Jurisdictions with Expedited Electric Permitting

Palo Alto, California provides homeowners with both a subsidy and a streamlined service to facilitate the replacement of their gas water heater with an energy-efficient electric alternative. In October 2022, the Palo Alto City Council approved the Advanced Hot Water Heat Pump Program, which aims to install 1,000 heat pump water heaters by the end of 2023. This was made possible through a partnership with Synergy, an energy and water efficiency contractor. The process is as follows: The homeowner fills out a brief online form and then sets a time for an assessor to come by, the assessor

determines what's needed for the installation and goes over options for electrifying space heating if there is interest. Homeowners can expect an assessment to be scheduled within just one week of contacting the city. In total (including permitting) \$2,700 is due upon completed installation or if preferred, \$1,500 due upon completed installation and the remainder of payments of \$20/month for 5 years can be included in the utility bill, also known as on-bill financing. As of May 2023, at least 200 assessments were completed or scheduled. Before the program, 90 percent of homes in Palo Alto had gas-powered water heaters and natural gas used in buildings contributed to about 35 percent of the city's carbon pollution.¹⁴

Cupertino, California has a dedicated "[Alternative Energy](#)" permit application for solar, electric vehicle charging equipment, and battery storage permit applications. Cupertino developed specific application materials for electrification that streamline the permit application process and accelerate plan reviews. Standardized internal protocols ensure consistent enforcement and help customers understand the requirements for successful applications and inspections.

In January 2023, the **Denver, Colorado** City Council adopted a new building code to help reach its goal of zero emissions by 2040. Regulations *based on the building code* add requirements for permit applicants seeking to install gas equipment. Permit applicants not willing to use electric systems and appliances will have to go through a more complicated permitting process to replace their units with fossil fuel versions, a reversal of the previous permitting process. The applicants must now furnish additional details regarding the viability of using electric equipment. They are obligated to demonstrate to the city that they have thoroughly assessed the feasibility of utilizing electric-powered equipment, conducted checks for gas line leaks, and verified that gas equipment is appropriately sized and operating efficiently, adhering to the prescribed regulations. Starting 2027 the city will no longer issue any permits for gas heating and cooling

equipment in commercial buildings. To incentivize building owners to plan for electrification and make the switch to electric systems and appliances before the building code requires them to, the city's Office of Climate Action, Sustainability, and Resiliency (OCASR) is offering the [Building Electrification Pilot Program](#), funded with \$7 million, to fund up to 70 electrification program.

→ b. Streamline and Standardize Rooftop Solar Permitting

Rooftop solar makes electric buildings even more cost-effective and can nearly zero out an electric building's carbon emissions. Unfortunately, compared to a solar-friendly country like Australia, the permitting and approval processes in the U.S add 2 to 6 months of delivery time and \$0.47/W in system costs, exceeding the cost of the solar panels themselves.¹⁵ **Streamlined rooftop solar permitting** can significantly reduce the costs of rooftop solar installation by simplifying the application process, reducing the time it takes to get permits approved through automation, and eliminating unnecessary requirements. Streamlined approaches include digitizing application systems, reducing the number of inspections, automating permit approvals with an app like SolarApp+, and/or offering pre-approved designs and installation requirements.

[SolarAPP+](#) is an online web portal that streamlines the permitting process to install code-compliant residential photovoltaic (PV) systems. It automates the plan review process and performs a compliance check based on inputs provided by the contractor, ensuring that the proposed system is safe and meets the requirements of model building, electrical, and fire codes. After the system is installed, the authority having jurisdiction (AHJ) conducts inspections to verify adherence to the approved design and installation practices. SolarAPP+ has been adopted by 34 communities, resulting in over 15,000 permits issued, 100,000 kilowatts approved, and an estimated 15,000 hours of review time saved. SolarAPP+ communities tend to be more racially diverse, have less owner-occupied housing, and

have greater median home values than non-SolarAPP+ communities.

The Department of Energy's (DOE) [SolSmart program](#) is now endorsing SolarApp+, a user-friendly tool that assists local governments in streamlining the solar permitting process. SolSmart offers step-by-step guidance and provides technical assistance to help communities adopt SolarApp+.

Examples of Streamlined and Standardized Rooftop Solar Permitting

Pima County, Arizona, was one of the early adopters of SolarAPP+ in late 2020 with the aim of streamlining the approval process for the approximately 3,600 solar permit requests they receive each year. Prior to implementing SolarAPP+, reviewing each permit used to take around 45 to 90 minutes. The software is capable of determining whether a proposed solar energy system complies with the building codes in just about 15 minutes. If a system is found to be non-compliant, SolarAPP+ promptly identifies the specific reason for the application's rejection, allowing the contractor to make the necessary revisions. They anticipate a remarkable 90% reduction in the workload associated with solar permits.¹⁶

Salt Lake City, Utah collaborated with local organizations and neighboring jurisdictions to create [a streamlined solar PV permit process](#) in 2017. The [permit application](#) is modeled off of the industry standard "Expedited Permit Process for PV Systems" by Bill Brooks, PEI, also known as the "Solar ABCs." Salt Lake City now ranks among the nation's top cities for solar.

The Town of **Southold, New York** adopted a solar permitting fast-track program for standard residential installations of solar electric and solar hot water systems (last updated 2022). Adopting this program was part of Southold's journey to becoming a designated NYS Clean Energy Community and was a part of the Long Island Unified Solar Permitting Initiative which eliminated unnecessary requirements imposed by some towns as part of their solar permit application such as the completion of a new property survey. The Fast Track Permit shortened the time period for approving a submitted application to 14 days or fewer. The model permit capped the application at \$50 and suggests that municipalities consider waiving the fee. New York State also has a [Unified Solar Permit Toolkit](#) with step-by-step guidance and a model resolution that can be adopted by municipalities.

→ c. Permit Discounts

Permit discounts are designed to incentivize electrification retrofits during a limited period. If the permit discount leads to a decrease in permit revenue, this strategy may require city council approval.

Examples of Permit Discounts

St. Helena, California's [Energy-Friendly Permit Sale](#) is a time-limited incentive program that encourages property owners to reduce their carbon pollution through reduced permit fees for water heater/heat pump replacement, HVAC replacement, window/door replacement, EV charging stations, or solar PV and battery storage systems.

4. Zoning Laws

Zoning laws are rules and regulations applied to specific areas in a municipality, such as specific neighborhoods or commercial districts. Local governments can establish zoning regulations that require electric

heating and appliances in new buildings. Overlay districts and electric vehicle (EV) zoning codes are two proven tools at the disposal of local leaders. Both can serve to allow forward-looking neighborhoods to lead the way, in effect piloting electrification ideas that city leaders might later adopt city-wide.

→ a. Overlay Districts

Overlay districts are zoning tools that allow for land use regulations beyond the underlying zoning requirements in a specific area of a neighborhood within a municipality. These additional regulations, often tailored to specific goals of the community, lay over the existing zoning regulations and apply to all properties within the overlay district. Local leaders could use this as a tool for electrification, but requiring a higher level of building performance inside a certain zone. The impetus for the overlay may come from neighborhood residents, offering a way for local leaders to respond to eager constituents.

Overlay districts can serve as effective tools to promote environmental justice, by restricting or prohibiting the siting of identified polluting facilities within their boundaries.¹⁷ The New Buildings Institute (NBI) has developed model language for municipalities interested in adopting all-electric building overlay zoning codes.¹⁸ Overlay districts could also serve as a first step towards neighborhood electrification and gas decommissioning.

Examples of Jurisdictions with Overlay Districts

In **Northampton, Massachusetts**, the zoning code creates an overlay district requiring new buildings to meet certain requirements. Buildings 1,200 sq. ft. or less must have a Home Energy Rating System (HERS) rating of 47 or lower. Buildings larger than 1,200 sq. ft. must have a HERS rating of 41 or lower. Alternatively, buildings must be LEED New Construction Gold or LEED Neighborhood Development Gold certified. At least 20 percent of housing units constructed must be affordable housing. For an affordable rental unit, the monthly rent including utilities and parking cannot exceed 30 percent of the maximum monthly income permissible for an eligible household.

→ b. Electric Vehicle Zoning Codes

Electric vehicle (EV) zoning codes are regulations that govern the installation and use of electric vehicle

infrastructure. They define the requirements for charging station placement, design, and operation, aiming to support the adoption of electric vehicles. These codes address factors like location, permits, and integration into existing areas. They play a vital role in facilitating the growth of electric mobility. For a comprehensive list of EV readiness policies, please see the Mayor's Caucus checklist.¹⁹

EV-Installed spaces include everything needed for charging an electric car, including the infrastructure and the actual charging station. EV Installed parking space is ready to charge an electric car as soon as the building permit is approved.

EV-Ready spaces refer to both the infrastructure and a wired outlet. An EV Ready parking space allows for the electric car driver to simply plug their portable charger into the outlet.

EV-Capable spaces refer to installing the necessary infrastructure (like conduit, breaker space, junction box, etc.) in place for a future EV charging station installation but at the time of permitting, there is no requirement to install the charging equipment itself. The advantage of EV Capable stalls is that they allow for easy installation of a charging station, saving a significant amount of money and avoiding tasks like cutting and patching concrete or asphalt.²⁰

Depending on how your zoning ordinance is written, consider adding EV charging stations as an accessory use.

Examples of Jurisdictions with Electric Vehicle Zoning Codes

In 2019, the City of **San Luis Obispo, California** passed an ordinance mandating the installation of electric vehicle (EV) charging stations at all new developments. Going beyond the State of California building code, which initially required 2% of parking stalls to be EV-Capable in 2017, San Luis Obispo increased this requirement to 10% in 2020. The number of required spaces is dependent on whether the new development is multi-unit residential with five

or more units or non-residential (commercial, office, industrial mixed use) and the total number of spaces. One year after the ordinance was adopted there were 294 EV charging plugs approved—tripling the EV charging station count²¹

In 2020, the City of **Boston, Massachusetts** began to require approval from the Boston Transportation Department's TAPA or the Article 80 Large Project Review, there are specific requirements for parking spaces. They need to have 25% of the total parking spaces equipped with EV charging stations already installed, and the remaining 75% of spaces should be ready for future installation of charging stations. If a development project falls under TAPA or Article 80 review, they must ensure that 75% of their parking spaces are ready for Level 2 Chargers or similar charging services. If they plan to install chargers

other than Level 2 Chargers in the future, they need to use the City-approved EV Requirement Equivalent Calculator.²²

The City Council of **Portland, Oregon** unanimously voted to amend their zoning laws with an Electric Vehicle (EV) Ready Code Project, which went into effect in March 2023. All new residential and mixed-use buildings with five or more units and onsite parking must ensure 50 percent of available parking spaces have EV-ready infrastructure. Parking areas with six or fewer spaces must be 100 percent EV-ready. This ordinance surpasses the Oregon Department of Land Conservation and Development's administrative rule requiring electrical conduit and charging capacity options in urban areas to supply 40 percent of parking spaces in new buildings.

SECTION 2: FINANCING ELECTRIFICATION

Local budgets are often strapped. But local leaders have many options for leveraging a small amount of cash into a bigger private sector investment, or lending their credit-worthiness to back financing efforts.

1. Green Banks

Green banks are financial institutions that provide loans, grants, other types of financing, and technical assistance. Green banks enable the wide range of other financial mechanisms in this section, including energy savings performance contracts, efficiency-as-a-service, and funding retrofits or all-electric buildings pilots. **As of January 2023, there were 23 green banks in the United States, and many more are being created.**²³

Local green banks are often established by cities or local governments and commonly receive funding from state or local governments. In many cases, green banks are established as public-private partnerships with government support, allowing them to leverage

public funds to attract additional private investment. Cities or local governments often provide seed money, such as grants or loans, to establish a local green bank, covering initial costs like salaries, office space, and marketing. This funding attracts additional private investment, helping the green bank become self-sustaining and repay the initial seed money. Local green banks are primarily government-funded but may also receive support from private investors, philanthropic organizations, or other sources.

Green banks differ from government grants or tax credits as they loan to clean energy or energy-efficiency projects with an expected return on investment. Green banks leverage a relatively small amount of public funds to make these projects more appealing to private investors through low-interest

loans, green liberty bonds, credit enhancements such as loan-loss reserves and loan guarantees, and highly concessional finance.²⁴ State and local green banks in the US have demonstrated the effectiveness of this model, with 99.62% of loans repaid, making the model self-sustaining and creating value through profitable investments.

Examples of Green Banks

In 2018 the Montgomery County Green Bank became the first county-level green bank in the U.S. It's a 501(c)3 nonprofit dedicated to accelerating clean energy investment and partnering with the private sector to offer affordable financing for energy-efficient, climate-resilient projects in **Montgomery County, Maryland**. The Green Bank began with two lenders, a board, a management team, and contractors who brought the first commercial loan product to market. Since their inception, they've created a residential energy efficiency and renewable energy loan program, launched a technical assistance pilot for affordable rental housing owners to assess energy needs, and developed a \$600K community solar development pilot to benefit low- and moderate-income households. The Green Bank's funding comes from public and private sources to enable flexible lending and investment funds for County residents and businesses.

2. Energy Service Contracts

→ a. Energy Savings Performance Contracts

Local governments can use **Energy Savings Performance Contracts (ESPCs)** to cover the upfront cost of electrifying public buildings such as schools, community centers, and affordable housing. Under an ESPC, an energy service company (ESCO) puts up the capital to install energy efficiency retrofits and offers measurement, maintenance, repair, and upgrade services for an agreed-upon contract term, typically 15 to 20 years. An ESPC also sets out an energy savings threshold or performance guarantee. In return, building owners make regular payments — either fixed amounts or a proportion

of realized savings — to the ESCO to pay back the initial investment and for ongoing services. When the contract ends, building owners assume maintenance responsibilities for the equipment and can keep all energy savings going forward. ESPCs are a common strategy for local governments pursuing larger retrofits across multiple sites.

Examples of Energy Savings Performance Contracts

The public housing authority in **Rockford, Illinois** implemented a \$7.5 million, 15-year ESPC to reduce energy use across nine of its 11 housing developments. Rockford Housing Authority started by utilizing a HUD-provided template to create an RFP, then signing an Energy Performance Contract with an ESCO who conducted an energy audit and estimated project costs. RHA finalized the plan and submitted it to HUD for approval. RHA also provided training to local lenders to encourage their participation in financing the project.

Rockford Housing Authority saved a total of \$100,000 per year between 2014 and 2015 or an average of 13 percent of costs per building. The energy and water efficiency upgrades include a prominent rooftop solar array. Notably, the housing authority won multiple awards in 2017 for its resident engagement efforts to create a culture of energy efficiency and boost energy literacy.²⁵

3. Grants or Rebates

Local governments can use **grant or rebate programs** to provide financial assistance to developers or building owners that can help offset the upfront costs associated with transitioning to all-electric systems. Grant or rebate programs can also help encourage innovation and experimentation with new technologies and approaches to building electrification, which can help drive down costs and improve the efficiency and effectiveness of these systems over time.

Households that install electric equipment like EV chargers may need to upgrade their electrical panels.

New panels are safe and efficient — but also expensive. To help residents electrify their homes, cities can offer panel and wiring rebates paired with the installation of electric appliances such as heat pumps, EV chargers, and solar.

→ a. Electric Retrofit Rebates

Examples of Electric Retrofit Rebates

In October 2022, **Peninsula Clean Energy** began offering the [Appliance Rebate Program](#). Peninsula Clean Energy is a Community Choice Aggregator formed by San Mateo County and serving several Bay Area cities. The program offers a \$3,000 rebate toward an upgrade from a gas water heater to a heat pump water heater, a \$500 rebate toward an upgrade from an electric resistance water heater to a heat pump water heater, and a \$3,500 rebate toward an upgrade from a gas heater/furnace to a heat pump HVAC system. There are additional bonus rebates including \$1,500 toward an electrical panel upgrade and \$1,000 for CARE/FERA customers. The rebates can stack with regional rebates and federal incentives in the Inflation Reduction Act. In San Mateo County, Peninsula Clean Energy's Appliance Rebate Program is integrated with the BayREN Home+ program which offers rebates for energy efficiency and electrification upgrades to residents of the Bay Area's nine counties. This allows customers who work with BayREN contractors to apply for rebates from both agencies through BayREN's single application process.²⁶

In 2020, **Burlington Electric Department** (BED) [Green Stimulus program](#) launched to boost both the City's economic recovery from the pandemic and its transition to a Net Zero Energy city. BED is Vermont's largest municipality-owned electric utility, serving over 19,600 customers. The Green Stimulus program and its [local rebates](#) are funded from \$800,000 in carry-forward energy efficiency funds. Since its launch, residential cold climate heat pump installations have increased by approximately 20 times (as of January 2023). These local rebates provide up to 75 percent of the installed cost

on ductless mini-split heat pumps and a \$500 rebate for a second heat pump. BED incentives can be combined with state and federal incentives.

In 2022, Palo Alto Utilities in **Palo Alto, California** initiated a [Water Heater Upgrade Program](#), subsidizing the cost of water heaters with revenues from the sale of cap-and-trade allowances and the Utility Department's Electric Special Projects Reserve. The process begins with a free call to their Efficiency Advisor to determine if a heat pump water heater is the right pathway and answer other home energy questions. The program offered by the City of Palo Alto Utilities provides rebates to eligible residential customers who receive utility services from them. To qualify, individuals must pay residential rates for electric and/or gas utility services and complete an online application, which must be approved prior to purchasing the equipment. The rebate is specifically intended for the replacement of existing water heaters and does not apply to new construction projects. In order to receive the rebate, participants must select a new heat pump water heater (HPWH) that meets at least Product Tier 3 or a higher tier from the Northwest Energy Efficiency Alliance (NEEA) Qualified Products List. For those replacing a natural gas water heater, projects with final inspection permits dated on or after October 4, 2022, are eligible for a rebate of \$2,300. However, if the final inspection permit is dated on or before October 3, 2022, the rebate amount for replacing a natural gas water heater is \$1,500. Program participants can stack the city's incentive with the federal Energy Efficiency tax credit of up to \$2,000.²⁷

The Department of Water and Power in **Pasadena, California** offers a [\\$1,000 rebate](#) for electric panels upgraded to 200 amps or higher. To qualify for the rebate, households need to have a newly installed Level 2 EV charger or a heat pump water heater. Households can receive an additional \$500 if enrolled in the utility's income-qualified bill assistance program at the time of application submission.

Residents of **Denver, Colorado** can take advantage of a suite of Home Energy Rebates, including an

add-on electric service upgrade. Newly electrified households in need of a load capacity boost can use this rebate to help cover costs of a new electrical panel, associated wiring, or a new circuit required to install new equipment. The rebate covers 80 percent of the project cost up to \$2,000, and must be paired with another rebate – such as those for solar, EV charging, or a heat pump.

4. Tools to Raise Capital

Local governments may use tools such as loans, bonds, grants, and other financial instruments to secure funding for projects.²⁸

A local government can use **low-to-zero interest loans** for building electrification when they need to provide immediate funding for a project that requires upfront capital. These loans are often provided by green banks, economic development entities, and private climate finance companies and may have more flexible repayment terms compared to other financial instruments.

Green bonds are used by local governments to fund public infrastructure projects. They are often issued with fixed interest payments and are repaid over a longer period (e.g. 10 to 30 years). Local governments may issue green bonds when they need to raise large amounts of capital for long-term projects and tap into the growing pool of investors interested in climate-friendly projects.

Tariffed on-bill financing allows utilities to invest in electrification upgrades and collect repayment from utility bill charges. This approach is often used to expand access to electrification for renters and credit-constrained customers, as it does not require credit checks or building owner investment. Local governments may use this tool to provide low-cost, on-bill financing options to residents that spread the cost of upgrades out over time.

→ a. Zero-to-Low- Interest Loans

Low- to zero-interest loans offered by green banks,

economic development entities, and private climate finance companies can help finance all-electric building construction. These loans can also finance retrofits that upgrade to electric appliances, including but not limited to electric panels, induction stoves, and heat pumps.

Examples of Zero-to-Low- Interest Loans

Commercial Property Assessed Clean Energy (C-PACE) programs offer a low-interest loan model for electrification upgrades in retail, industrial, office, nonprofit, and multifamily buildings. Enabled by states and enacted by local governments, C-PACE programs fully finance the upfront cost of projects, often through green banks and third-party financiers typically provide the capital for PACE projects. Property owners save money with increased energy efficiency and pay off the loan through property taxes over an extended period of 15 to 20 years. Over 2,000 cities in the United States offer commercial PACE programs for businesses, nonprofits, and multifamily units, including nearly 140 of Connecticut's 169 towns and cities. Other C-PACE examples include Columbus, Ohio, and Atlanta, Georgia.

New York City's Green Housing Preservation Program aims to lower utility costs and greenhouse gas emissions in New York City's affordable housing sector. The program offers low- and zero-interest loans of up to \$50K or \$80K depending on project scope to small- and mid-sized building owners for energy efficiency work. Eligible efficiency projects include solar electricity, insulation, and heating upgrades.

In October 2022, Peninsula Clean Energy, a Community Choice Aggregator serving several Bay Area cities, began offering Zero Percent Loan program to homeowners in **San Mateo County** and the **City of Los Banos, California**. The loans are in addition to its substantial rebates for heat pumps, heat pump water heaters, and electrical panel upgrades (see the rebates section for more information). Their Zero Percent Loan program provides interest-free

financing up to \$10,000 per home for projects such as installing electric heat pump equipment, including water heaters and HVAC units. Gas-powered equipment is not eligible for this financing and the loan duration ranges from two to 10 years, with repayment made through monthly electric bills. No credit check is required, but customers must have a zero past-due balance on their previous three PG&E billing statements. Peninsula Clean Energy is a not-for-profit, community-controlled agency established in 2016 as a Community Choice Aggregation (CCA) program. It was formed by San Mateo County, along with all 20 of its cities and towns. In 2020, the City of Los Banos also joined the program.

→ b. Green Bonds

Green bonds function like regular municipal bonds, in which a city borrows money from investors to fund public infrastructure and pays down its debt with fixed interest payments. Green bonds are limited to projects with a positive environmental impact, like reducing carbon pollution. By issuing green bonds, local governments can tap into an expanding group of financiers prioritizing investments in climate mitigation projects which could include lowering the cost of electric building projects.

Examples of Green Bonds

Burlington, Vermont is using green bond revenue to finance efficient electrification without raising costs for ratepayers. In December 2021, Burlington voters approved the country's first Net Zero Energy Revenue Bond, which proposed to raise \$20 million over three years to help electrify the city. The Burlington Electric Department plans to use the funds in part to expand its Green Stimulus incentives for clean electric technologies like heat pumps, electric vehicles, and induction stoves. These rebates can stack with state and federal incentives. Notably, the Net Zero Energy Revenue Bond is designed to be cost-neutral: as customers use rebates to switch to electric appliances, they will purchase more electricity from the municipal utility, and the utility can in turn use the added revenue to pay down debt.

This financing strategy is a useful model for all local governments with municipal utilities.

The **Port of Los Angeles** has issued over \$50 million in green bonds since 2016. These bonds have supported renewable energy and green building projects, including a solar array at the World Cruise Ship Terminal, and a LEED-Gold certified port police headquarters building.

→ c. Tariffed On-bill Financing

Tariffed on-bill financing enables utilities to invest in electrification upgrades and collect repayment from utility bill charges. Tariffs are tied to a utility meter, not a resident, and do not require credit checks or building owner investment. Further, energy savings from the upgrade lower the cost of residents' utility bills, despite the charge. This is a great approach for expanding electrification access to renters and credit-constrained customers. Local governments and utility regulators may need to put forth legislation or regulations to support on-bill loan programs.

Boulder, Colorado submitted a tariffed on-bill financing program proposal from Xcel Energy, Colorado's largest investor-owned utility, for consideration by the Colorado Public Utilities Commission in 2023. Boulder, in partnership with the Building Electrification Institute, engaged a large coalition of stakeholders over multiple years to design an inclusive program that would meet the city's ambitious climate goals and serve lower- and moderate-income residents and renters.

→ d. Local Taxes

Local governments may place taxes on the sales of goods and services, utility usage, and others in order to pool and allocate revenue toward climate and electrification initiatives.

Denver, Colorado has a Climate Protection Fund, funded by a 0.25% rise in local sales and use taxes to be put toward climate change mitigation. This funding was approved by Denver voters through

Ballot Initiative 2A on November 3, 2020. The fund has an annual budget of \$40 million and aims to allocate over half of this fund to support communities disproportionately affected by the impacts of climate change. \$7 million of this fund is being put toward the [Building Electrification Pilot Program](#). The intent of this funding is to “demonstrate the feasibility and benefits of all-electric buildings with local examples, show the process of how all-electric buildings can be designed, built, and operated in Denver, and pair local examples with case studies and other resources to assist with the shift to all-electric buildings for new construction. This program is also intended to incentivize building owners to plan for electrification and make the switch to electric systems and appliances

before the building code requires them to.

In 2020, **Albany, California** passed a utility user tax increase measure through a ballot measure approved by voters. The tax is placed on natural gas, electricity, and telecommunication usage, with the electricity tax removed for low-income households. A third of this revenue is allocated toward carbon pollution reduction and climate change adaptation. One of the programs being funded by the tax revenue is a Heat Pump HVAC Rebate Program, launched in June 2022. Originally the budget for this program was \$40K but funding dried out in six months. In 2022, for the first time in Albany, CA, half of the HVAC systems installed were heat pumps.

SECTION 3: LOCAL LEADERSHIP

1. Climate Goals and Electrification Plans

If a city wants to take action on climate, the first step is to establish climate goals and create a climate action plan. To be most effective, the plan should include building electrification targets and offer detailed strategies that advance equity and lower carbon pollution. Plan content should be developed through an inclusive process informed by diverse community and industry stakeholders. Each strategy in the plan should include specific actions the city can begin to develop and implement right away. Consideration of equity, implementation, estimated costs, financial resources, potential partners, emissions impact, and timeline will help lawmakers prioritize strategies. Plans should prioritize the collection of electric use and consumption data, which will in turn improve planning for all electrification programs.

Plans should consider including the addition of local clean energy resources, such as local solar and battery storage, in order to improve local energy resiliency and reliability to meet new electrified loads,

while reducing the need for expensive grid projects. EV chargers should also be paired with local solar and batteries when possible, to reduce the impact on the electric grid.

Examples of Climate Goals and Electrification Plans

Longmont, Colorado's Electrification Plan was created after the city's establishment of a Climate Emergency. The locality had already established a Sustainability Plan in 2016, a 2018 City Council Resolution committing to 100 percent renewable energy by 2030, and a Climate Action Recommendations Report (which included Recommendation BE.2, Electrification, incorporating equity and housing affordability). The next step in Longmont's climate planning was a city-convened Building Electrification Feasibility Committee tasked with guiding and informing the planning process and the plan content. This committee focused on community and equity priorities, workforce considerations, communication strategies, and implementation details. The City's starting points for beneficial building electrification

include strategies for partnerships, policies, programs and financing.

In 2019 the **City of Alexandria, Virginia** declared a Climate Emergency and adopted its [Environmental Action Plan](#) (EAP) 2040. The plan aims to reduce greenhouse gas pollution by 50 percent by 2030, and 80 to 100 percent by 2050, with a focus on addressing local priorities. It includes order-of-magnitude cost estimates, impact analysis, and references to other documents for more detailed guidance and policy. The plan includes building electrification actions, including community deep-energy efficiency retrofit programs and the transition to electric power from fossil fuels for existing private buildings to achieve the city's mid- and long-term goals.

Ann Arbor, Michigan initiated its 10-year journey to a carbon-neutral future in 2020, outlined in its [carbon neutrality plan](#). The plan's third strategy is for all new construction to have net-zero carbon pollution between 2022 and 2030. [Some local developers](#) in small- and middle-scale housing developments are voluntarily implementing these recommendations. For example, a quadplex "passive house" apartment building in the Ann Arbor Old Fourth Ward neighborhood is designed to generate more on-site energy than it consumes. A 79-unit apartment building to be constructed on North Maple Street in Ann Arbor will solely rely on electric energy and geothermal heating, and 15 percent of units will be priced more affordably. The reduced cost of energy allows for more affordable units in the building while maintaining full electrification. In 2021, the **Salt Lake City** School District in Utah launched the student-led [Sustainability Action Plan](#). The plan requires that all school buildings transition from gas-powered equipment to electric by 2040. The first two schools undergoing retrofits begin construction in the summer of 2023.

2. Workforce Development Programs

The Heating, Ventilation, and Air Conditioning (HVAC) sector has limited familiarity with heat

pumps. As a result, customers face difficulties trying to find experienced contractors and installers. This creates a market barrier for heat pumps, and electrification more broadly. Addressing this problem will help facilitate building electrification and create family-sustaining jobs.

As much as possible, building electrification policies should include labor provisions that protect prevailing wages, create project labor agreements or labor peace agreements, include Buy American incentives or requirements, create best value procurement, create apprenticeship and pre-apprenticeship programs, preserve workers' collective bargaining agreements and rights, and/or prioritize hire for disadvantaged and displaced workers.

Examples of Workforce Development Programs

[RichmondBUILD](#) is a public-private partnership launched in 2007 by the **City of Richmond, California** aimed at providing workforce training in renewable energy or construction industries to local low-income households. Over 800 residents have been trained in the renewable energy and construction sectors. Almost all graduates are minorities (90 percent) and a significant proportion have a history with the justice system (30 percent). The program runs for 16 weeks and offers sector-specific training in carpentry, waste removal, and green-collar positions. Participants are required to complete an apprenticeship in carpentry, after which they can choose from various elective courses, including solar energy, energy efficiency, electrical wiring and theory, and eco-literacy. As part of the solar program, students assist in the installation of at least two solar energy systems for low-income homeowners financed by low-interest loans. The job retention rate for program graduates is 85 percent, with an average starting salary of over \$18.00 per hour.

The **City of Ann Arbor** partnered with Michigan Saves in 2022 for an [Electrification Badging program](#) to help homeowners find knowledgeable contractors in electrification, solar, and efficiency. Contractors must complete five training modules to earn the badge and can then offer exclusive energy financing

minimum of 10 percent of the project workforce are equity-eligible individuals.

The Energy Coordinating Agency, a nonprofit in **Philadelphia, Pennsylvania**, opened a [heat pump training lab](#) in May 2023. The new heat pump lab supplements ECA's existing HVAC training facility with heat pump systems from multiple manufacturers. Appliances in the lab include a heat pump clothes dryer, heat pump water heater, and numerous home heating and cooling systems, including ductless mini splits. The program aims to train 500 people each year — from high school students to experienced HVAC installers. The Philadelphia Energy Authority has committed \$100,000 to sending 30-40 individuals through the training program. ECA will also prioritize lower-income residents, Black and other people of color, women and the formerly incarcerated for training spots, as well as offer the courses for free to these groups.

3. Target Delivered Fuels

One of the highest-impact residential decarbonization actions local governments can take is switching to electric heat pumps from delivered fuels, like propane and heating oils. This swap improves indoor air quality and health outcomes while significantly lowering heating costs. **Switching to heat pumps from delivered fuels would save 87% of U.S. households money on their utility bills.** Local leaders should focus efforts on low- and moderate-income households dependent on delivered fuels.

According to [Atlas Building Hub](#), the U.S. Northeast Census Region is home to nearly 80 percent of all U.S. households reliant on fuel oil for space heating, and more than 90 percent of all U.S. households dependent on fuel oil for water heating. The price per gallon of fuel oil in November 2022 in New England was 67 percent higher than the year prior (<\$3.50 vs. \$5.50), sending energy bills skyrocketing. In the Mid-Atlantic states (NJ, PA, and NY), fuel oil prices per gallon that November increased 64 percent year over year (<\$3.50 vs. \$5.74).

→ B. Develop Fuel-switching Programs

Households that currently rely on fuel oil and propane for space and water heating can reduce pollution and save on their bills by switching to efficient electric heat pumps. Cities can offer targeted programs that make it easier and cheaper for low- and middle-income households to replace their fossil fuel furnaces and water heaters.

Developing Fuel-switching Programs

In 2023, **Seattle** City Council approved \$2.6 million in funding to convert homes using fuel oil for heating to convert to heat pump heating. The 2023/2024 budget allocates \$1.7 million to fully cover 125 low-income home conversions and \$800,000 for the rebate program to fund approximately 400 homes. Seattle's [Clean Heat Program](#) offers a \$2,000 instant rebate when households switch from fuel oil to a Mitsubishi Electric Heat Pump. Seattle's Office of Sustainability and Environment estimates that there are only about 10-12k homes in Seattle still heating with oil, whereas there were 18k households back in 2017. The office's goal is to assist in transitioning residents away from oil-based heating systems by 2028. Since the program was launched, the number of heating oil companies in the city has decreased from 5 to 2 and based on the program's progress, they anticipate that there will be no remaining heating oil used in Seattle by 2028.

→ C. Simultaneous Weatherization and Electrification

The federal Weatherization Assistance Program (WAP) has supported home upgrades since the 1970s. But WAP funds can't always be used for electrical upgrades, and homes with issues like faulty wiring, lead-based paint, or mold might be deferred. This makes it harder for low-income households with overlapping burdens to access the program. Local governments can address this gap by offering holistic, whole-home retrofits that weatherize and electrify homes at the same time.

Examples of Simultaneous Weatherization and Electrification

In 2021, the “[Built to Last](#)” program in **Philadelphia, Pennsylvania** launched its first pilot to deliver whole-home retrofits to 50 low-income homeowners — the program is now in its second pilot phase. Built to Last offers a benefits assessment, holistic property assessment, and streamlined construction management. Service providers can deliver energy efficiency, electrification, and solar where appropriate. This program is a strong fit for cities like Philadelphia, which has a high rate of home ownership (49 percent) and more than 60,000 homeowners living in poverty. With many old homes in need of multiple repairs, Philadelphia has over a 25 percent WAP denial rate.

The **Beneficial Electrification League (BEL)**, a national non-profit, is working with cooperative electric utilities across the U.S. to pilot joint weatherization and electrification for low-income homes. Launched in 2022, BEL’s [Weatherization/Electrification Together](#) initiative partners with electric cooperative utilities such as La Plata Electric Association in Colorado, Flint Energies in Georgia, and Anza Electric Cooperative in California. [Initial results](#) of their demonstration projects show that traditional weatherization combined with advanced metering, wiring upgrades, heat pump and induction stove installation delivered dramatically lower energy consumption.

In 2022, Elevate Energy, Project Home, and the Community and Economic Development Association of **Cook County, Illinois** received [\\$2 million](#) in DOE Enhancement & Innovation (E&I) funding to pair WAP-administered weatherization with building electrification. This “one stop shop” program plans to deliver retrofits to 900 low-income multifamily housing units across Cook County, Illinois and Dane County, Wisconsin. This project could serve as a model for deep energy retrofits in other underserved communities.

4. Local Government Procurement

Local governments can lead by example by using

their building management and purchasing decisions to walk the walk on electrification. Clean procurement makes government buildings and budgets healthier. It also accelerates the local market because there will be more experienced contractors, lower energy rates in many states, and possibly lower-cost equipment available as manufacturers and distributors are able to take advantage of economies of scale.

- To help electrify their operations and their communities, local governments can make the following procurement decisions:
- Electrify local government buildings, including offices, community centers, and, if applicable, schools and city-run affordable housing.
- Electrification efforts can include procurement requirements that ensure any government-owned building replacing a piece of fossil fuel-powered equipment does so with an electric machine.
- If the local government is already purchasing electric equipment for their buildings, they can expand their order to make a bulk purchase at a lower cost, then allow residents to access the equipment at the negotiated bulk rate.

→ a. Bulk Purchasing

Bulk purchasing, or buying a product in large quantities, reduces the cost per unit. Local governments can aggregate demand and negotiate with suppliers to get better prices for new technologies like heat pumps, then pass savings on to residents. Bulk purchasing campaigns can also increase awareness and adoption of new technologies and create economies of scale for installation and maintenance services.

Examples of Local Government Procurement

The **City of Portland, Maine** is using a [bulk purchasing program](#) to offer lower-cost solar panels, heat pumps, and electric vehicle chargers for homeowners and businesses as part of an initiative to lessen fossil fuel use. The 2021 “Electrify Everything” campaign began

as part of the city's goal to reduce community-wide greenhouse gas emissions by 80 percent by 2050. The city released requests for proposals to energy efficiency providers and solar partners soliciting discounted pricing for equipment in September 2021.

Localities in **Oregon** and **Washington**, including **Coos County, Bellevue, Issaquah, Kirkland, Mercer Island**, and **Redmond**, campaigned for heat pump collective purchasing through [Energized South Coast](#) and [Energy Smart Eastside](#). The groups have partnered with heat pump wholesalers and community organizations to offer heat pumps at a discounted rate. These programs offer rebates of \$500 to \$2,400 for heat pump upgrades to residents who attend a free, one-hour online workshop. Further, these rebates can be stacked with other incentive programs like utility rebates, state programs, and federal tax credits for heat pumps. The Eastside Climate Collective applied for a grant and received it, and is now administering it in partnership with the King County Housing Authority.

→ b. Procurement Requirements

Procurement requirements are policies that require local government agencies to purchase goods from specific sources. They exist to ensure that governments make purchasing decisions based on the public good. Clean procurement can increase demand for electrification technologies and promote their adoption. To spur building electrification, local governments may require agencies and contractors who do business with the city to purchase heat pumps and other electric appliances when older, fossil-fueled technologies need replacement.

Procurement requirements primarily influence the purchasing decisions of local governments and contractors who do business with them, but they also have spillover effects. For example, procurement requirements may increase local contractors' knowledge of and comfort with electric technologies, making contractors more likely to talk up the benefits of electrification with other customers. To maximize spillover benefits, local procurement decisions should include a focus on contractor training.

Examples of Procurement Requirements

In December 2022, New York's Governor released the first state-led green purchasing program for local governments. The program is administered by the Department of Environmental Conservation and the Office of General Services. All local governments in New York State are eligible to participate in the program if they update their policies to require purchasers to follow the state's GreenNY purchasing specifications and submit an application. GreenNY specifications for heating and cooling equipment cover air-source heat pumps, ground-source heat pumps, heat pump water heaters, and variable refrigerant flow systems.

→ c. Community Choice Aggregation

Local governments can use **Community Choice Aggregation** (CCA) to purchase and provide clean electricity to their residents and businesses while still relying on the existing power grid. CCAs allow a community to choose a higher percentage of renewable energy sources than the default utility provider offers. This boosts the climate benefit of every building electrification project because the power comes from a zero- or low-carbon mix. CCAs can also offer lower-cost power, which means a faster payback on investments in all-electric buildings. This can be especially beneficial for low-income communities that are often disproportionately impacted by high energy bills. CCAs should include local clean energy resources (ie. in-state). Otherwise, a CCA could rely on RECs and/or far-away, large-scale renewables.

Localities can reduce costs by utilizing the Clean Electricity Investment Tax Credit. The Clean Electricity Investment Tax Credit (CEITC) is available for any investment in a qualified facility and storage facility that is placed in service after December 31, 2024, and produces or stores electricity with a greenhouse gas emissions rate of zero.

Examples of Community Choice Aggregation

As of April 2018, the majority of **Contra Costa, California** residents are buying renewable electricity

from Marin Clean Energy (MCE), a not-for-profit clean energy provider. On March 24, 2020, the Board of Supervisors voted to go Deep Green with MCE, or 100 percent renewable, for the majority of the County's accounts. This decision went into effect for the County's 2021-2022 fiscal year budget and is expected to eliminate over 1,500 metric tons of carbon pollution each year. On January 18, 2022, the Board of Supervisors adopted its [All-Electric Building Ordinance](#) requiring new construction of all residential, hotel, office, and retail buildings to be all-electric. This process was cost-effective in part due to CCA. MCE and PG&E have teamed up to compare electric rates, monthly bills, and where electricity comes from for their customers. [A chart](#) illustrates how their rates and bills compare, as well as what types of energy sources are used to generate electricity for different types of customers. The chart shows that MCE Light Green (61 percent renewable) is slightly cheaper than PG&E rates, while MCE Deep Green is slightly higher.

1. See more information about codes here. This FEMA guide has a step by step process for jurisdictions to assess their ability to and/or pass model codes.
2. The Building Decarbonization Coalition's [zero-emissions buildings database](#) is an updated source of state and local building code changes for all-electric, electric-ready, and stretch codes.
3. See more information by visiting <https://www.energy.gov/scep/technical-assistance-adoption-building-energy-codes>
4. In California, Title 24 of the Code of Regulations sets the building code standards for all jurisdictions statewide. However, local governments can adopt more stringent requirements, which are known as reach codes. All energy efficiency-related reach codes must be proven to be cost-effective. All reach codes must go through a public process for approval. All reach codes must be re-approved with each Energy Code update (about every 3 years).
5. See information about Bay Area Reach Codes at <https://bayareareachcodes.org/>
6. See JD Supra website for more detailed information on the [California Restaurant Association v. City of Berkeley decision and its implications for other localities](#).
7. See more information about the 2023 ordinance by visiting <https://www.mwalliance.org/blog/new-construction-oak-park-will-now-be-all-electric>
8. This ordinance followed the adoption of Massachusetts' law aimed at promoting the adoption of fossil fuel-free codes for new construction and allows ten cities and towns to completely prohibit the use of fossil fuels in new construction and significant renovations. Each community must first meet the 10% affordable housing target mandated by state law.
9. See the [Results & Findings for the Single Family New Construction Cost-Effectiveness Study](#) and [Nonresidential New Construction Cost-Effectiveness Study](#)
10. For more information on the Municipal Fossil-Free Building Demonstration Program, visit <https://www.mass.gov/info-details/municipal-fossil-fuel-free-building-demonstration-program>
11. U.S. Department of Energy guidance on installing electric vehicle charging equipment in compliance with the Americans with Disabilities Act, visit the website here https://afdc.energy.gov/fuels/electricity_in_frastructure_ada_compliance.html
12. An example of this cost disparity between EVSE installations and retrofits can be found here https://www.peninsulacleanenergy.com/wp-content/uploads/2020/08/PCE_SCVE-EV-Infrastructure-Cost-Analysis-Report-2019.11.05.pdf
13. California's air quality management districts are unique in their ability to develop and enforce regulations tailored to local conditions. However, other states do have agencies responsible for managing air quality, such as state environmental agencies and departments of health. These agencies typically work in partnership with the Environmental Protection Agency to implement federal air quality regulations like the Clean Air Act and to monitor and report on air quality in their state. Some states also have regional air quality management agencies that are smaller than state agencies, but operate at a larger scale than local air quality management districts. These local, regional, and state agencies are responsible for addressing air quality issues and could look to California's zero-pollution standard as a model.
14. For more information, visit <https://www.cityofpaloalto.org/Departments/Utilities/Residential/Ways-to-Save/Water-Heater-Upgrade-Program>
15. See Marginal Revolution, [Why does home solar energy cost so much in the United States?](#), 2018.
See Andrew Birch, [How to Halve the Cost of Residential Solar in the US](#), 2018.
16. For more details about Pima County's success story visit: <https://www.energy.gov/eere/articles/eere-success-story-solarapp-rips-red-tape-approval-process-rooftop-solar-panels>
17. See more information here <https://law.lclark.edu/live/files/34365-regulating-natural-gas-in-oregons-buildings-a>
18. See the New Buildings Institute model language here: <https://new-buildings.org/resource/building-decarbonization-code/>
19. <https://mayorscaucus.org/initiatives/environment/becoming-ev-ready/>
20. See Charged Future's article from 2020 for more information <https://www.chargedfuture.com/ev-charging-station-ordinance/>
21. See Charged Future's article from 2020 for more information <https://www.chargedfuture.com/ev-charging-station-ordinance/>
22. See the 2020 Guidance Document for more details <https://www.boston.gov/sites/default/files/file/2020/03/EV%20Readiness%20Policy%20For%20New%20Developments%20%287%29.pdf>
23. Learn more about green banks from the National Caucus of Environmental Legislators issue brief: <http://www.ncelenviro.org/resources/green-banks-issue-brief/#:~:text=Currently%20there%20are%2023%20green.create%20a%20national%20green%20bank>.
24. Concessional finance refers to financial assistance provided at below-market interest rates or with more flexible repayment terms than traditional loans
25. For more information on Energy Service Agreements see <https://www.epa.gov/statelocalenergy/performance-contracting-and-energy-service-agreements#ref5>
26. For more information, see https://www.peninsulacleanenergy.com/wp-content/uploads/2022/09/Peninsula-Clean-Energy-Appliance-Rebates-Terms-Conditions_10.01.22.pdf
27. See [Rewiring America's Factsheet on 25C and 25D tax credits](#).
28. Note, additional financial mechanisms include using loan loss reserves and interest rate buy-downs. These mechanisms use a small number of public funds to make a big increase in access to private sector loans for building electrification projects. Either credit enhancement strategy makes all-electric building projects less risky for lenders, and more attractive and accessible to borrowers with lower credit scores and incomes. Loan loss reserves entail setting aside a pool of funds to cover a portion (typically up to 10 percent) of lender losses in the event a borrower defaults. Interest rate buy-downs are upfront payments to a lender that lower interest rates for a borrower hoping to electrify. A buy-down program's specific terms will depend on factors such as borrowing costs, loan size and duration, and project demand.
29. Note, Seattle's rebates are stackable with Inflation Reduction Act rebate programs.
30. Starting in 2023 and available across the country, federal tax credits and state-run grants will offer heat pump rebates of up to \$8,000 for low-income households (distributed by state energy offices and tribal governments). Higher income households will qualify for up to \$2,000 in tax credits for installing a heat pump.