



## BUILDINGS DEEP DIVES

# Building Codes and Standards

## Overview

Federal policymakers have a critical role to play in support of individual states' building policies. In particular, the Department of Energy (DOE) and other federal agencies should develop standards and approaches that can drive new construction to zero emissions as quickly as possible. They should also provide technical guidance and funding support to states as they implement performance standards for existing buildings.

## Policy Principles

**Model Building Codes:** New residential and commercial buildings must be built to zero-emissions standards as soon as possible, so that we don't lock in inefficient operations for decades. Zero-emission buildings (also called net-zero-carbon buildings) are high-performance structures that use integrated energy-saving solutions and produce or procure at least as much renewable energy as they consume from emissions-producing sources every year. While the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) and the International Codes Council have typically developed model building codes, DOE should advance model codes as well and standardize technical guidance to facilitate their adoption by states and localities.

Along with prioritizing deployment in low-income and historically disadvantaged communities, a national zero-emissions model code for new residential and non-residential buildings (differentiated by building type and climate zone) should incorporate the following key elements:

- Prescriptive and performance pathways that require sufficient levels of energy efficiency to achieve zero emissions, after the inclusion of renewable energy and other measures. Prescriptive standards set forth specific requirements for building envelopes, HVAC systems, water heating, power, lighting, energy storage, and other equipment. Performance standards should be based on federally developed carbon intensity (CI) targets by building type and climate zone in lieu of traditional energy-use intensity (EUI) targets. This could be facilitated by the creation of a "CarbonStar" program and rating system akin to EnergyStar, based on life cycle assessment data.



- Electrification criteria for new construction, with technical guidance on climate-specific electric systems and appliances for all end uses, including heating and cooling, hot water, clothes drying, and cooking. Guidelines should prohibit on-site combustion of fossil fuels in buildings as well as associated hookups.
- Renewable-energy requirements, which can be differentiated for states that have 100 percent clean electricity targets and states that do not. For the former, all-electric requirements will eventually be enough for new buildings to achieve net-zero emissions, but model codes can incentivize building-level renewable energy in the interim. For the latter, model codes should include requirements for on-site renewable energy generation and off-site renewable energy procurement sufficient to meet or exceed the emissions-producing energy the building consumes. Off-site procurement requirements should support local demand for clean energy (via green tariffs or community solar, for instance).
- Electric vehicle (EV) charging infrastructure requirements for single-family residential (e.g., one EV-ready parking space), with standardized EV requirements and ratios differentiated for other building types (e.g., multifamily, hotel, commercial) to support current and future EV adoption at scale.
- Demand-side flexibility standards for certain appliances (such as heat pumps or EV chargers) that automatically shift loads to times of renewable generation and/or other grid signals. These standards would help align the supply and demand of renewable energy and improve grid stability.
- Low embodied carbon materials requirements that seek to reduce emissions from the supply chain of building materials: mining, manufacturing, and transport, for example. These requirements should include caps on allowable embodied carbon for different materials or building types.
- Support for code compliance at all levels via expanded training, educational platforms, and credentials for design and construction professionals, and/or funding support to states for such purposes.

**Existing Building Emissions Standards:** Because on-site building energy use and building electricity consumption are responsible for 31 percent of all emissions in the U.S., and because an estimated two-thirds of today's buildings will still be standing by mid-century, we must increase the pace and scale of retrofits for efficiency and electrification, specifically in low-income and historically disadvantaged communities. Existing building emissions standards establish decreasing limits for annual operational emissions from larger commercial and multifamily buildings. Using emissions-based rather than energy-based standards can further accelerate electrification as the power supply becomes cleaner.

The DOE can standardize technical guidance and federal policymakers can allocate funding to support policy implementation at the state or local level by:

- Directing DOE to develop carbon emissions intensity targets (kgCO<sub>2</sub>e/sf/yr) by building-use type and climate zone for commercial and multifamily buildings through 2050 to facilitate state-level policy development.



- Directing DOE to develop technical guides to support implementation and achieve emissions targets, including prioritized climate-specific efficiency and electrification retrofit strategies by building-use type.
- Directing EPA to develop functionality within its EnergyStar Portfolio Manager software to automate the conversion of energy-consumption data (by fuel type) into emissions, accounting for local or regional electricity mix emissions factors as well as time-of-use emissions where possible, to streamline and standardize reporting processes.
- Providing funding support to states implementing emissions standards, including early adoption incentives and funds to help building owners pay for retrofits.