

# **A Regional Roadmap for a New Net Zero**

## **Redefining Net Zero and Aligning New Construction Codes in the Eagle River and Roaring Fork Valleys**

November 2024

*Photo courtesy of Daniel Bayer Photography, provided by the Community Office for Resource Efficiency (CORE).*

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# Abbreviations

- AHJ - Authority Having Jurisdiction
- CAC - Climate Action Collaborative
- CORE - Community Office of Resource Efficiency
- CLEER - Clean Energy Economy for the Region
- EEOP - Exterior Energy Offset Program
- EV - Electric Vehicle
- HVAC - Heating, Ventilation, and Air Conditioning
- REMP - Renewable Energy Offset Program
- PV - Photovoltaic



# Why We Need a Net Zero New Construction Roadmap

**Our mountain region is facing increasing climate threats as Statewide climactic changes warm our local climate. The local governments in the Eagle River and Roaring Fork Valleys recognize this threat and have established strong goals to ensure we reduce our local carbon emissions to secure a vibrant and resilient future for our communities.**

**The Net Zero New Construction Roadmap (Roadmap) is a local government and utility staff-led effort to identify how we can achieve zero carbon emissions for all new buildings, in line with our climate action goals, by 2030, while maintaining housing affordability, and bolstering our local workforce to deliver on these objectives.**

**Through this collaborative effort, we defined what "net zero" truly means for our mountain region, providing a clear path for local governments to adopt energy codes that will achieve net zero newly constructed buildings by 2030. This unified approach ensures that our region will effectively tackle climate challenges while fostering economic growth and sustainability.**



*Photo courtesy of Daniel Bayer Photography, provided by the Community Office for Resource Efficiency (CORE).*



# Introduction

In 2024, a Cohort of building department and sustainability staff, sustainability and building code experts, and local utility company representatives from communities within the Roaring Fork and Eagle River Valleys convened to develop a Net Zero New Construction Roadmap (Roadmap) for new residential and commercial buildings. This effort aims to encourage a regionally consistent building code that will progress toward eliminating greenhouse gas emissions from newly constructed buildings, support the local workforce, and improve overall housing affordability.

The Roadmap plays an important role in supporting Colorado's ambitious climate goals of reducing emissions by 50% by 2030 and 90% by 2050. While it contributes significantly to these objectives, it is part of a broader strategy that will be necessary to meet the comprehensive emissions reductions needed in the built environment. The Roadmap also aligns with local climate action plans that prioritize emissions reductions, particularly focusing on the emissions impact of new construction.

This Net Zero New Construction Roadmap provides a stepped approach for local governments to use as a guide for adoption of energy codes and beyond-code programs for future building code adoption cycles, with the end goal of adopting and enforcing a code standard that achieves new net zero buildings by 2030.

The Roadmap includes core elements that address carbon emissions of new buildings and phase out fossil fuel systems. The core elements of the Roadmap include energy efficiency, electrification, energy storage, renewable energy, and demand response. While the Roadmap does not explicitly address embodied carbon and electric vehicles, these are encouraged to be additional considerations for each jurisdiction as they update their energy codes between now (2024) and 2030.



## Key objectives of the roadmap include:

- 1 Re-define what “net zero” energy use for newly constructed buildings means in our local context.
- 2 Eliminate operational GHG emissions that are generated by newly constructed homes and commercial buildings’ energy use in the region (except for special circumstances).
- 3 Provide local government staff and elected leaders a clear pathway to follow for new construction energy code updates to enforce net zero building requirements, as defined in this Roadmap, by 2030.
- 4 Support ongoing collaboration amongst local government staff and elected leaders to adopt the same building energy codes that result in net zero buildings by 2030, so the rules and standards across the region are consistent.

## A New Net Zero

During discussions, the cohort recognized that a net zero building can mean many different things to different types of stakeholders. As a result, the cohort agreed on a unique description of a net zero building that everyone in the region can work toward. In addition, the region represented in this Roadmap is served by electric utilities rapidly on their way to supplying 100% renewable, carbon-free electricity [1]. This fundamental shift in our regional energy supply, led by our progressive electric utilities, allowed the Cohort to envision what “net zero” means if the electric grid is supplying the clean energy a building needs, rather than each individual building producing it itself.

For the purposes of this roadmap and the region, a net zero building is a building that has the following attributes:

- **Is powered by electricity;**
- **Uses renewable energy from the grid and/or onsite generation;**
- **Has the ability to store energy and/or shift energy use to reduce peak demand on the electric grid;**
- **Achieves energy performance above base International Energy Conservation Code;**
- **Is designed to minimize embodied carbon; and**
- **Is EV-ready.**



## RESIDENTIAL New Construction Roadmap

	<b>Step A</b> Suggested time frame: 2024–2026	<b>Step B*</b> Suggested time frame: 2026–2029	<b>Step C*</b> Suggested time frame: 2030 and beyond
<b>Energy Efficiency</b>	Adopt the 2021 or 2024 IECC base code and the required state Electric and Solar Ready Code, at a minimum.	Adopt the State Minimum Code (HB22-1362): State Low Carbon and Energy Code based on the 2024 IECC or the 2027 IECC. <i>Note: The new state minimum is required for jurisdictions updating building codes starting July 1, 2026.</i>	Adopt the most recent IECC. Identify above code options to drive additional residential energy efficiency as necessary.
<b>Home Size Threshold</b>	Higher energy efficiency must be demonstrated in homes over a certain size.		
<b>Electrification</b>	<b>Electric-preferred code</b> to encourage electrification of new buildings, along with, electric-readiness for all energy end uses in a building.	<b>All-electric with exceptions</b> for gas supplemental heat, emergency generators, and other items as decided by AHJs or building officials.	<b>All-electric with no OR rare exceptions</b> as decided by AHJs or building officials.
<b>Energy Storage</b>	Utilize the REMP or EEOP Programs to incentivize battery storage. For AHJs requiring PV for new buildings, energy storage is strongly encouraged or incentivized to be installed with the PV system.	Utilize the REMP or EEOP to incentivize battery storage. Energy storage is required if a new PV system is installed.	Utilize the REMP or EEOP to incentivize battery storage. Energy storage is required if a new PV system is installed.
<b>Renewable Energy Pathway 1:</b> For jurisdictions with existing Solar Requirements	Solar is required. If solar is installed, energy storage is required to be installed with the PV system.	Solar is required to offset remaining "non-renewable" energy being consumed from the electric grid.  If solar is installed, energy storage is required with the PV system.	Solar-readiness is required.  Solar installation is optional, as long as utilities have accomplished 100% renewably powered grid.
<b>Renewable Energy Pathway 2:</b> For jurisdictions with existing Solar-Ready Requirements	Solar-readiness is required.	Solar-readiness is required.  If solar is installed, energy storage is required with the PV system.	If solar is installed, energy storage is required to be installed with the PV system.
<b>Demand Response</b>	None.	Demand response controls for electric water heaters are required (per state law CRS 6-7.5-101-110, effective Jan 1, 2026)	Demand response controls for electric water heaters and for thermostats are required.

\*See 2027 & 2030 Re-evaluation



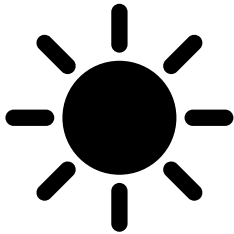
## COMMERCIAL New Construction Roadmap

	Step A Suggested time frame: 2024-2026	Step B* Suggested time frame: 2026-2029	Step C* Suggested time frame: 2030 and beyond
<b>Energy Efficiency</b>	Adopt the 2021 or 2024 IECC base code and the required state Electric and Solar Ready Code, at a minimum.	Adopt the State Minimum Code (HB22-1362): Low Carbon and Energy Code based on the 2024 IECC or the 2027 IECC. <i>Note: The new state minimum is required for jurisdictions updating building codes starting July 1, 2026.</i>	Adopt the most recent IECC. Identify <i>above code options</i> to drive additional commercial energy efficiency.
<b>Electrification</b>	<b>Electric-preferred code</b> to encourage electrification of new buildings, along with electric-readiness for all energy end uses in a building.	<b>All-electric with some exceptions</b> as decided by AHJs or building officials <b>OR</b> Adopt a stronger electric-preferred standard with increased efficiency requirements.	<b>All-electric with rare exceptions</b> as decided by AHJs or building officials. <i>Note: Evaluate all rare exceptions prior to adoption to ensure they are relevant, based on how electrification technology has evolved.</i>
<b>Energy Storage</b>	Utilize the REMP or EEOP to incentivize battery storage. For AHJs requiring PV for new buildings, energy storage is required to be installed with the PV system.	Utilize the REMP or EEOP to incentivize battery storage. Energy storage is required if a new PV system is installed.	Utilize the REMP or EEOP to incentivize battery storage. Energy storage is required if a new PV system is installed.
<b>Renewable Energy Pathway 1:</b> For jurisdictions with existing Solar Requirements	Solar is required on commercial buildings over 5,000 sq ft. If solar is installed, energy storage is required to be installed with the PV system.	Solar is required to offset remaining "non-renewable" energy being consumed from the electric grid for commercial buildings over 5,000 sq ft.  If solar is installed, energy storage is required to be installed with the PV system.	Solar-readiness is required.  Solar installation is optional, as long as utilities have accomplished 100% renewably powered grid.
<b>Renewable Energy Pathway 2:</b> For jurisdictions with existing Solar-Ready Requirements	Solar-readiness is required.	Solar-readiness is required.  If solar is installed, energy storage is required to be installed with the PV system.	If solar is installed, energy storage is required to be installed with the PV system.
<b>Demand Response</b>	None.	Demand response controls for some electric water heaters are required (per state law CRS 6-7.5-101-110, effective Jan 1, 2026 for small commercial applications 40-120 gallons).	Demand response controls for all electric water heaters and for thermostats are required.

\*See 2027 & 2030 Re-evaluation

# 2027 and 2030 Re-Evaluation

This Roadmap is based on the current understanding of net zero strategies, costs, policies, technology, and utility support, all of which may evolve before 2030. To meet the Roadmap's goals, ongoing collaboration and re-evaluation during each code cycle are essential. Communities and utility representatives should reconvene with technical and workforce experts ahead of 2027 and 2030 code cycles to review renewable energy, energy storage, and demand response elements, aligning on new data, state policies, and regional standards.



**Renewable Energy:** As utilities integrate more large-scale renewables, the role of onsite solar may shift to resiliency, and changes in net metering rules or financial incentives could affect adoption.



**Energy Storage:** Rapid advancements in energy storage may influence utility incentives and grid management needs, shifting demand between residential and commercial systems by 2030.



**Demand Response:** With rising demand from electrification and EVs, demand response may, over time, become more important for balancing grid supply, keeping energy affordable, and maintaining reliability of the electrical grid.





# Equity

There is a need to address equity in building energy policy development and implementation, recognizing that inefficient and outdated buildings unfairly impact equity-priority community members and businesses. Homes or other buildings, when built poorly or to old energy code standards, lead to higher energy bills, poor indoor air quality, and increased health risks. As building technologies improve and the electric grid becomes cleaner, there is an opportunity to build net zero from the start. Doing so can lower energy costs, improve health outcomes, and ensure that no community member is left behind with older, polluting systems in the places where our community lives, works, and plays.

The Roadmap development process identified key equity concerns, one of which was a desire to minimize upfront costs of new construction, which could support more accessible and affordable housing for community members in each valley, while ensuring new construction meets high efficiency standards. Through case studies from new buildings across the three county region and other Colorado mountain communities, it's been shown that all-electric, high efficiency new buildings are feasible without a higher price tag if the design and intent to build net zero is a goal from the start [2]. Proposed solutions to ensure housing affordability does not come at the sacrifice of energy efficiency include expanding green financing options for affordable net zero housing or using the permitting process to reduce fees or review time for all-electric and/or energy-efficient buildings.

**The Eagle County Climate Equity Plan engaged with community members through a survey, which revealed that 72% of Spanish-speaking survey takers and 32% of English-speaking survey takers use money meant for important needs, like food and medicine, to pay their energy bills instead. Additionally, renters, who often live in less energy efficient properties, face additional barriers like landlords being unwilling to make energy-saving upgrades [3].**



Electrification emerged as a critical equity issue as well. Electrification offers significant health benefits by eliminating indoor pollution from gas-powered systems through the installation of highly efficiency, all-electric systems that also lower operational costs. However, participants noted that without energy efficiency measures, inefficient electrification could increase utility costs for low-income families. Because of this, our Roadmap to Net Zero includes regular updates to the International Energy Conservation Codes, which will ensure high performing envelopes and high efficiency systems will enable beneficial electrification for all community members.

It was noted through this effort that the project scope limited the Cohorts ability to engage with members of the public who are experiencing energy burden in our communities. As the Roadmap implementation advances and each subsequent code cycle is adopted, inclusive engagement with low income and underrepresented groups will be crucial in shaping building energy codes that delivers equitable outcomes for everyone.



*Photo courtesy of the Community Office for Resource Efficiency (CORE).*



# Green Workforce Development

Achieving net zero new construction by 2030 relies on a skilled workforce proficient in green building practices, including energy-efficient systems, renewable energy, energy storage, and electrification. Addressing existing workforce gaps and planning for future growth is essential to reducing carbon emissions and meeting future demands.

A 2024 study by Inclusive Design Group (IDG) on green building workforce development in Pitkin, Eagle, and Garfield Counties found a significant shift toward green building within skilled trades, revealing strong demand for expertise in weatherization, insulation, and heat pump installation. Meeting this demand is crucial for the Roadmap's net zero goals, particularly in areas with lower wages where demand for skilled tradespeople is higher. Key strategies to enhance green workforce development include:

- **Expanding Skilled Trades:** Workforce initiatives should focus on training existing workers in new technologies and techniques needed for net zero buildings, especially as building codes evolve.
- **Creating Partnerships:** Educational institutions, such as Colorado Mountain College and local high schools, play a critical role in developing future green building professionals.
- **Incentivizing and Funding Training:** Scholarships for apprenticeship programs and skills training will be vital for rapidly developing the green workforce.

In addition, community nonprofits focused on climate solutions in our region, including Walking Mountains (WM), Community Office of Resource Efficiency (CORE), and Clean Energy Economy for the Region (CLEER) conducted "Listen & Learn" sessions to gather industry insights on the Roadmap.



Key themes from these discussions show support for the goals of this Roadmap and highlight the regional challenges we may face as these goals advance:

**1 Code Adoption and Alignment:** Participants stressed the need for consistent building codes across jurisdictions to avoid confusion and streamline approvals and support industry in understanding and complying with the code requirements. Companies emphasized it cannot be the responsibility of the private sector to convince customers to go net zero. If the code requires net zero, local businesses can get there.

**2 Workforce Development and Housing Challenges:** Finding and retaining skilled local workers remains challenging due to high housing costs and low wages.

**3 Electrification and Affordability:** Affordability concerns regarding electrification costs in new construction and retrofits were noted, highlighting the need for balancing cost considerations while pursuing electrification. It was also noted, by a local contractor that heat pump installations are at an all time high in our mountain community, including in multifamily buildings.

**4 Technological Challenges:** Participants expressed perceived concerns about grid readiness for electrification and the availability of suitable technology in the area to meet electrification goals. *Note: Despite these concerns, through extensive engagement with the local utilities serving the region, the utilities that participated (Appendix A) emphasized that the grid is ready for electrification.*

**5 Community Involvement & Education:** Ensuring net zero initiatives benefit all community members is essential, especially across the large income gaps in our community. Increased community education and engagement in policy shaping will be essential so the building industry knows why codes are moving to net zero and can support these goals.

These insights underline the importance of workforce development, technological readiness, and equitable access as the region works towards net zero goals. Consistent building codes are crucial for reducing confusion and advancing sustainability efforts equitably across communities.



# Future Work

The Regional Net Zero Roadmap defines a pathway to adopt regionally consistent codes for net zero construction by 2030. Achieving this goal requires ongoing collaboration among sustainability and building department staff within local governments, as well as community members in the building industry. Next steps include:

- 1 Continued collaboration:** Convene the cohort or regional partners before each code cycle to align on net zero amendments, share lessons, and establish new regionally consistent code standards in alignment with this Roadmap. With support from local nonprofits, reconvene the Mountain Building Code Officials group and work with CORE, CAC, and CLEER to provide regional officials with necessary training and resources.
- 2 Review funding opportunities:** Identify state or other grants to fund cohort facilitation, resource development, and cost studies. Additional funds could support local Community-Based Organizations (CBOs) and bolster compliance efforts in building departments.
- 3 Provide regular updates and share resources:** CORE, CAC, and CLEER should give regular updates on code progress to ensure that all communities stay informed. Communities should also exchange insights, studies, and data to support collaborative code development.
- 4 Turn focus to existing buildings:** After adopting the net zero code for new construction, expand efforts to improve energy efficiency and reduce emissions in existing buildings. Work with CORE, CAC, and CLEER to evaluate equitable retrofitting incentives, set performance benchmarks, and explore policies for broader climate goals.



# Appendix A

## Net Zero Roadmap Participants

### **Project Manager**

- Lotus Engineering & Sustainability

### **Local Governments**

- Town of Avon
- Town of Basalt
- Town of Eagle
- Eagle County
- Town of Minturn
- Town of Red Cliff
- Town of Vail
- City of Aspen
- Pitkin County
- Town of Snowmass Village
- City of Glenwood Springs
- Town of Carbondale

### **Utilities**

- Xcel Energy
- Holy Cross Energy
- Aspen Utilities
- Glenwood Springs Electric & Public Works
- Black Hills Energy

### **Technical Experts Advising on the Project**

- Shums Coda Associates
- Biospaces Energy Consulting
- Southwest Energy Efficiency Project

### **Community Nonprofits**

- Community Office of Resource Efficiency (CORE)
- Climate Action Collaborative at Walking Mountains (CAC)
- Clean Energy Economy for the Region (CLEER)



## End Notes

[1] [Aspen's Path to 100% Renewable Electricity](#)  
[City of Glenwood Springs, Energy and Climate Action Plan 2024](#)  
[Holy Cross Energy Annual Report 2023](#)  
[Xcel Energy 2023 Sustainability Report](#)

[2] [Cost-Effectiveness of the 2021 IECC for Residential Buildings in Colorado — 2015 IECC Baseline SWEET - Breckenridge shows how affordable and sustainable housing can be all-electric too](#)  
[Garfield Clean Energy - Energy savings make Rifle housing project doubly affordable](#)  
[Eagle County Energy Code Modeling Report](#)

[3] [CAC Climate Equity Plan](#)



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