



Electrification and Energy Codes Primer

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Background

Buildings make up almost 40 percent of global greenhouse gas emissions. Technologies that decarbonize our building stock can provide a massive opportunity to mitigate the impact of climate change and curb future emissions. Residential and commercial buildings are among the largest source of CO₂ emissions in the United States. This means there are large opportunities for emissions reductions and cost savings by pursuing energy efficiency together with electrification. A recent study found that meeting the US 2050 net-zero emissions goal would require a combination of renewables, demand-side solutions such as high-performance windows, and use of efficient electric equipment such as heat pumps; this could result in a reduction of annual power system costs by \$100 billion USD.¹

One critical aspect of decarbonization is ensuring all new buildings are prepared for electricity-powered equipment. An all-electric building does not have combustion equipment. Removing this equipment reduces exposure to harmful pollutants, improving indoor air quality. The concept of electric readiness and electrification is becoming popular in local and state-wide energy codes across the country and is being incorporated into future national model energy codes. For instance, the second draft of the 2024 International Energy Conservation Code (IECC) includes requirements for installation of new electrical branch circuits for future electric appliance installation near cooking products, household clothes dryers, and water heaters that are currently using fuel gas or liquid fuel.

Electric Readiness

Electric readiness means wiring homes or buildings to accommodate the installation of future electric equipment. This includes installing outlets near current water heating, appliances, and areas for modern technologies as well as having space on an electrical panel to accommodate future loads. A building subject to electric-ready codes functions as an intermediary between current needs and future electrification even if fossil fuel equipment is present. In addition, electric readiness offers homeowners protection against costly future electric panel retrofits.

¹ <https://buildings2050.lbl.gov/>



Components of a New All-Electric Home or Building

The following is a summary of the components commonly associated with a new all-electric home or building. For more information, refer to NEEP's brief on Electrification and Energy Codes.

- Electric clothes dryers
- Induction stoves and cooktops
- A dedicated EV charger or an EV-Ready parking space
- An on-site energy storage system (ESS), or a dedicated space and wiring for a future system
- A properly sized electrical panel that can accommodate a fully electric home or building
- Tight thermal envelope that can support space heating equipment

Challenges and Barriers

Grid Capacity: Electrification requires the electric grid having the capacity to manage additional load necessary to power homes. Technologies are emerging that reduce the strain on the grid, such as demand responsive controls and on-site energy production and storage.

Equity: It is important not to increase burdens in vulnerable communities when electrifying existing building stock. Electrification and energy efficiency measures must work together. Well-insulated homes reduce energy waste and can better accommodate new systems. This highlights the importance of expanding weatherization projects in these communities.

Initial Costs: Higher upfront costs can discourage builders from considering electrification in their projects. However, one national study shows that an all-electric new single-family home costs less to build and operate than a new mixed-fuel home.² In addition, incentives can help defray expenses.

- In Massachusetts, the All-Electric Home Incentive program from Mass Saves provides \$15,000 to \$25,000 to single-family homes that achieve a certain level of above code energy savings.
- The Energize Connecticut Residential New Construction All-Electric Home Incentive has a similar program that provides \$7,500 to \$10,000 to single-family home applicants.
- The federal Inflation Reduction Act (IRA) also extended the 45L Tax Credit through 2030, which provides \$5,000 to single-family homes that achieve the Department of Energy (DOE) Zero Energy Ready Homes Program requirements.

Electric readiness and electrification incentive programs must benefit everyone. Property owners must feel motivated to incur the upfront cost of electrifying and weatherizing so tenants can experience utility savings. This ensures equitable outcomes that benefit both tenants and property owners when making decisions on incentive programs.

² <https://rmi.org/insight/the-economics-of-electrifying-buildings-residential-new-construction/>



Examples of Electric Readiness and Electrification in Practice

Several states have already incorporated electrification provisions into their base or stretch energy codes.

Massachusetts currently has two above-base codes, the [Stretch Code](#), which has been adopted by at least 300 communities,³ and a more stringent [Municipal Opt-In Specialized Code](#) that, as of November 2023, has been adopted by 25 communities representing almost 24 percent of the state population.⁴ Some examples of electric readiness and electrification provisions include:

- The Stretch Code requires a minimum of 20 percent of parking spaces be wired for electric vehicles for business and residential space.
- The Specialized Code requires new homes over 4,000 square feet to follow the all-electric or zero energy pathway.
- The Specialized Code provides three pathways for commercial code compliance, and the simplest requires that all space heating, water heating, cooking equipment, and drying equipment is powered by electricity and meets minimum efficiency standards.

California has mandatory electric readiness requirements in its [2022 Building Energy Efficiency Standards](#).

Colorado developed a [Model Electric Ready and Solar Ready Code](#) because of [legislation](#) passed in May 2022.

Washington has provisions in the [Residential 2021 Washington State Energy Code](#) in Section R403.5.7 requiring heat pump water heaters and Section R403.13 requiring heat pumps for space heating. In the [Commercial 2021 Washington State Energy Code](#), Section C403.1.4 requires that *“heating energy shall not be provided by electric resistance or fossil fuel combustion appliances,”* and C404.2.1 also requires the use of a heat pump water heater.

Conclusion

It is expected that more states will adopt electric-ready or electrification provisions in their energy code in the coming years as funding from the IRA becomes available. By examining the steps to achieve electrification, the specific components of new all-electric homes or buildings, and the challenges associated with decarbonization, communities can better understand the opportunities ahead and make more informed decisions when updating their energy code. For more information, refer to NEEP’s brief on [Electrification and Energy Codes](#).

³ <https://www.mass.gov/doc/stretch-code-adoption-by-community-map/download>

⁴ <https://www.zerocarbonma.org/resources>