



2022 Denver Energy Code Changes for Residential Buildings

Community Planning and Development /
Office of Climate Action, Sustainability and Resiliency

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2022 Denver Energy Code

- This is a high-level summary changes to the **residential provisions** of the 2022 Denver Energy Code (DEC). The intent is to provide an overview of what has changed and important topics to be aware of.
- Does not include all changes to the 2022 Denver Energy Code. Please reference the 2022 Denver Energy Code for specific code language.
[Denvergov.org/BuildingCode](https://denvergov.org/BuildingCode)
- For additional resources visit [Denvergov.org/NetZero](https://denvergov.org/NetZero)

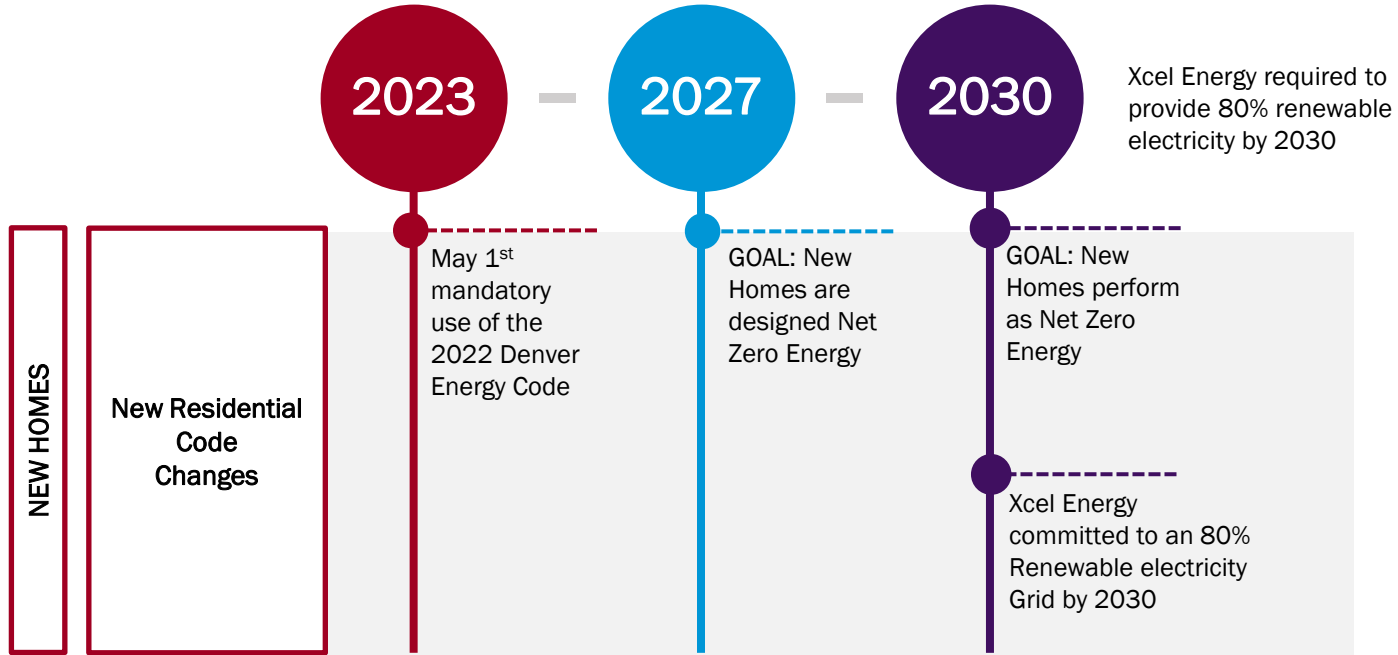


= Prescriptive provision

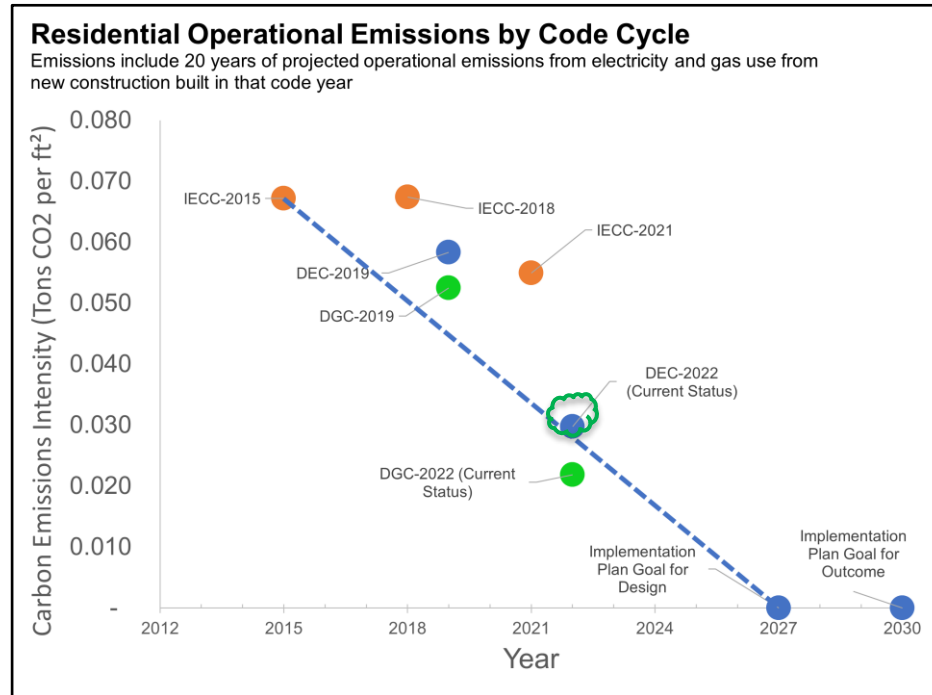


= Mandatory provision

Timeline - Residential Electrification & Performance Requirements



2022 Denver Energy Code Progress - Residential



2022 Denver Energy Code Highlights

1. **Prescriptive Path:** *U*-factor/*R*-value Revisions (R402.1.2 and R402.1.3) & Expanded Additional Efficiency Package Options (R408)
2. **Performance Paths:** Total Building Performance (R405) & Energy Rating Index (R406)
3. Service Hot Water Systems (R403.5.4 & R403.5.5)
4. Intermittent Exhaust Control (R403.6.4)
5. Electric Vehicle Charging (R404.4)
6. Electric-Ready Infrastructure (R404.5)
7. Solar-Ready Zone (R404.6)
8. Minimum On-Site Renewable Energy Systems (R404.7)
9. Change of Occupancy or Use (R505)

Prescriptive Path: *U*-factor/*R*-value Revisions



R401.2.1: Prescriptive projects shall meet all requirements of Sections R401 through R404 and R408.

- 2022 DEC revisions to prescriptive *U*-factors and *R*-values increase the thermal performance of some assemblies.
- For more information on compliance pathways visit [Denvergov.org/NetZero](https://denvergov.org/NetZero)

Tables R402.1.2 and R402.1.3: Summary of Revised Values

Code	Fenestration <i>U</i> -factor	Skylight <i>U</i> -factor	Glazed Fenestration SHGC	Wood Frame Wall <i>R</i> -value	Floor <i>U</i> -factor / <i>R</i> -value
2022 DEC	0.27/0.25*	0.45	0.40	30 or 20 + 5ci or 13 + 10ci or 0 + 20ci	0.026 / 38
2021 IECC	0.32	0.55	NR	20 + 5ci or 13 + 10ci or 0 + 15ci	0.033 / 30

* Where the proposed glazing area is less than or equal to 15% of the conditioned floor area, the second lower *U*-factor shall not be exceeded.

Prescriptive Path: Expanded R408



R408 Additional Efficiency Package Options (Prescriptive)

- Requires buildings to select **additional efficiency packages** to achieve a minimum credit total based on building type.

The **new credit method** in R408 increases flexibility for prescriptive compliance while promoting more energy efficient buildings than previous code cycles.

Requirements for All-Electric Properties	Requirements for All Other Buildings
Compliance with High OR Premium Performance Electric Space Heating package (R408.8.2 OR R408.3)	18 Credits from Table R408.1
Compliance with High Performance Electric Water Heating in Conditioned OR Unconditioned Space package (R408.10.2 OR R408.10.3)	
3 Credits form Table R408.1	

All-electric buildings have an easier path to compliance to promote building electrification and align with Net Zero Energy goals

Total Building Performance & Energy Rating Index

R401.2.1 Projects may choose from two performance based compliance options:

- **Total Building Performance (R405)** - provides more flexibility than prescriptive compliance by allowing for tradeoffs in envelope performance, but does not allow most trade offs with lighting, HVAC or service hot water. Projects must also meet the requirements of all provisions listed in Table R405.2.
- **Energy Rating Index (R406)** - provides the most flexibility since thermal envelope, MEP systems, and lighting all contribute the ERI. Projects must also meet the requirements of all provisions listed in Table R406.2.

Performance Path Option	All-Electric Properties	All Other Buildings
Total Building Performance (R405)	Whole building energy modeling showing 5% annual energy cost savings above the Standard reference design.	Whole building energy modeling showing 18% annual energy cost savings above the Standard reference design.
Energy Rating Index (R406)	ERI analysis with a maximum ERI value of 55	ERI analysis with a maximum ERI value of 50

All-electric buildings have an easier path to compliance to promote building electrification and align with Net Zero Energy goals

For more information on compliance pathways visit [Denvergov.org/NetZero](https://denvergov.org/NetZero)

Service Hot Water Systems

NEW PROVISIONS



Section	R403.5.4 – Water heating equipment location	R403.5.4 – Demand responsive water heating
Applicable equipment	Natural gas and electric resistance storage water heaters	Electric storage water heaters 40-120 gallons with a nameplate input rating 12 kW or less
Requirements	Locate water heaters in a space with minimums: <ul style="list-style-type: none"> • 3 ft x 3 ft x 7 ft high • 760 cubic feet 	Demand responsive controls listed for participation in a demand response program that serves the building site and meet the section requirements
Exceptions	<ul style="list-style-type: none"> • Electric water heaters with a rated storage volume less than 20 gallons • Locations that meet manufacturer space requirements for a heat pump water heater 	<ul style="list-style-type: none"> • Water heaters supplying 180° F or higher water • Water heaters in compliance with Section IV, Part HLW or Section X of the ASME Boiler and Pressure Vessel Code • Water heaters that use 3-phase electric power
Intent	To make future building electrification more feasible by considering the increased space requirements of retrofitting to heat pump water heaters.	To prepare homes for participation in demand response programs , which reduce demand on the power grid and contribute to Denver’s emissions reduction goals

Intermittent Exhaust Control

NEW PROVISION



R403.6.4 Intermittent exhaust control for bathrooms and toilet rooms

- Bathroom/Toilet room **exhaust system with intermittent operation** must provide **manual-on controls AND one or more of the following**:
 1. Timer control with a setpoint of 30 minutes
 2. Occupant sensor to turn fans off within 30 minutes of occupants leaving a space
 3. Humidity control capable of manual or automatic adjustment for a relative humidity of minimum 50% and maximum 80%
 4. Contaminant control for particle or gaseous concentration

Exception:

- Exhaust systems serving as an **integral part of a ventilation systems** (i.e. energy recovery ventilators) are only required to have manual controls.



Electrical Vehicle Charging



R404.4 One- and two-family dwellings and townhouses EV charging requirements

- Each new dwelling unit, new garage/carport, or new on-site parking space must provide a minimum of one electric vehicle ready space
- Each EV ready space must have the required infrastructure for conductors and branch circuits per R404.4.4
- Construction documents must graphically indicate and label all EV ready spaces and associated termination locations.
- **The total number of EV ready spaces is not required to exceed one EV ready space per dwelling unit on a given lot.**



New provision in 2019 Denver Energy Code, with minor language updates in 2022 DEC. EV charging requirements for Group R Occupancy removed.

Electric-Ready Infrastructure

NEW PROVISION



R404.5 Additional Electric Infrastructure

- A junction box or receptacle shall be located within one foot of **ALL fossil fuel appliances and equipment**, capable of serving equivalently sized electric equipment.
- The electric infrastructure shall meet the requirements of this section, and labels on the dedicated circuit breaker space shall indicate they are “For future electric equipment”

Exceptions:

- Fossil fuel space heating equipment where sufficient capacity exists for space cooling equipment
- Large water heating equipment that serves multiple dwellings

This provision is included to **simplify future building electrification** for homeowners. The additional cost of the electric ready infrastructure should be considered when deciding between fossil fuel or electric appliances and equipment.

Solar-Ready Zone



R404.6 Solar-Ready Zone

- **New detached one- and two-family dwelling and townhouse projects** with optimally oriented or low-sloped **roofs over 600 square feet** must provide a zone that is ready for future installation of a solar photovoltaic (PV) system.
- Solar-ready zone must be at least **300 SF** (or 150 SF for a townhome).
- The **junction box and electrical panel** directory entry for the dedicated circuit breaker space shall have labels stating, “For future electric equipment”.

The intent of this provision is to ensure that dwellings are prepared for easy installation of solar PV in the future.

New requirement in 2019 Denver Energy Code, moved from an appendix to the main code language in 2022 DEC.

Exceptions:

- Projects with a **permanently installed onsite renewable energy system** (i.e. projects required to comply with the minimum renewable energy system capacity section 404.7)
- Buildings with **suboptimal roof orientation**
- Buildings where the **roof is in full or partial shade** for a majority of the year (70% +)

Minimum On-Site Renewable Energy Systems



NEW PROVISION

R404.7 Minimum renewable energy system capacity

- New residential dwelling projects must install onsite renewable energy system(s) capable of **producing approximately 50% of the building's annual energy use** (7.2 kbtu/yr [2.1 kWh/yr] or 0.12 ft² of panel per square foot of conditioned floor area)
- Note: projects required to comply with this section are **exempt from the Solar-Ready requirements** (R404.6)



This provision was added to align with the overall goals of decarbonization.

Exceptions:

- All-electric properties.
- Buildings with **13 efficiency package credits in addition** to the minimum requirements of **R408**.
- Buildings with an ERI 5 points below **Section R406** requirements.
- Buildings with a **proposed energy use 9% below Section R405** requirements.
- Dwelling units with a conditioned floor area of **less than 1,000 square feet**.
- Renewable production may be reduced for meeting **extra additional efficiency packages**.

Change of Occupancy or Use

R505: Any space that is converted to a residential building shall comply with the requirements for additions, alterations, and repairs

- Spaces undergoing a change in occupancy or use to a higher energy-demand category shall comply with the requirements of this code for new construction

Exceptions:

- A change from a lower-energy demand category that does not result in increased energy demand
- Where Total UA Alternative (R402.1.5) is used, the total building thermal envelope UA may not exceed 110% of total UA determined by prescriptive tables
- Where Total Building Performance (R405) path is used, the annual energy cost of the proposed design is permitted to be 110% of the annual energy cost allowed by R405.2

Table R505.1

Energy-Demand Category	IBC Occupancies	IRC Uses
4 (highest energy-demand)	A, B small assembly space	
3	B gym, E, I-4, M	
2	B (except as listed above), I-1, I-2, I-3, R	All uses permitted in IRC structures
1 (lowest energy-demand)	F, H, S	

Thank you!

For more information, visit:

[Denvergov.org/BuildingCode](https://denvergov.org/BuildingCode)

[Denvergov.org/NetZero](https://denvergov.org/NetZero)

Contact us:

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