



2022 Denver Energy Code Contractor/Inspector Commercial Code Considerations *Part 2: Compliance Paths*

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

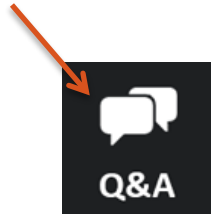
June 21, 2023

INTERPRETATION INSTRUCTIONS

- This session is available in both English & Spanish. Click on the “Interpretation” icon at the bottom of the Zoom window and choose either "English" or “Spanish”
-
- Esta sesión está disponible en inglés y español. Haga clic en el icono "Interpretación" en la parte inferior de la ventana de Zoom y elija "Inglés" o "Español"

Questions?

- Time is reserved at the end of the presentation for Q&A
- Please use the Q&A feature to submit your questions



- Responses to all questions not addressed today will be sent out by email to registered participants
- Additional questions may be sent to: energy.review@denvergov.org

Training Series

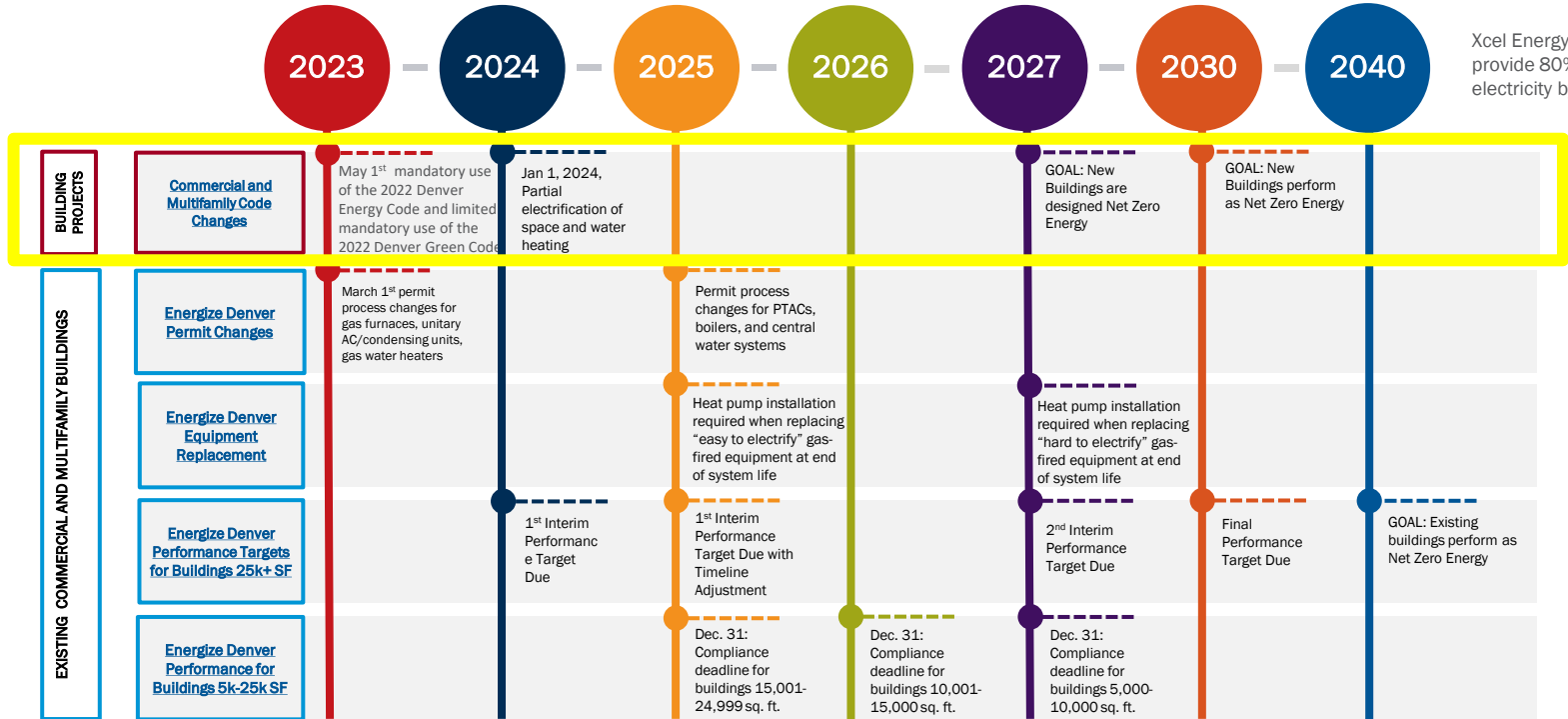


SCAN ME



	Commercial/Multifamily (Wednesdays at 12 pm)	Residential (Thursdays at 1 pm)
	Electrification May 24	Compliance Overview May 25
Prescriptive Path	May 31	June 1
Performance Paths	June 7	June 8
Contractor/Inspector Part 1	June 14	June 22
Contractor/Inspector Part 2	June 21	June 29

Timeline - Commercial Electrification and Performance Requirements



Xcel Energy required to provide 80% renewable electricity by 2030

2022 Denver Energy Code

- This is a high-level summary of the **commercial prescriptive and performance paths** of the 2022 Denver Energy Code
- Does not include all changes to the 2022 Denver Energy Code. Please refer to the 2022 Denver Energy Code for specific code language. [Denvergov.org/BuildingCode](https://denvergov.org/BuildingCode)
- Denver-specific COMcheck and REScheck are anticipated fall 2023

Net Zero Energy Hub – Codes and Resources

www.denvergov.org/EnergyCode

Resources for:

- New provisions in the 2022 Denver Energy Code
- The Denver Energy Code compliance pathways
- Specifics to each phase of a new building project, from design and construction to alterations and additions
- Training videos to walk you through specific provisions that have been updated since the 2019 Denver Building Code

Home / Government / Agencies, Departments, and Offices / Climate Action, Sustainability & Resiliency / High Performance Buildings and Homes / **Net Zero Energy Hub - Codes and Resources**

Net Zero Energy Hub - Codes and Resources

This resource hub pulls together information from Denver and pairs it with resources from across the country to help building owners, professionals, and residents:

- Learn about changes in the 2022 Denver Building and Fire Code and the 2022 Denver Green Code
- Understand the importance of building electrification and energy efficiency
- See examples of successful Net Zero Energy building projects in a variety of building types and uses
- Navigate new regulations and requirements with confidence!



Resources for New Commercial and Multifamily Buildings

Buildings that are regulated by the Denver Commercial Building Code, which include commercial buildings and multi-unit residential buildings that are not regulated by the Denver Residential Code.



Resources for New Single Family, Duplex, and Townhomes

Any detached one- or two-family dwelling unit and townhomes three stories or less are regulated by the Denver Residential Code.

New Building Electrification Pilots



Design Support: partial funding for drawing sets and as-built drawings that can be reviewed by Denver builders to help inform how electrification can work for their projects



Pilot Projects: partial funding for builders or property owners interested in leveraging city funds to help a new building project be built all-electric

www.denvergov.org/NetZero



Equity and Local Focus: 50% of the pilot project funds will be prioritized for affordable housing or otherwise serve or benefit under-resourced communities in Denver. Denver-based and/or MWBE firms and organizations are especially encouraged to apply for incentives.

Tips for referencing code

2022 Denver Amendments

+

2021 International Energy Conservation Code (IECC)

=

2022 Denver Energy Code (DEC)

Agenda

- 2022 DEC Requirements overview
- Setting up for success
- Prescriptive Path review
- Performance Path review
- Summary

Purpose: This presentation is the second part of installation and inspection requirements and considerations for commercial building projects focusing on prescriptive and performance paths.

See recordings of previous trainings for the first part for general installation and inspection requirements and more details on design submittal considerations.



2022 DEC Requirements Overview

Definition: Commercial Building

Residential buildings are detached one- and two-family dwellings and multiple single-family dwellings (townhouses) and Group R-3 and R-4 buildings three stories or less in height above grade plane.

Commercial buildings are all other buildings

Definition: All-Electric Property

All-Electric Property is one that contains no permanently installed equipment or appliances that utilize *combustion*, plumbing for fuel gas or fuel oil or *fuel gas* utility connection, installed within the *building(s)* or site, except for *emergency power systems* and *standby power systems*.

Commercial Compliance Process

- Choose a Compliance Pathway (C401.2.1): Prescriptive or Performance
- Meet requirements for all paths - partial list:
 - HVAC/DHW/Lighting Commissioning
 - Building Envelope Verification and Air Leakage Testing
 - Complete 2022 DEC Checklist for Requirements
 - ❖ *Includes reporting Energize Denver Ordinance 2030 EUI Target*
- Related
 - Denver Green Buildings Ordinance - denvergov.org/Greenroofs
 - Denver Green Code - denvergov.org/Greencode

All Pathways – Denver Green Buildings Ordinance

Green Buildings Ordinance (GBO) applies to:

- New buildings and additions 25,000 square feet or larger
- Existing buildings 25,000 square feet or larger, upon roof recover or replacement
- Some multifamily residential projects need only comply with roof reflectance requirements and not additional green building options

NOTE: New construction options which require an extra **12% or 5% energy savings** beyond code also require the project to be an **All-Electric Property***



denvergov.org/greenroofs

**Green Building Ordinance updates for Council approval June 2023 and effective October 1, 2023*

All Pathways – Denver Green Code (DGC)

Limited mandatory use for new and *major renovation commercial projects*

denvergov.org/GreenCode

Table 101.4.1 Limited Mandatory Use: Quantity of Provisions Required		New Construction	Major Renovation
Chapter 1	Scope and Administration: Ecological Impact Statement (EIS)	0	0
Chapter 2	Reserved	n/a	n/a
Chapter 3	Definitions	n/a	n/a
Chapter 4	Residential Energy [RE]	0	0
Chapter 5	Site Sustainability	4	2
Chapter 6	Water Use Efficiency [WE]	1	0
Chapter 7	Commercial Energy	1	1
Chapter 8	Indoor Environmental Quality [EQ]	1	1
Chapter 9	Materials and Resources [MR]	3	1
Chapter 10	Construction and Plans for Operation [CX]	2	2



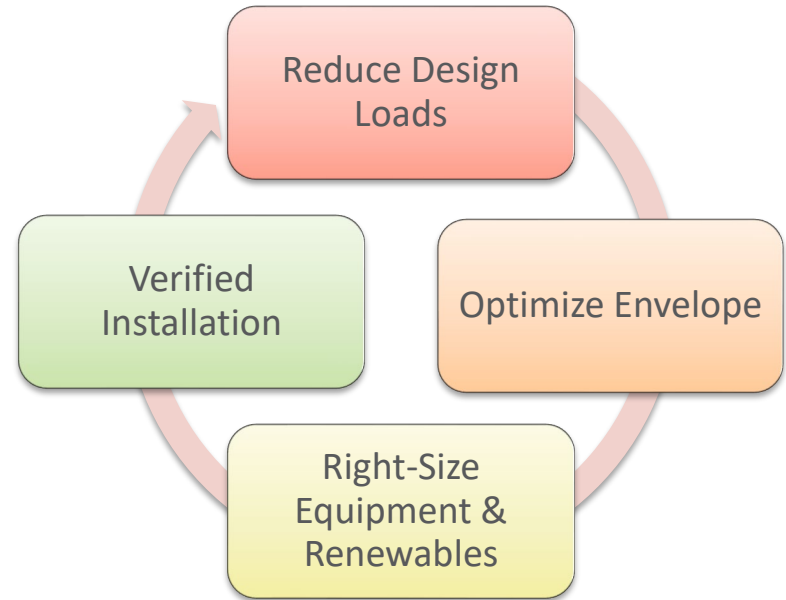
Setting up for Success

Success with Energy Compliance

- Energy is interdisciplinary and holistic
- Design team has weighed tradeoffs to select options that will optimize the design and achieve compliance

Therefore

- Build to construction documents
- Use RFIs before making substitutions
- Understand the impact of changes



Inspector Support at Preconstruction Meetings

Energy-specific preconstruction meeting

- Attendees: Inspector, GC, PMs, Air barrier consultant, optional design team members
- Agenda topics:
 - ✓ Identify compliance path
 - ✓ Use 2022 DEC checklists and approved construction documents to tailor the discussion
 - ✓ Identify critical components of the design and construction that will achieve success



2022 Denver Energy Code Checklists

- Index to design documents for energy information
- See checklists in drawings for each discipline

CHECKLISTS:
 General Compliance
 Building Envelope
 HVAC & Kitchen
 Service Water Heating
 Power & Lighting
 C406 (Prescriptive Only)

Code Section	Focus Area	Code Description	Drawing or Specification Number to demonstrate compliance (N/A if not applicable)	Submitter Notes (e.g. If "N/A" Please explain why requirement does not apply or is not demonstrated on drawings/specs)	Submittal Requirements and Clarifications
ALL COMPLIANCE PATHS					
C402.1.5	Minimum insulation	Roofs, walls, and floors shall meet applicable maximum U-factor requirements of Table C402.1.5	A-301	<i>Reference to Drawing</i>	Indicate location of: - Supplemental calculations if applicable

Compliance Pathway

- Check drawings for General Checklist:

2022 Denver Energy Code - Commercial Compliance Checklist

Prescriptive Path - General

- Inspector can see Permit Scope of Work text box where review team will list the **compliance path** from four options:
 - Prescriptive Compliance Path
 - C407 Energy Cost
 - Appendix SE Site Energy
 - Appendix PT Performance Target

All-Electric Property

- Check drawings for General Checklist:

GENERAL		RESPONSE	SUBMITTER NOTES
Property type	Is this an all-electric property? (Y/N):	Y	ALL-ELECTRIC PROPERTY. A property that contains no permanently installed equipment or appliances that utilize combustion, plumbing for fuel gas or fuel oil or fuel gas utility connection, installed within the building(s) or site, except for emergency power systems and standby power systems.

- Inspector can see Permit Scope of Work text box where review team will list **All-Electric Property** status, if applicable:
 - All-Electric Property
- If All-Electric Property, permanent fuel equipment and utility connection are only allowed for *emergency power systems and standby power systems*

Other Inspector Instructions

Inspector can see Permit Scope of Work text box where review team will list, if applicable:

- If alteration selected **test all gas piping**:
 - C503.3.3 Test all gas piping serving replacement furnace per Section 406 of the IFGC
 - C504.4.1 Test all gas piping serving replacement water heater per Section 406 of the IFGC
- If prescriptive path **C406 Reduced Air Infiltration** is used:
 - C406.9.1 Reduced Air Infiltration 0.25 cfm/sq. ft.
 - C406.9.2 Further Reduced Air Infiltration 0.15 cfm/sq. ft.
- If prescriptive path **C406 Renewable Energy** is used:
 - C406.5.1 Basic Renewable Credit with ___ kW_{DC} array
 - C406.5.2 Enhanced Renewable Credit with ___ kW_{DC} array
- If performance path **Renewable Energy** is included for compliance via drawings, lease, or contract:
 - Renewable Energy ___ kW_{DC} array



Prescriptive Path & C406 Additional Efficiency

C406 Additional Efficiency Credits

Prescriptive Path - C401.2.1 Option 1

- Comply with C402 through C406 and C408
- C406 Additional Efficiency Credits dependent on building type
- Fewer credits required for All-Electric Properties to **incentivize electrification**
- C406.1.1 – Tenant spaces* must attain a total of 10 credits
(*not previously occupied)

Building Type	Credit Requirement for All-Electric Properties	Credit Requirement for All Other Buildings
Multifamily	10	40
Healthcare/Hospital	10	40
Hotel/Motel	10	36
Office	10	31
Retail	10	35
School	10	24
Warehouse	10	48
All Other	10	40

C406 Envelope Credits

Sub-section	Group B	Group R & I	Group E	Group M	Other ^a	
C406.8.1: Reduced envelope UA** • 15% Reduction	10	4	2	4	5	
C406.8.2: Further reduced envelope UA** • 25% Reduction	15	6	3	6	8	
C406.9.1: Reduced air infiltration* • Tested 0.25 cfm/sf	4	5	N/A	2	4	Noted in Permit Scope of Work
C406.9.2: Further reduced air infiltration** • Tested 0.15 cfm/sf	7	8	N/A	3	7	

*Credits supported by COMcheck IECC-2021

**Credits supported by COMcheck IECC-2021 with Denver Specific Instructions

Other credits are Denver Specific

C402 and C406 – Envelope



- Maintain envelope backstop of C402.1.5
- Envelope COMcheck & Inspection checklist
- Envelope performance verification and air leakage testing
- Any C406 efficiency credits?
 - ✓ Reduced envelope UA
 - ✓ Reduced air infiltration

C403.5 Economizer Requirements

Air or water economizers are required for the following cooling systems for prescriptive compliance:

Chilled water systems – chilled-water capacity less capacity of cooling units with air economizers

- Local water-cooled systems: cooling capacity > 1,320,000 Btu/h
- Air-cooled or district systems: cooling capacity > 1,720,000 Btu/h

Individual Fan Systems

- *Group R: total cooling capacity greater than 270,000 Btu/h*
- Other than Group R: total cooling capacity greater than 33,000 Btu/h
- Systems with cooling capacity greater than 75,000 Btu/h require two stages of mechanical cooling
- Systems with capacity greater than 33,000 Btu/h may use the economizer as the first stage (but many systems can use integrated economizers)
- **VRF Systems with Dedicated Outside Air Systems (DOAS) do not require economizers***

*Update for Council approval June 2023

C403.7.4 Energy Recovery Requirements

TABLE C403.7.4.2 (1)
ENERGY RECOVERY REQUIREMENTS
 (Ventilation systems operating less than 8,000 hours per year)

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	≥10 & < 20	≥20 & < 30	≥30 & < 40	≥40 & < 50	≥50 & < 60	≥60 & < 70	≥70 & < 80	≥80
	DESIGN OUTSIDE OR EXHAUST AIRFLOW RATE (CFM)							
5B Outside	NR	NR	NR	NR	6,000	5,500	5,000	4,000
5B Exhaust	NR	NR	NR	NR	4,500	4,125	3,750	3,000

TABLE C403.7.4.2 (2)
ENERGY RECOVERY REQUIREMENTS
 (Ventilation systems operating 8,000 or more hours per year)

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	≥10 & < 20	≥20 & < 30	≥30 & < 40	≥40 & < 50	≥50 & < 60	≥60 & < 70	≥70 & < 80	≥80
	DESIGN OUTSIDE OR EXHAUST AIRFLOW RATE (CFM)							
5B Outside	500	400	300	200	84	84	80	80
5B Exhaust	1,500	1,200	900	600	252	252	240	240

C406 HVAC & Kitchen Credits

Sub-section	Group B	Group R & I	Group E	Group M	Other ^a
C406.2.1: 5% Heating eff imprv.*	1	1	1	2	1
C406.2.2: 5% Cooling eff imprv.*	2	1	1	1	1
C406.2.3: 10% Heating eff imprv.*	2	2	3	3	3
C406.2.4: 10% Cooling eff imprv.*	4	1	2	2	2
C406.2.5: >10% Cooling eff imprv.**	Proportional Credit				
C406.2.6: >10% Heating eff imprv.**	Proportional Credit				
C406.6 Dedicated OA sys (DOAS)*	5	8	N/A	2	5
C406.11: Fault detection*	1	1	1	1	1
C406.12: Efficient kitchen equipment*	See Section				

*Credits supported by COMcheck IECC-2021

**Credits supported by COMcheck IECC-2021 with Denver Specific Instructions

Other credits are Denver Specific

C406 HVAC & Kitchen Credits

Sub-section	Group B	Group R & I	Group E	Group M	Other ^a
C406.13: All-electric space heating	4	6	6	9	6
C406.14: Cold climate heat pumps	4	5	5	9	6
C406.16: Demand responsive thermostats	1	1	1	1	1
C406.17.1: Reduced fan power	2	N/A	6	7	3
C406.17.2: Further reduced fan power	4	N/A	11	14	6

*Credits supported by COMcheck IECC-2021

**Credits supported by COMcheck IECC-2021 with Denver Specific Instructions

Other credits are Denver Specific

C403 and C406 – HVAC & Kitchen

- Mechanical COMcheck & Inspection checklist
- HVAC Commissioning
- Any C406 efficiency credits?
 - ✓ Heating / cooling efficiency improvement
 - ✓ Dedicated outside air system
 - ✓ Fault detection and diagnostics
 - ✓ All-electric space heating
 - ✓ Cold climate heat pumps
 - ✓ Demand responsive thermostats
 - ✓ Reduced fan power



C406 Service Water Heating Credits

Sub-section	Group B	Group R & I	Group E	Group M	Other ^a
C406.7.2: Recovered/renew SWH _b *	N/A	14	1	N/A	14
C406.7.3: Eff fossil fuel SWH _b *	N/A	9	2	N/A	6
C406.7.4: Heat pump SWH _b *	N/A	5	1	N/A	5
C406.15: All-electric water heating	9	13	13	4	9

*Credits supported by COMcheck IECC-2021

**Credits supported by COMcheck IECC-2021 with Denver Specific Instructions

Other credits are Denver Specific

C404 and C406 – Service Water Heating



- Mechanical COMcheck & Inspection checklist
- SHW commissioning
- Any C406 efficiency credits?
 - ✓ Recovered or renewable water heating
 - ✓ Efficient fossil fuel service hot water
 - ✓ Heat pump service hot water
 - ✓ All-electric water heating

C406 Power & Lighting Credits

Sub-section	Group B	Group R & I	Group E	Group M	Other ^a	
C406.3: Reduced light power**	7	2	8	12	7	
C406.3.2: Reduced light power by 15%**	11	3	12	18	11	
C406.3.2: Reduced light power by >15%**	Proportional Credit					
C406.4: Enhanced digital light control*	2	N/A	2	3	2	
C406.10: Energy monitoring*	2	1	2	3	2	
C406.5.1: Basic renewable credit*	9	7	6	7	2	Noted in Permit Scope of Work
C406.5.2 Enhanced renewable credit	9-18	7-14	6-12	7-14	7-14	

*Credits supported by COMcheck IECC-2021

**Credits supported by COMcheck IECC-2021 with Denver Specific Instructions

Other credits are Denver Specific

C405 and C406– Power & Lighting

- Lighting COMcheck & Inspection checklist
- Electric ready infrastructure
- Electric vehicle requirements
- Lighting control commissioning
- Any C406 efficiency credits?
 - ✓ Reduced lighting power
 - ✓ Enhanced digital lighting controls
 - ✓ Energy monitoring
 - ✓ On-site renewable energy



Example – C406.17 HVAC Fan Power Credit

Example: A grocery store contains (5) 10-ton rooftop HVAC systems, each with a constant volume supply fan with a design airflow of 4,000 cfm, return fans, and heat recovery.

- The heat recovery device effectiveness is 70%
- The total bhp of all systems is 23

C406.17.2 Further reduced HVAC system fan power. The total design fan power for all HVAC units shall be no less than 20 percent lower than the fan power allowance defined in Table C403.8.1, Option 2.

Would this system be eligible for the fan power credit?

TABLE C403.8.1(1)
FAN POWER LIMITATION

	LIMIT	CONSTANT VOLUME	VARIABLE VOLUME
Option 1: Fan system motor nameplate hp	Allowable nameplate motor hp	$hp \leq CFM_s \times 0.0011$	$hp \leq CFM_s \times 0.0015$
Option 2: Fan system bhp	Allowable fan system bhp	$bhp \leq CFM_s \times 0.00094 + A$	$bhp \leq CFM_s \times 0.0013 + A$

C406.17 HVAC Fan Power Credit

Answer:

Allowed System bhp = $0.00094 \times (5 \times 4000) + 2.421 + 5.0351 = 26.256$
Design System bhp = 23

$(26.256 - 23) / 26.256 = 12.4\%$ reduction

From Table C406.1(1), **7 credits** are available for the fan systems.

Sub-section	Group M
C406.17.1: Reduced fan power • 10% reduction	7
C406.17.2: Further reduced fan power • 20% reduction	14



Performance Path

Performance Path Options

Compliance Path	Energy Cost	Site Energy	Compares to Baseline Building	Compares to Performance Target
Modified C407: Energy Cost	X		X	
Appendix SE: Site Energy		X	X	
Appendix PT: Performance Target		X		X

Benefits:

- Allows for a more holistic design process
- More flexibility with prescriptive requirements
- Calibrated towards Denver's NZE goals
- Plan for GBO compliance
- Incentivizes all-electric buildings

Mandatory Requirements

All Performance Paths must meet 2022 DEC C407.2 mandatory requirements ***and*** 90.1-2019 Appendix G mandatory provisions

[Performance Checklist](#)

Why ASHRAE 90.1-2019 requirements?

- Since the Performance Path follows ASHRAE 90.1 Appendix G modeling protocol, those requirements supersede 2021 IECC
- Refer to the Prescriptive Path training for more details

Use the Performance Checklist during design to help identify mandatory requirements

Mandatory Requirements – Envelope

2022 Denver Energy Code

- C402.1.5 Minimum insulation
- C402.5 Thermal envelope and air barrier requirements
- C402.5.5 Room containing fuel burning appliances
- C402.5.8/9 Loading docks and vestibules
- C402.5.10 Recessed lighting
- C403.12 Data centers

ASHRAE 90.1-2019

- Use Appendix G for envelope baselines
- Can use semi-heated space categories

Mandatory Requirements – HVAC & Kitchen

2022 Denver Energy Code

- C402.4.11 Operable openings
- C403.1.2 Data centers
- C403.2.3 Fault detection diagnostics
- C403.2.4 Space heating equipment electrification

Alterations:

- C503.3.2 Low NOx Emissions requirements
- C503.3.3 Partial electrification

**same or similar to 2022 DEC*

ASHRAE 90.1-2019

- Follow Appendix G modeling guidelines
- 6.4.1 Minimum equipment efficiencies*
- 6.4.2.1 Calculation of heating/cooling loads*
- **6.4.3 HVAC control requirements**
- **6.4.3.4.5 Enclosed parking garage ventilation controls**
- 6.4.3.6 Humidification/dehumidification*
- 6.4.4.1.3 Pipe insulation*
- **6.4.4.2.2 Duct/plenum sealing & leakage testing**
- 6.4.5 Walk-in coolers and 6.4.5 Refrigerated display cases*
- 10.4.5 Air curtains*

Mandatory Requirements – Service Water Heating

2022 Denver Energy Code

- C404.10 Water heating equipment electrification
- C404.11 Demand response controls for electric storage DHW
- C404.12 Provide electric infrastructure for fossil fuel equipment

Alterations:

- C503.4.1 Partial electrification requirements

**same or similar to 2022 DEC*

ASHRAE 90.1-2019

- Follow Appendix G modeling guidelines
- 7.4.2 Minimum equipment efficiencies*
- 7.4.3 Pipe insulation*
- 7.4.4 Service water heating controls*
- **7.4.5 Pool controls and covers**
- 7.4.6 Heat traps*
- **10.4.2 Service water pressure booster systems**

Mandatory Requirements – Power & Lighting

2022 Denver Energy Code

- C405.4 Lighting for plant growth
- C405.12 Energy monitoring
- C405.13 EV Spaces
- C405.14 Solar ready requirements
- C405.15 Electric infrastructure

ASHRAE 90.1-2019

- Follow Appendix G modeling guidelines
- 8.4.1 Voltage drop*
- 8.4.2 Automatic receptacle control*
- 8.4.4 Electric transformers
- **9.4.1 Interior/Exterior lighting controls**
- 9.4.1.2 Parking garage lighting controls*
- **9.4.1.3 Special application lighting controls**
- **9.4.3 Dwelling unit lighting efficacy**
- 10.4.1 Electric motor efficiencies*
- 10.4.3 Elevators & 10.4.4 escalators*
- **10.4.6 Whole building energy monitoring***

**same or similar to 2022 DEC*

On-site Renewable Energy

- Renewable energy may be used to meet the Performance Path requirements for **up to 10%** of the proposed design's energy cost (C407) or energy use (appendix SE and PT)
- Requires a fully designed photovoltaic array ready to permit
- PV array energy production calculated using software such as Helioscope or PV Watts
- System must be **owned**, be under a **lease** of minimum 15 years, or be under **contract** to purchase the energy generated for a minimum of 15 years

When $(PBP_{nre} - PBP)/BBP > 0.10$, new buildings, additions to existing buildings, and/or alterations to existing buildings shall comply with the following:

$$PCI + [(PBP_{nre} - PBP)/BBP] - 0.10 < PCI_t$$

Performance Path Energy Model Report

New report templates: Denver has adopted the DOE/PNNL 90.1 tool suite

- Leverages actively supported tools and technical assistance
- Provides modelers with a consistent tool compatible with other programs like LEED
- Teams will submit both:

Part 1 - **Compliance Form** - ASHRAE Standard 90.1 Appendix G

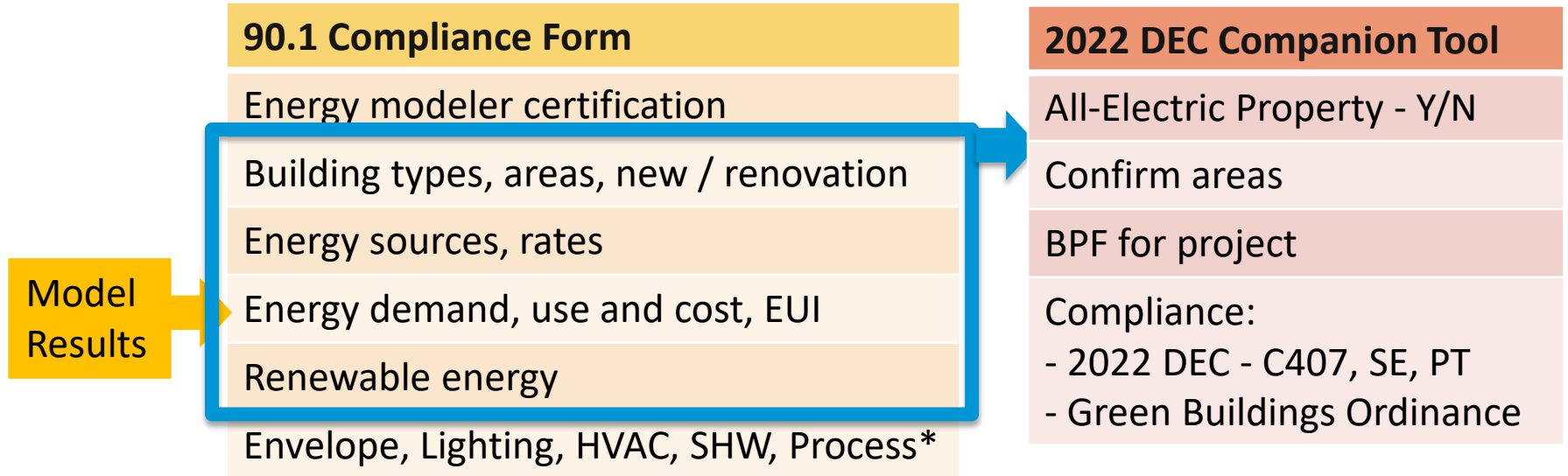


<https://www.energycodes.gov/ashrae-standard-901-performance-based-compliance-form>

Part 2 - **2022 DEC Companion Tool** - Denver-specific overlay for code and Green Buildings Ordinance

<https://Denvergov.org/BuildingCode>

Performance Path Energy Modeling Report



**Can substitute 2019 Commercial Energy Modeling Report Table 2 through 9/30/2023*

Energy Model Submittal Package

Teams will upload a zipped file with:

- Energy model report files
- Input and output reports from energy simulation (IP units preferred)
- Energy rates
- Exceptional calculations
- On-site renewables – may be letter from owner with summary of contract or lease
- If adjacent buildings or topology shades building, include in a site plan

Naming convention: <energyreport>_<address>_<date>.zip



Summary

Requirements for all paths (see Training #1)

2022 DEC requirements

C402.1.5 Minimum insulation requirements

C402.5 Envelope performance verification / testing

C403.2.3 Fault detection diagnostics

C403.2.4 Space heating partial electrification

C403.4.1.1 Heat pump supplementary heat

C404.10 Water heaters partial electrification

C404.11 Demand responsive water heating

C404.12 Water heater equipment location

2022 DEC requirements continued

C405.12 Energy monitoring

C405.13 Electric vehicles

C405.15 Electric infrastructure

C408.2 / C408.3 HVAC, SHW, lighting
commissioning

C503.3.3 Gas furnace, unitary AC
permit parity

C503.4.1 Gas and instantaneous SHW
permit parity

Verification & Commissioning Summary

	Prescriptive	Performance
C402.5.1.5 Air barrier drawing review	●	●
C402.5.1.5 Air barrier construction inspection	●	●
C402.5 Air leakage testing	●	●
C408.2 HVAC, SHW commissioning	●	●
C408.3 Lighting commissioning	●	●
C403.12.2.3 / 90.1-2019 6.4.4.2.1 Duct leak test	●	●
90.1-2019 6.4.4.2.1 Exterior duct leak test		●

What if things change during construction?

- Envelope changes
- Windows NFRC performance variation
- HVAC / DHW efficiencies
- Prescriptive – C406 Efficiency credits not met
- Performance – Field installation differs from modeled conditions

Coordinate between CPD, GC, owner, design team, and energy consultant to verify continued code compliance

Submit **Modified Drawings** with

- Revised C406 planning tool and compliance - or-
- Updated energy model submittal package

What are Modified Drawings?

Once a permit has been approved and issued, the project must be built to those approved plans. If changes are needed to the approved plans during construction, the changes must be reviewed and permitted. The changed documents and drawings submitted for review after initial permits were issued are called ***modified drawings***.

Modified drawings are submitted as a new permit application in e-permits. Choose "building log" when prompted to select a permit type.

2022 DEC reasons for TCO

Energy code reasons for a Temporary Certificate of Occupancy instead of a regular Certificate of Occupancy:

- All-Electric Property has temporary gas
- Alterations - gas leak testing documentation
- Project does not meet air leakage testing requirements
- Required renewable energy system is not yet installed

Existing Building Support and Resources

Resources and technical assistance available through the Electrification Program website, www.denvergov.org/BuildingElectrification or contact us at:

- electrification@denvergov.org:
 - Electrification Feasibility Reports and incentives
- mechplumb.review@denvergov.org:
- Permitting and code compliance



Electrification Program

Starting on **March 1, 2023**, the requirements for pulling a permit to replace your AC units, gas-fired furnaces, and hot water heaters in commercial and multifamily buildings is going to change. For the fastest permitting process, we strongly recommend that you plan now for the new requirements.



Planning for Equipment Replacement

Starting on March 1, 2023, the requirements for pulling a permit to replace your gas-fired appliances is going to change. Learn more about what to expect.



Code Changes In 2023, 2025, and 2027

Energize Denver requires electrification for space and water heating equipment. This will happen through a series of updates to the Denver Building Code. Learn more about what to expect.



Electrification Feasibility Reports

Denver's updated building code will soon require you to look at whether electrifying your space and water heater and cooling is a good choice for you. Find out more about these requirements.



Incentives and Financing

We want to help you replace your



Home Electrification Incentives



Why Electrify?

Shifting to electric equipment like

How is electrification in existing buildings going for you?

CASR's existing building electrification team would love to hear stories and feedback from contractors and building professionals about how heat pump installation is going for you!

If you'd like to share your experience with CASR email electrification@denvergov.org

Questions?

- Time is reserved at the end of the presentation for Q&A
- Please use the Q&A feature to submit your questions



- Responses to all questions not addressed today will be sent out by email to registered participants
- Additional questions may be sent to: energy.review@denvergov.org

Thank you!

For more information, visit:

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

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

Contact us:

Questions about energy code: energy.review@denvergov.org

Questions about programs & resources: sustainability@denvergov.org