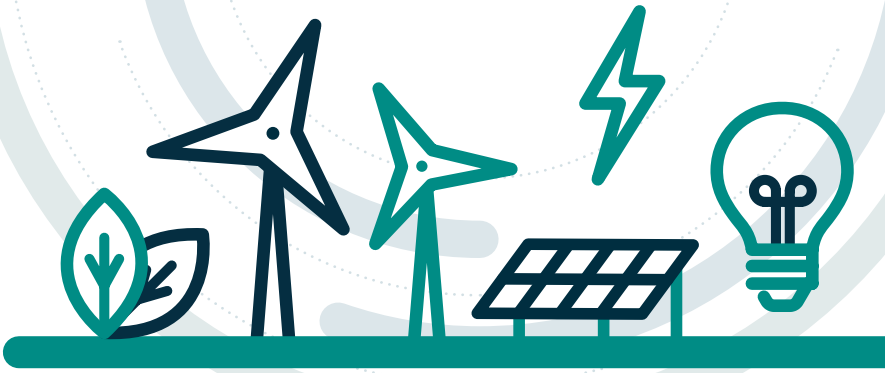
IMT
INSTITUTE
FOR MARKET
TRANSFORMATION



PART I

Code Adoption Toolkit

The Code Adoption Toolkit is intended to encourage and support those interested in energy code adoption. Whether you are just starting out, creating your plan to actively participate, or seeking more information to become an expert, the Toolkit can help. It contains a wide variety of resources including topic briefings, templates, and interactive tools.

Part I: The Basics

Introduction to Building Energy Codes and Standards

Building energy codes are essential to saving energy and protecting health and safety in buildings. Buildings account for 74% of electricity consumption in the U.S. and are responsible for a third of greenhouse gas emissions. Constructing to modern, stronger energy codes can result in buildings that are more efficient when compared to buildings constructed to an older code. Efficient buildings can save money, improve air quality, reduce stress on the grid, and improve energy security. Energy codes, a subset of building codes, set minimum energy efficiency standards for building technologies and design elements. They are the foundation for a quality building stock that protects residents and tenants and reduces emissions and operating costs.

The Department of Energy (DOE)'s Building Energy Codes Program (BECP) provides a **Codes 101** overview which introduces the model commercial and residential building energy codes in the U.S. By statute, the model commercial energy code is **ASHRAE-90.1**, and the model residential energy code is the **International Energy Conservation Code (IECC)**. These are referred to as "model" codes because there is no national code in the U.S.; each state or jurisdiction adopts their own code, which is often based on these model codes. Both ASHRAE 90.1 and the IECC are updated every three years through a standards committee process.[1] While **ASHRAE-90.1** is the official commercial code, many jurisdictions adopt the commercial version of the IECC instead, which references **ASHRAE Standard 90.1** as an alternative compliance path. Publication of the latest IECC code follows behind the latest ASHRAE standard by two years.

The International Code Council (ICC)

The **ICC** is responsible for coordinating the development of model codes and standards, such as the International Energy Conservation Code (IECC), which is part of a **suite of codes** that also includes the International Building Codes (IBC), the International Mechanical Code (IMC), the International Fire Codes (IFC), and the International Plumbing Code (IPC), among others. Nearly all 50 states reference the International Codes, with the adopted version **varying by state and also by code**.

ASHRAE

ASHRAE – form erly the American Society of Heating, Refrigerating and Air-Conditioning Engineers – and its members focus on the areas of building systems, energy efficiency, indoor air quality, and sustainability as they pertain to these fields. ASHRAE conducts research, provides continuing education, and writes standards, such as ANSI/IES/ASHRAE Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

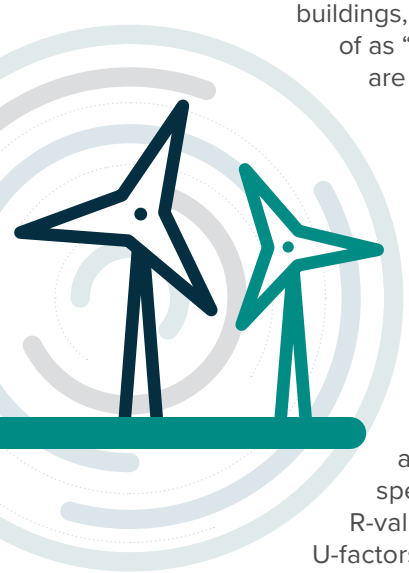
Residential vs. Commercial Codes

The IECC is split into two major subcomponents: residential buildings and commercial buildings. Both are laid out with the same general sections including:

- Scope
- Definitions
- General requirements
- Energy efficiency provisions
- Requirements for existing buildings
- Referenced standards, and
- Appendices

1 Until the 2024 development cycle, the IECC was updated through a governmental consensus process. In 2021, the ICC Board voted to shift the code development to a committee process.

The residential code covers detached one- and two-family dwellings, townhouses, and other residential structures three stories or less, such as apartments, long-term care facilities, and dormitories. All other buildings that do not fall under the residential classification are considered commercial buildings, including those typically thought of as "residential" (e.g. apartments) that are over three stories.



Energy Code Scope

The energy code establishes minimum efficiency provisions in building components and systems such as the building envelope (i.e. walls, windows, and roof); mechanical systems (i.e. heating, ventilation, and air-conditioning, or HVAC)[2]; electrical, power, and lighting; and service water heating. It spells out the minimum insulation R-value and maximum assembly U-factors of a building, outlines HVAC system requirements, sets lighting power density allowances, and provides water piping and insulation requirements. Requirements vary by climate zones reflecting how energy use is affected by geographic location.

While building codes primarily apply to new construction, they also come into play when an existing structure is significantly altered, such as during a renovation, or a major piece of equipment is replaced. The energy code addresses how to maintain a building in accordance with the code and how additions, alterations, repairs, and changes of occupancy must be handled.

The IECC includes appendices that contain provisions for solar capacity and requirements for net zero construction. While these are not necessarily adopted as part of the base code, some jurisdictions may choose to include them to help achieve local goals.

Code Compliance

Energy code compliance typically follows one of two paths: prescriptive or performance. The prescriptive path requires that materials and equipment meet specific requirements, with little flexibility. The performance path requires energy modeling to show that the proposed building uses the same or less energy annually compared to a similar reference building that just meets the minimum requirements for all components. The performance path is more complicated and expensive than the prescriptive, but provides flexibility, especially for larger, more complex buildings.

The Case for New Codes and Energy Efficiency

Adopting an updated energy code can provide diverse benefits when compared to older codes, including lower energy costs, improved comfort and health, reduced emissions, and improved community resilience. Adopting a new code can minimize the unpredictability of utility bills and save residents and tenants money.[3] For homeowners, utility bills are typically the highest cost of homeownership after the mortgage and the most unpredictable. Building to the residential 2021 IECC can cut annual home energy costs by nearly 9% on average compared to the 2018 version, and if the current version of the code is older than the 2018, the savings will be even greater. The added construction costs associated with energy efficiency requirements in the energy code are recouped by monthly energy bill savings in just a few years, and after that, positive cash flow from energy bill savings will return to the owner for the rest of the home's life.[4]

The indoor environmental improvements that arise from adopting stronger residential energy codes can improve health by reducing symptoms of asthma and allergies, helping prevent temperature-related mortality, and improving mental health conditions.[5] Additionally, energy codes are an essential component of community resilience strategies as they develop a building stock that is more durable, minimizes grid impacts, and enables tenants to shelter in place longer during extreme weather events.[6]

The cost benefits of energy efficiency in commercial buildings have been well-documented.[7] DOE determined that the 2019 version of ASHRAE Standard 90.1 would save approximately 4.3% compared to the

2 HVAC and water heating system efficiency is dictated by federal statute, and the code cannot require systems that exceed those levels. https://www.energy.gov/eere/buildings/about-appliance-and-equipment-standards-program

3 Salcido, V. Robert, et al. Energy Savings Analysis: 2021 IECC for Residential Buildings. PNNL, 2021. https://www.energycodes.gov/sites/default/files/2021-07/2021_IECC_Final_Determination_AnalysisTSD.pdf

4 ICF. Cost Effectiveness of the Residential Provisions of the 2021 IECC. ICF, 2022. https://energyefficientcodes.org/wp-content/uploads/2022/05/ICF-2021-IECC-Cost-effectiveness-Analysis.pdf

5 Burgess, Chris and Nicole Westfall. Documenting the Expanding Benefits of Strong Energy Codes. MEEA, 2020. https://www.mwalliance.org/sites/default/files/meea-research/documenting_the_expanding_benefits_of_strong_energy_codes.pdf?current=/taxonomy/term/11

6 ICC. The Important Role of Energy Codes in Achieving Resilience. ICC, 2019. https://www.iccsafe.org/wp-content/uploads/19-18078_GR_ANCR_IECC_Resilience_White_Paper_BRO_Final_midres.pdf

7 IEA. Multiple Benefits of Energy Efficiency. Paris: IEA, 2019. https://www.iea.org/reports/multiple-benefits-of-energy-efficiency

2016 version[8], with over 50% savings since the 1975 version[9] . In addition to monetary benefits, requirements for better insulation and reduced air leakage, for example, can promote better indoor environmental quality and increased occupant thermal comfort in office spaces, contributing to greater worker productivity.

Newer energy codes can support decarbonization efforts by lowering energy use and creating a path to all-electric buildings, preventing major equipment and appliance replacements down the line. Requiring all-electric, or electric-ready, provisions in the energy codes ensures that they are added at the time when they are least costly to install, at construction.

Code Adoption

The process to adopt building codes varies from place to place. The starting point is always the jurisdiction's existing code and the designation of an administrator authorized to make modifications to that code. The administrator is determined through one of three basic approaches:

1. The state legislature adopts a code through legislation,
2. State legislation empowers a council working with a governmental body to develop and maintain the building code, or
3. State legislation empowers local jurisdictions to develop and maintain building codes.[10]

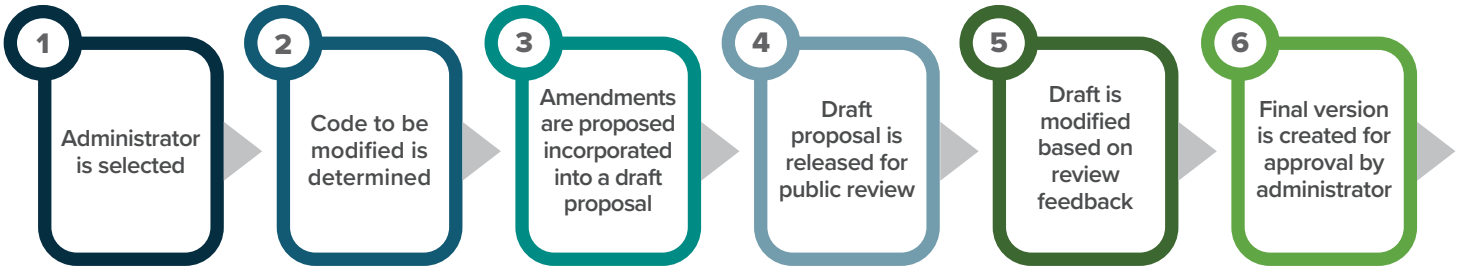
Figure 1 demonstrates the basic code adoption process. Though different jurisdictions may have variations to this process, the general structure remains the same. First, unilaterally or through public discussions, the administrator decides whether to only consider modifications to the existing code or to consider the adoption of a new code (in almost all cases meaning a newer version of one of the model codes). State or local government officials and/or appointed committees review either the existing or the model codes and suggest amendments to create a draft code proposal. In most cases, members of the public can also suggest amendments to the officials or committees. The draft undergoes a public review process, and is updated based on that feedback. Once a final draft is created, it is reviewed by the administrator. In some places the administrator has the authority to approve the code while in others it must go back to the legislature for final approval. Once approved, the code becomes law.

Within the above process, there is no guarantee that better codes will be adopted. Many jurisdictions simply choose not to run the process at all so the codes are never or rarely updated. If the process does occur, opponents can successfully impose weakening amendments. Ensuring that the energy code is consistently updated and enforced is essential to improved efficiency and reducing emissions. Constant and progressive code adoption is a foundational step to meeting climate action goals.

Home Rule, Dillon's Rule, and the Grey Space in Between

The terms "home rule" and "Dillon's rule" denote who holds authority over regulations and policies. As they relate to building codes, a home rule state is one where the local government has the ability to adopt and enforce code.[11] Under this scenario, a few variations are common:

Figure 1: Code Adoption Process



8 Office of Energy Efficiency and Renewable Energy, Department of Energy. Final Determination Regarding Energy Efficiency Improvements in ANSI/ ASHRAE/IES Standard 90.1–2019. DOE, 2021 https://www.govinfo.gov/content/pkg/FR-2021-07-28/pdf/2021-15971.pdf

9 Williams, Jeremy. "Updates from the Building Energy Codes Program". 2021 National Energy Codes Conference, July 21, 2021

10 Cohan, David. How Are Building Codes Adopted? DOE, 2016. https://www.energy.gov/eere/buildings/articles/how-are-building-codes-adopted

11 National League of Cities. Cities 101 — Delegation of Power. https://www.nlc.org/resource/cities-101-delegation-of-power/

there may be a state building code in place, but it is only applicable to state-owned buildings; a state code may be in place and enforced if a local jurisdiction has not chosen to adopt their own code; or the state gives the local jurisdiction complete control over whether to adopt a code, when to adopt it, and what code they choose to adopt. Home rule states value local control and assert that localities should be able to adopt the code that best fits their needs.

Dillon's rule states retain code adoption power at the state level. Often this establishes either a minimum or maximum code requirement that cannot be exceeded by a local jurisdiction. There is significant variation as to how these "rules" are applied. Functionally, most states have a hybrid of home rule and Dillon rule. As a general rule, for purposes of building codes, states with no statewide code are classified as home rule and states with a statewide code are considered Dillon rule states. Figure 2 shows the states by category: Home Rule, Dillon's Rule where only a minimum is established, and Dillion's Rule where both a minimum and maximum code stringency are set.

Understanding the rules under which your state or city operates is essential to understanding and participating in the code adoption process.

Figure 2: Home Rule, Min, and Min/Max States