

Colorado's Energy Code Environment: Drive by Legislation, Community Desires, and the Need for Change

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Abstract

As Colorado considers its climate future, lawmakers, community members, and local jurisdictions with climate goals recognize the need to stretch toward measures that dramatically reduce greenhouse gas emissions in buildings. In recent years, the state has enacted laws that set minimum energy code requirements that must be adopted by local jurisdictions when updating other building codes, which reshape the landscape for energy codes in a home rule state. For some, adoption of the state's recently developed *Colorado Model Electric Ready and Solar Ready Code* and *Colorado Model Low Energy and Carbon Code* is a good first step toward improving efficiency and lowering carbon emissions; for others, aspirational local climate goals demand further measures.

Jurisdictions across Colorado have taken different approaches to build upon state efforts and drive even greater progress. One such example is the City of Fort Collins, which has developed a performance-based energy code to reach zero carbon new construction by 2030. This approach aligns with the city's Our Climate Future plan, which aims to cut carbon emissions 80% from 2005 levels by 2030. This paper explores ways to raise the floor of state-level energy codes while empowering local jurisdictions to go further with innovative decarbonization strategies for new homes and buildings. These efforts aim to inspire broader adoption in the future.

Introduction and Colorado Context

At the state level, Colorado is relatively new to energy codes. Colorado is a home rule state, with nearly 350 local municipalities and counties that have the authority to adopt and enforce building codes. Historically, these local jurisdictions have had full autonomy to determine what, if any, building and energy codes they adopt, with a few notable exceptions. The state adopts the latest versions of the National Electrical Code, the International Plumbing Code, and the International Fuel Gas Code on regular cycles, which apply statewide regardless of local adoptions, as well as codes that regulate the safety of escalators, elevators, and other conveyance systems. Because of this local authority to adopt and enforce building and energy codes, Colorado has a significant patchwork of adopted codes across the state (see Figure 1).

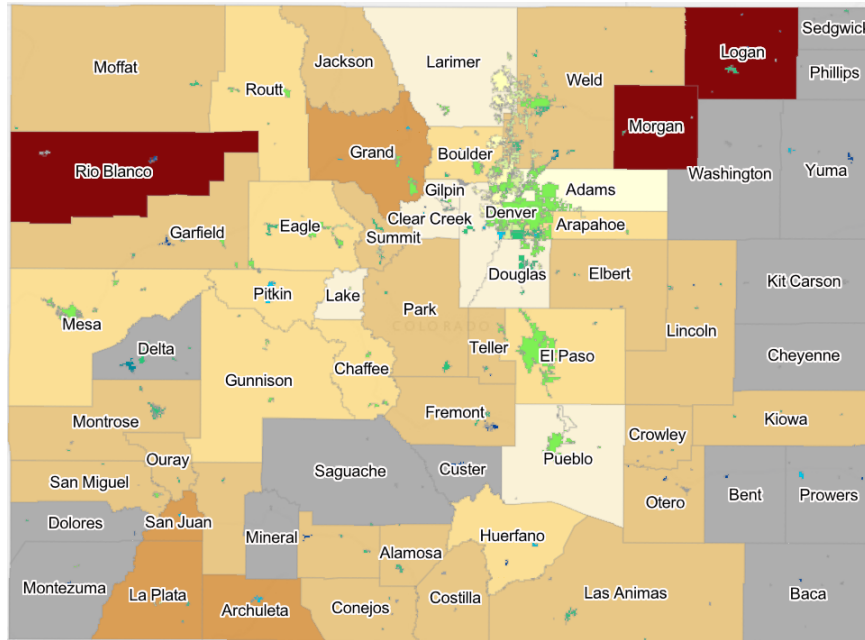


Figure 1. A map of Colorado's counties and municipalities demonstrating the adopted energy code in each jurisdiction. Jurisdictions with no energy code are depicted in gray. Jurisdictions with energy codes are depicted in varying color shades, with the oldest energy codes depicted in darker colors, and newer energy codes depicted in lighter colors.

In 2019, the Colorado General Assembly passed the first statewide minimum energy code requirement, which directed any municipality or county that updated any of their building codes after the legislation became law to adopt their choice of the three most recent editions of the International Energy Conservation Code (IECC). In 2021, the Colorado Energy Office and several other state agencies published the state's first Greenhouse Gas Pollution Reduction Roadmap (GHG Roadmap), which identified buildings as one of the five largest sources of greenhouse gas pollution in the state. This roadmap established actions for each of the five sectors, including the buildings sector, to achieve net-zero emissions by 2050; adoption of energy codes that advance energy efficiency and emissions reductions was one of the primary actions for the buildings sector. (State of Colorado 2022) In response to the GHG Roadmap, the General Assembly updated the statewide minimum energy code in 2022 to require newer energy codes, which would be developed by the state, to be adopted by municipalities and counties updating any other building code. This updated energy code requirement superseded the 2019 law.

Colorado faces a number of significant challenges in developing a statewide energy code, including: 1) four unique climate zones represented across the state (4B, 5B, 6B, and 7) that have different needs and for which there are a wide range of technological solutions; 2) a combination of dense urban areas in the Denver metropolitan area and along Colorado's Front Range and Western Slope, sparsely populated rural areas in the Eastern Plains and southern mountain regions, and mountain resort communities with significant winter recreation economies and extensive wealth; and 3) a housing affordability crisis that is impacting communities across the state.

In response to these challenges, the state has had to take a realistic approach to advancing energy codes in a way that addresses the unique needs of different communities across the state

while continuing to make progress on improving energy efficiency and reducing greenhouse gas emissions. The Colorado Energy Office has established partnerships across local governments, industry, and non-governmental organizations to evaluate viable strategies to advance energy efficiency in a cost-effective manner, promote electrification and electrification readiness as appropriate, and maintain or reduce lifecycle housing costs.

Colorado State-Level Energy Code Strategy

Colorado has established ambitious targets for reducing economy-wide greenhouse gas emissions reductions to achieve net-zero emissions by 2050. Because buildings were identified as one of the five largest sources of emissions in Colorado, building energy codes have been a primary policy lever for the state to use to reduce emissions from the built environment. This work accelerated with the passage of House Bill 22-1362, which directed the Colorado Energy Office and the Colorado Department of Local Affairs to convene an Energy Code Board to develop new statewide energy codes for Colorado. The legislation further directed local municipalities and counties updating any of their building codes after July 1, 2023 to adopt the 2021 edition of the IECC for both residential and commercial buildings along with a state model code providing for electric ready, solar ready, and EV ready provisions. Beginning July 1, 2026, any municipality or county updating any of their building codes must adopt a new state low energy and carbon code.

Energy Code Board

Convened under the directive of HB22-1362, Colorado's Energy Code Board ("the Board") is the body responsible for developing and approving new state minimum energy code requirements for adoption by local jurisdictions. The Board is made up of 21 members representing a wide range of interests in the buildings and energy sectors, including homebuilders and developers, local building officials, energy efficiency and renewable energy experts, architects, engineers, electrical and plumbing professionals, and environmental experts. Additionally, the Board represents a broad range of geographies across Colorado, with nearly every major region and every climate zone having at least one representative, ensuring a diverse set of economic, political, and climate perspectives are reflected in the state's code development process.

The Energy Code Board is responsible for all aspects of the state's energy code development process, including proposing amendments to the national model energy codes and previous state minimum energy codes, facilitating stakeholder engagement and public comment, and approving the final code to be adopted. This process was established to guarantee a robust development of the state's energy code that reflects diverse needs and perspectives of local governments and industry across the state.

State Goals for Model Energy Code

To navigate the challenges of developing an energy code at the state level in a home rule state, the state had to establish particular interests of statewide concern to justify developing and requiring a statewide energy code. Through the development of the authorizing legislation, and the code development itself, three main statewide interests were identified: 1) reducing greenhouse gas emissions from the buildings sector; 2) maintaining or improving housing

affordability; and 3) promoting greater consistency in code adoption and enforcement across the state. From these three statewide interests, the Colorado Energy Office and Colorado Department of Local Affairs established four goals to guide the development of the state minimum energy code.

Goal #1: Reduce greenhouse gas (GHG) emissions from new construction and major renovations by enhancing energy efficiency and encouraging electrification of buildings and transportation.

Electrification of new buildings, and ensuring that new buildings are equipped to support the deployment of electric vehicles and other transportation solutions, are primary goals for the state to reduce emissions from both the buildings and transportation sectors. Approximately 21 percent of all GHG emissions in Colorado come from on-site combustion of natural gas and other fossil fuels in residential, commercial, and industrial buildings, while an additional 25 percent come from transportation-related activities. (CDPHE 2026) Therefore, it was a priority to ensure that the state minimum energy code effectively encouraged electrification of buildings where appropriate, while maintaining viable compliance options for high efficiency mixed fuel buildings. It was also a priority to build in infrastructure to support current and future electric vehicle (EV) charging in new and majorly renovated buildings.

Goal #2: Ensure that the state energy code minimizes upfront costs and maximizes long-term cost savings as much as possible to maintain or improve housing affordability.

It was a high priority for the Energy Code Board to consider the upfront cost implications of different measures of the IECC and any proposed amendments to that code and minimize those upfront costs where possible, particularly for the residential sector. This priority was emphasized by a number of prominent stakeholders in the process, most notably the homebuilding industry, due to concerns over housing attainability and the ability for middle class Coloradans to access housing to take advantage of the energy efficiency benefits. Concurrently, it was necessary to evaluate the lifecycle costs associated with different energy code measures to balance the need to minimize upfront costs while ensuring long-term cost savings from energy efficiency and decarbonization measures to maintain affordability over time and minimize energy bills for Colorado residents.

Goal #3: Support development and adoption of a code that has applicability statewide and can promote consistency in adopted energy codes across the state.

As previously noted, Colorado's home rule structure has led to an increasingly disparate landscape of adopted building and energy codes across the state. This has created significant challenges for compliance with adopted codes, with builders, developers, contractors, and design professionals being forced to design and build to distinctly different codes within the regions they serve. By establishing a statewide energy code that has applicability for all areas of Colorado, the state intends to foster greater consistency in adopted codes across jurisdictions and regions to ease compliance challenges.

Goal #4: Support local governments that want to go above and beyond state minimum energy codes in a way that is as consistent with state interests and strategies as possible.

While the state has established a minimum energy code for local jurisdictions to adopt, it is a high priority to empower local jurisdictions to adopt energy codes that exceed state minimum

requirements. Because of this, it was important to develop a statewide model code that has pathways for local governments to easily strengthen the requirements of the code without changing the fundamental structure or approach. For example, by incorporating consistent performance-based pathways, it is possible for jurisdictions to simply adjust performance targets to be more stringent than the state code while maintaining consistency with the structure of the code.

Model Energy Codes

At the state level, Colorado has developed two model energy codes: the *Colorado Model Electric Ready and Solar Ready Code (MERSRC)* and the *Colorado Model Low Energy and Carbon Code (MLECC)*. Each of these codes was developed with the intent to improve energy efficiency, enable greater GHG emissions reductions, and balance cost with progress.

The *MERSRC* is fundamentally a “readiness” code, with requirements focused on preparing new homes and buildings for future high-efficiency electric appliances and equipment for space heating, water heating, cooking, and clothes drying, future rooftop solar, and future electric vehicle (EV) charging. This approach is effective in preparing new homes and buildings to electrify appliances and add EV charging at a fraction of the cost of retrofitting these buildings down the road. The code addresses readiness through a number of pre-wiring requirements, where conduit, wiring, receptacles or junction boxes, circuit breaker space, electrical panel capacity, and sufficient physical space (rooftop space and structural capacity for solar or locations for electric equipment) is provided to ensure an easy and cost-effective transition to electric and renewable energy technologies with minimal retrofit to the existing building. As such, the code was designed as an add-on to the International Energy Conservation Code, rather than a full replacement of the energy code. While much of the code is original material developed by the Energy Code Board, some material for the solar ready portion of the code was modeled off of the IECC’s Appendices RB and CB. Published in June 2023, the *MERSRC* is part of Colorado’s minimum energy code requirement, along with the 2021 IECC (or 2024 IECC), when any local jurisdiction updates any of its building codes between July 1, 2023 and June 30, 2026.

Unlike the *MERSRC*, the *MLECC* is Colorado’s first comprehensive energy code developed by the Energy Code Board. It is intended to entirely replace the national model energy code, rather than acting as a supplement like the *MERSRC*, though it is foundationally based on the 2024 IECC. From the statutory directives in HB22-1362 to maximize GHG emissions reductions consistent with maintaining housing affordability, the Energy Code Board evaluated amendments to the 2024 IECC that would drive greater energy efficiency and encourage electrification where appropriate, while addressing challenges unique to Colorado and eliminating or simplifying elements of the code where possible. Based on this approach, the Board identified several key changes that were incorporated into the *MLECC*. These include:

1. **Fuel debiasing and encouraging electrification** - Early on in the development of the *MLECC*, the Energy Code Board determined that the IECC does not provide equal compliance pathways for all fuel types, allowing mixed fuel buildings to achieve significantly lower levels of energy efficiency than all-electric buildings, and making compliance with the code via a mixed fuel building easier and cheaper. Therefore, the Board felt strongly about removing the biases in the code and leveling the playing field

for all fuel types to compete fairly, and for the benefits of fuel types to be based on energy efficiency, not fuel-dependent metrics. While the intent behind this change was to increase fairness, the result serves to encourage all-electric development by making it easier and more cost-effective to comply with the code for all-electric buildings than it has been in previous national model energy codes without making it more difficult or less cost-effective for mixed fuel buildings to comply. The fuel debiasing approach is represented in a variety of ways in both of the compliance pathways for the commercial energy provisions and in all three of the compliance pathways for the residential provisions.

2. **Home size** - The sizes of new homes in Colorado vary widely, with new homes in urban metro Denver commonly ranging from 1,000 to 2,500 square feet, while new homes in many mountain resort communities (and in limited areas elsewhere in the state) can exceed 20,000 square feet. Not only does the total amount of energy consumption increase as homes get larger, but energy consumption per square foot also increases significantly as total square footage increases. For example, a study was completed for Pitkin County, CO that found that as home size increased from 2,200 square feet (near the national average) to 13,000 square feet, the average energy use per square foot increased from 35 kBtu/ft²/yr to 163 kBtu/ft²/yr, an increase of more than 4.6 times. (Hasz 2025) This means that a 13,000 square foot home from this study would use over 27 times the amount of energy that the 2,200 square foot home would use on an annual basis, despite being less than 6 times larger. Because of the significant disparity in the energy use profile of homes as they get larger, and the economic profile of the owners of these larger homes, the Energy Code Board determined that one effective strategy to significantly reduce energy consumption and GHG emissions from the residential sector while minimizing cost impacts on affordable housing is to increase the energy efficiency requirements on homes based on their size. The Board established three tiers of home size, based on conditioned floor area, with energy efficiency requirements increasing approximately 7-10% between the smallest tier and the middle tier (depending on compliance pathway), and requiring the largest tier to achieve net-zero energy use through the Energy Rating Index (ERI) compliance pathway. Figure 2 demonstrates the difference in required ERI targets across each of the home size tiers.

Climate Zone	ERI Target (>5,000 ft ²)	ERI Target (5,000-7,499 ft ²)	ERI Target (≥7,500 ft ²)
4	51	48	42 (0 with OPP)
5	52	49	42 (0 with OPP)
6	51	48	42 (0 with OPP)
7	50	47	42 (0 with OPP)

Figure 2. ERI targets for the Colorado Model Low Energy and Carbon Code (Colorado Energy Code Board 2025) for mixed-fuel homes by home size and climate zone. Note: Two lower tiers also have the option of prescriptive or simulated building performance pathways, while the highest tier is limited to ERI.

3. **Demand response** - With the push to encourage electrification of homes and buildings through the energy code and a vast array of incentive programs, the state must take into

consideration the impacts of the electrification transition on utility infrastructure. One strategy to enable greater grid peak load management is to enable HVAC, water heating, and lighting systems and equipment to be demand response capable. For commercial buildings, the Board adopted the requirement for all three systems to be demand response capable; for residential buildings, the Board adopted a demand response capability requirement only for water heating. This requirement would simply ensure that all covered systems would be capable of receiving and responding to a demand response signal; it would not require any utility customer to opt in to a demand response program.

4. **Renewable energy** - On-site renewable energy is required in the 2024 IECC for commercial buildings over 5,000 square feet. The Energy Code Board evaluated this requirement within Colorado's context, and deemed that because the state has established ambitious goals for investor-owned, cooperative, and municipal utilities across the state to achieve near-zero emissions from electricity generation by 2040, the cost associated with this requirement was not justified. Therefore, the Board elected to remove the mandatory prescriptive requirement, but maintained options for compliance with energy credits for renewable energy in Section C406. Similarly, the Board maintained the energy credit options for renewable energy on the residential side in Section R408. While the mandatory requirement was removed from the code, the Board chose to adopt those same provisions as a voluntary appendix to the code, enabling any local government interested in applying renewable energy mandates to adopt such requirements should they choose to do so.

In addition to these amendments to the 2024 IECC, several minor amendments were made to the prescriptive provisions of the code, largely focused on eliminating onerous or costly requirements that achieve little if any energy savings, or clarifying the application of certain requirements. The *MLECC* also incorporates the electric ready, solar ready, and EV ready provisions of the *MERSRC* rather than maintaining those requirements as a separate code.

Encouraging AHJs to Adopt Stronger Codes

While Colorado has established a statewide minimum energy code, the state continues to prioritize support for local jurisdictions to adopt and enforce an energy code that achieves greater energy savings or GHG emissions reductions than the state minimum energy code. House Bill 22-1362 explicitly states that any municipality or county that adopts any building code on or after July 1, 2023 “shall adopt and enforce an energy code that achieves equivalent or better energy performance than the 2021 International Energy Conservation Code and the *MERSRC*...” Similarly, the legislation states that any municipality or county that adopts any building code on or after July 1, 2026 “shall adopt and begin enforcing an energy code that achieves equivalent or better energy and carbon emissions performance than the *MLECC*...” (Colorado General Assembly 2022). The legislation clearly provides flexibility for local jurisdictions to adopt energy codes that are different from the state minimum energy code, including those that achieve a greater energy efficiency and carbon emissions profile than the state code, so long as the adopted code is verified through analysis to result in performance at least as effective as the state code.

Creating consistent compliance pathways that could be easily amended to be more stringent was a primary consideration for the Energy Code Board in evaluating code changes that

would work for statewide applications. Modifying the performance pathways to be based on site energy rather than energy cost and to utilize a fossil fuel baseline as opposed to a like-for-like baseline, along with simplifying the requirements of the energy credits sections (Sections C406 and R408), created straightforward options for jurisdictions to strengthen the state code. For example, jurisdictions have the option to set more efficient site energy performance targets or require a greater number of energy credits without fundamentally changing the structure or approach of the code, ensuring continued alignment with the state and neighboring jurisdictions.

On top of creating a state minimum energy code with easy to customize performance and prescriptive requirements, the Colorado Energy Office provides significant resources to local jurisdictions to support them in adopting energy codes that either meet or exceed the state minimum code. These resources include technical assistance, workforce development, and funding opportunities for local governments that serve as critical linkages between the state and local governments, ensuring that state mandates for energy codes become an opportunity, rather than a burden, for the local governments adopting them. Examples of jurisdictions that the Colorado Energy Office has supported in going above and beyond the state minimum code through these resources include:

1. **City of Fort Collins** - The Energy Office has partnered with the City of Fort Collins to support the development of the City's Net Zero Carbon Code, specifically focused on operational carbon, which is discussed more extensively later in this paper.
2. **City of Golden** - The City of Golden received an award through the Colorado Energy Office's Energy Code Adoption and Enforcement Grant Program to adopt an energy code that exceeds the *MLECC*. The code adopted by Golden has set more ambitious energy performance requirements, more explicit signals to encourage all-electric design and construction, and established energy storage readiness requirements to encourage the deployment of energy storage systems in new buildings.
3. **EcoAction Partners Collaborative** - EcoAction Partners, representing nine county and municipal governments in San Miguel County, San Juan County, and Ouray County, received an award through the Energy Code Adoption and Enforcement Grant Program to support each of the participating jurisdictions with adopting energy codes that exceed the *MLECC*. Amendments to these codes include more explicit electrification requirements, additional requirements for insulation and air tightness, and requirements for cold climate heat pumps to be used in all-electric buildings.

City of Fort Collins Net Zero Carbon Code

The City of Fort Collins, with a population of approximately 171,000 residents, home to Colorado State University, and a community-owned municipal electric and water utility serving about 66,000 customers, has long been a leader in climate policy and initiatives. In 2015, the Fort Collins City Council adopted citywide climate goals that strive to reach carbon neutrality by 2050 (see Figure 3). Interim goals at years 2020 and 2030 serve as milestone checkpoints and provide opportunities for adaptation of policies and initiatives. Also in 2015, the city revised its energy policy to align with the newly established climate goals.

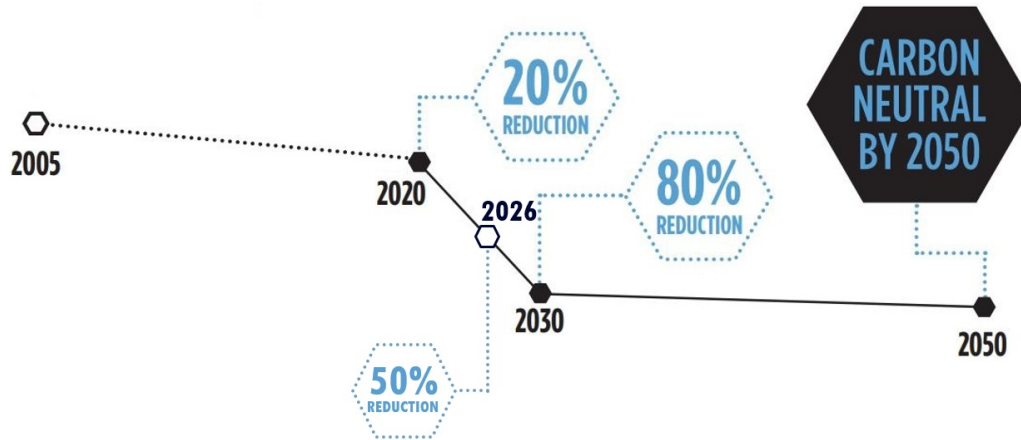


Figure 3. A timeline of the City of Fort Collins carbon reduction goals, ultimately reaching carbon neutrality by year 2050, shows interval reduction targets beyond the 2005 levels at years 2020, 2026, and 2030.

In 2018, City Council adopted a goal for 100% renewable electricity, and in 2019, at the request of community members and sustainability groups, City Council passed a global “climate emergency” resolution.

In 2021 the city finalized and adopted its Our Climate Future (City of Fort Collins 2021) plan which serves as a community guide to creating the carbon neutral, zero waste, and 100% renewable electricity future the community desires. This plan was born out of community conversations and feedback collected through 140 community partners and ambassadors, approximately 214 community conversations, 245 pop-up events, and 9 online feedback opportunities in 2019. Some of the environmentally centered feedback that rose to the surface was “healthy air quality”, “more renewable energy”, “affordable housing”, “more reuse, recycling, and composting”, “be prepared for changes in our climate”, and “healthy natural environment”. The Our Climate Future team compiled the feedback into buckets resulting in a plan that aims to achieve three primary environmental goals:

1. Reduce 2030 greenhouse gas emissions by 80% below 2005 levels;
2. Provide 100% renewable electricity by 2030 with grid and local sources, and
3. Achieve zero waste, or 100% landfill diversion, by 2030.

Fort Collins has a distinct make-up in its greenhouse gas inventory. The city’s two largest sources of greenhouse gas emissions are the buildings and transportation sectors, with buildings making up more than 65% of the city’s emissions. With the city forecasting its population reaching 240,000 residents by 2050, it is critical that each new building or home be constructed with improved efficiency, and with reduced dependency on fossil fuels, to keep overall emissions in check despite future population increases.

Robust carbon accounting has enabled the city to prioritize initiatives based on work completed and the impact of the work, or the impact it will have in meeting greenhouse gas reduction goals. Coupled with interim goal years 2020 and 2030, the Our Climate Future plan is made up of “Big” and “Next” moves that are transformational outcomes connected to specific goals for climate, energy, and waste, and specific strategies and tactics that lead to the outcomes

of these goals. The plan in whole is made up of thirteen Big Moves, and each of these has an associated set of supporting Next Moves. Each of the Next Moves are regularly evaluated for their impact on goals, benefits and costs, and potential for improving equity and resilience.

Accompanying the Big and Next Moves is a regularly updated “Two-year Tactical Plan” that serves as a guide for the coming years. The intent of the tactical plan is to provide a review and calibration cycle to be able to refine the Next Moves over time to align with the community targets. The approaches defined within the plan are to be considered as a flexible portfolio that can be adjusted within a two-year period, and over time to fit community needs and respond to the market and developments in technology.

Inherent to the work surrounding buildings and the energy code is Our Climate Future’s “Big Move 6 – Efficient, Emissions Free Buildings.” This Big Move was created in response to feedback from the community that “Everyone lives and works in healthy, energy and water efficient buildings which transition to become emissions free.” The plan describes this as meaning to improve efficiency in all existing buildings and new development of homes and commercial buildings to:

- Improve building efficiency to save resources and improve indoor air quality;
- Change habits for conservation and become active participants in the future energy system;
- Transition away from the use of natural gas to other fuels (electrification) for heating and cooking while improving grid flexibility; and
- Engage local manufacturing partners to reduce industrial process emissions, which are a source of potent and long-lived greenhouse gases.

Progress on Big Move 6 is tracked in several ways, one of which is the annual change in the community use of electricity and natural gas. The changes in the use of these fuels are closely tied to the city’s carbon inventory, which is further broken down by energy source.

Of the supporting Next Moves, one is to “Develop an energy performance path for new construction to zero carbon building by 2030.” This is further defined within the city’s Two-year Tactical Plan as one of the most significant and impactful steps to reducing emissions and lowering costs for homeowners and tenants over the life of the building. As previously mentioned, Colorado is a home rule state and jurisdictions independently adopt and amend codes. Fort Collins has a long history of strengthening code sections to better align with community goals. Despite all of this, it was recognized that going beyond code amendments to developing the city’s own path to zero carbon new construction by 2030 would need broad support and require an effort likely beyond the capacity of city staff. The city would need to look for input from the building community, local stakeholder groups, and consultants. There was also intent to build off the actions within the State of Colorado GHG Roadmap, specifically to reduce GHG emissions from new construction by enhancing energy efficiency and encouraging electrification. This aligned with emerging Fort Collins City Council priorities, one of which was to “Reduce climate pollution and air pollution through best practices, emphasizing electrification.”

Funding the City's Code Development

In 2022, the U.S. Department of Energy (DOE), under the Bipartisan Infrastructure Law, introduced the Resilient and Efficient Codes Implementation (RECI) funding opportunity. The funding opportunity announcement (FOA) sought applications from “project teams ready to advance building energy codes and other building efficiency policies within a particular region, state, or local jurisdiction.” The FOA also cited prioritization of the following areas of interest:

- State and Local Code Adoption
- Workforce Development
- Implementation and Compliance
- Innovative Approaches
- Equity, Energy and Environmental Justice
- Partnerships

Fort Collins staff recognized this as a near-complete alignment of priorities in the development of an energy performance path for new construction to zero carbon building by 2030. A team was quickly assembled, an approach developed, and a full application was submitted to the DOE in March 2023. The application project team was assembled from past partnerships, collaborations, support of studies, and organizations enabling a potential to scale. The team was led by the City of Fort Collins with support from New Buildings Institute (NBI), Florida Solar Energy Center (FSEC), the International Code Council (ICC), and the Colorado Energy Office.

The work scope provided within the application evolved into a technical summary that aimed to: 1) Document baseline building energy performance from utility analysis and from the city’s Building Energy and Water Scoring (BEWS) policy, largely recognized as commercial benchmarking; 2) Develop methodologies to establish Energy Use Intensity (EUI) and carbon dioxide equivalent (CO₂e) performance targets for commercial and multifamily buildings and Energy Rating Index (ERI) scores and CO₂e targets for residential homes; 3) Form a stakeholder or community advisory group to capture feedback on code development and inform supporting resources; 4) Develop and adopt the Energy Performance Path for New Construction to Zero Carbon Code; 5) Create an implementation guide and training to support the code; and 6) Evaluate the effectiveness of implementation from compliance performance review.

In July of 2023 the city received notification of the award from the DOE. Once all agreements were in place, the project team worked to establish a project timeline to zero carbon that was to stretch across the three code cycles: 2024, 2027, and ultimately reaching zero by 2030.

The first task was to understand the performance of the city’s built inventory, specifically buildings and homes constructed under the most recent energy codes. The project team evaluated recent building permits by building classification and quickly realized the impact the COVID-19 pandemic had on the number of commercial buildings constructed under the city’s most recent energy code, the 2021 IECC. Still, this allowed the team to estimate the performance of several of the 2021 code commercial buildings and provided a starting point from which to develop energy and emissions performance targets. Looking for other ways to establish the 2030 targets,

the team started with measured data, or a mix of annual metered data collected by NBI’s “Getting to Zero Buildings database” (NBI 2024), publicly posted benchmarking data from similar cities, climate zones, and typologies, and real-world data points that included buildings already achieving the city’s desired performance. The analysis continued with modeled performance of state, city, and national codes that have undergone performance modeling, and then to market research that included papers and studies like GARD Analytics’ “Development of Maximum Technically Achievable Energy Targets for Commercial Buildings – Ultra-Low Energy Use Building Set.” (Glazer 2015) All of this was then compiled into an analysis that provided targets, benchmarks, and data points that allowed the team to determine building types that had good alignment between measured and modeled data. EUI Targets were then set within this threshold (see Figure 4).

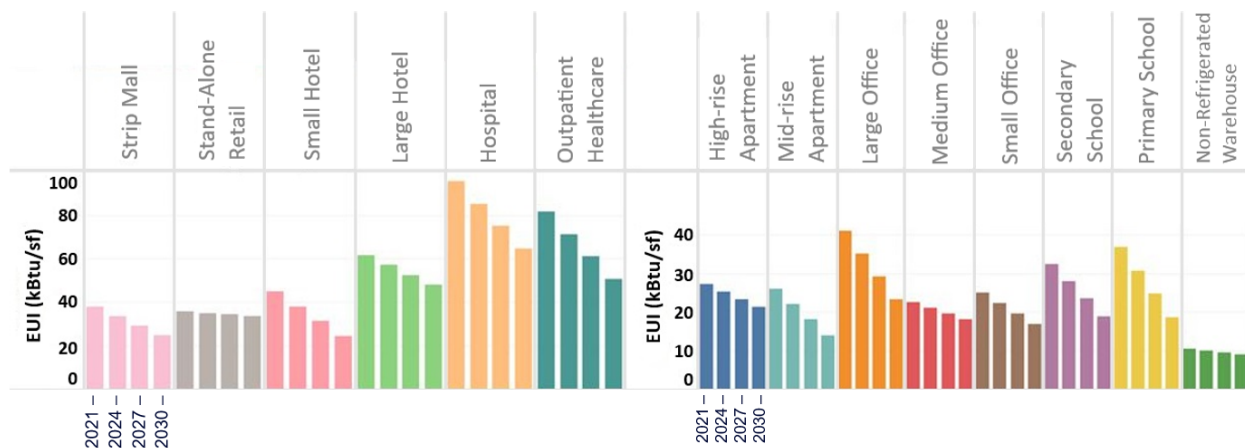


Figure 4. The trajectory, or progression of EUI reduction by building type is shown above. The highest bar is the 2021 code baseline, and the lowest bar is the 2030 code. In Fort Collins this performance trajectory averages an approximate 11% improvement each code cycle.

Building types not found within the developed gross site EUI targets by building type and code year are required to comply with the C407 Simulated Building Performance pathway of the IECC and the building emissions compliance provision. Energy modeling submitted at time of permit is to include proposed energy use totals by source, which will be performance verified against actual utility use post occupation.

With respect to residential buildings, the team chose to build from IECC’s Appendix RC Zero Net Energy Residential Building Provisions. This provided an established energy performance path that reached zero net energy consumption annually. Having determined that well over half of all Fort Collins permit submittals utilized a performance (modeled) approach to compliance meant there was an established workforce and industry knowledge of these compliance options. The Energy Rating Index (ERI) path defined within Appendix RC already had wide familiarity because of its close alignment to the IECC’s R405 Simulated Building Performance pathway. The maximum ERI trajectory developed for use in the Fort Collins code is as follows:

Date of adoption of amended IECC	2024	2027	2030
ERI Not Including Renewable Energy	50	46	42

The established EUI and energy targets enabled the team to determine commercial building emission compliance by calculating electricity emissions for both the standard reference design and the proposed design using the long-run marginal emissions rates for Cambium Generation and Emission Assessment Region RMPAc. Fossil fuel emissions were calculated by multiplying the annual consumption by the established CO₂e emission factors by fuel type. The residential ERI target is also used to calculate the maximum CO₂e Rating Index, recognized as RESNET's Carbon Rating Index. (RESNET 2022) This too uses hourly emission and electricity generation rates multiplied by hourly energy consumption of different fuel types. The maximum CO₂e targets developed for the Fort Collins code are as follows:

Date of adoption of amended IECC	2024	2027	2030
CO ₂ e Index Including Adjusted OPP	50	25	0

Lastly, provisions were made for off-site renewable energy procurement, or energy generated, delivered, or credited to the building through direct connection, the local utility, or an interconnected electrical network, under the assumption that not all buildings will have space for on-site renewable energy. Off-site renewable energy procurement factors were set by building type recognizing not all building types will be able to achieve a “one for one” offset of carbon emissions. One example of that is a fast-food restaurant - most often the energy use and corresponding carbon emissions per square foot of building area will far exceed that of other building types, sometimes by an order of magnitude or more.

With the previously detailed work complete, the project team developed the Performance Path to Zero Carbon Building as appendices to the IECC. Appendix CZ and Appendix RZ were amended into the city's energy code, and the entirety of the city's International Codes package was adopted by City Council on December 16, 2025 with an effective date of April 1, 2026.

The decision to develop the Performance Path to Zero Carbon Building code as a set of appendices served to enable other statewide jurisdictions and entities to more easily consider utilizing what the city has developed. Under the scope of work for the city's DOE RECI grant, the project was to include scaling to include other statewide climate zones and their respective buildings' energy performance. The goal was to provide a stretch code to either the *MLECC* or Colorado's *Model Green Code*. However, during the work period, and with the change in federal energy and environmental priorities, the future of the project under the DOE RECI funding became uncertain. The team's commitment compelled them to complete work through the first budget period of the grant, but it would leave the support of the code compromised once adopted. It also meant assessing code effectiveness, compliance with the code, and the user experience would be in jeopardy. Although reaching the first milestone of adoption meant success, the city was facing a period of uncertainty and running out of time to develop resources to support the adopted code.

Colorado Energy Office Lifeline

For the project duration, Colorado's support of local jurisdictions looking to achieve greater emissions reductions beyond national and state codes was understood, and the state has stayed abreast of the work in Fort Collins. It was in this period of uncertainty city staff began to look for options and support. The city found it through the Colorado Energy Office, and secured funding for an Energy Code Adoption and Enforcement Grant.

At the end of 2025 the Colorado Energy Office notified the city of their award selection. Working with a reduced timeline and funding, staff set out to streamline the process yet maintain support for completed work and to complete ongoing and future work. Now that the Fort Collins code has been adopted, the focus is shifting to code implementation and evaluation, and assessing adaptation of the code to a Colorado stretch code, development of the Colorado stretch code, revising the Fort Collins code in preparation for the release of the 2027 IECC, preparing an implementation guide for the state's stretch code, reconvening a community stakeholder group in preparation for the 2027 code adoption, and validation of performance outcomes and project reporting.

Expanding Fort Collins Net Zero Carbon Code for Statewide Applications

Through the Energy Code Adoption and Enforcement Grant awarded to Fort Collins by the Colorado Energy Office, the state and the city will be working together closely to modify the city's Net Zero Carbon Code to have broader applicability across Colorado. The adaptation to include all climate zones within the state will again require reviewing measured and annual metered data, publicly available benchmarking data, modeling, market research, and other real-world building data points. From there, building energy and emissions performance targets will be established for Colorado's remaining climate zones, enabling the Fort Collins code pathway to be adopted anywhere in the state.

Following the modifications to the Fort Collins Net Zero Carbon Code, the Colorado Energy Office will evaluate appropriate avenues to include the city's code as voluntary options within state building codes. One option will be to include the code language in a voluntary appendix to Colorado's minimum energy code, which will be the *Colorado Model Low Energy and Carbon Code (MLECC)*. This approach would enable local jurisdictions that are interested in a net zero carbon code pathway to voluntarily adopt the appendix to the state code, while allowing other local jurisdictions to stay with the state minimum energy code. Adoption of the Net Zero Carbon Code as a voluntary appendix to the *MLECC* would necessitate approval from the Energy Code Board, which may not occur until Colorado's next code development cycle. Therefore, the Colorado Energy Office will also explore establishing the Fort Collins Net Zero Carbon Code as an alternative compliance option within the state's stretch code, the *Colorado Model Green Code (MGC)*. The MGC is a voluntary stretch code that local jurisdictions can choose to adopt or not, making inclusion of the Net Zero Carbon Code language similar to incorporating it into an appendix to the *MLECC*, but without the required approval from the Energy Code Board. The Colorado Energy Office will evaluate both options, and determine which path forward is the most appropriate.

Conclusion

Colorado has successfully established an ecosystem in which the state sets minimum energy codes that all jurisdictions are required to adopt upon adoption of any other building code, while simultaneously fostering local advancement of the energy code beyond state minimums. This ensures that as a state, Colorado continues to move forward with improvements in energy efficiency and decarbonization of the buildings sector while providing some flexibility for local control over how quickly those advancements occur. This balance between state and local action presents a unique model for other states across the country, and continues to enable regions with different geographies, political persuasions, climates, and workforce capacity to make progress at a pace that is more appropriate for their needs. Colorado is excited by the prospects that this structure can offer, and looks forward to continuing this robust engagement with and support of its local jurisdictions into the future.

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