Building Energy Education | architects

2022 Chicago Energy Transformation Code Overview

4.20.2023

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Providing effective energy strategies for buildings and communities

ICC Preferred Provider # 2396
ICC Course #36106

AIA Illinois

Eric Klinner
Managing Director

ILLINOIS GREEN ALLIANCE

Juanita Garcia
Board Member

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Presenters:

Robert Schlorff

Shawn Maurer

SEDAC is a Preferred Education Provider with the International Code Council (ICC). Credits earned on completion of this program will be reported to ICC for ICC members. Certificates of Completion will be issued to all participants.

ICC PREFERRED EDUCATION PROVIDER

This workshop is approved for 1.5 LU/HSW CES credits from the American Institute of Architects (AIA). Credits earned on completion will be reported for AIA members.

AIA Continuing Education Provider

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Learning Objectives

1. Understand the intent and organization of the 2022 Chicago Energy Transformation Code.

2. Describe key changes in the updated 2022 Chicago Energy Transformation Code from 2019 Chicago Energy Conservation Code.

3. Summarize the most significant 2022 Chicago Energy Transformation Code compliance issue in the commercial and residential provisions.

4. Comply with the updated 2022 Chicago Energy Transformation Code for commercial and residential buildings.

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Who We Are

We assist buildings and communities in achieving energy efficiency, saving money, and becoming more sustainable.

We are an applied research program at the University of Illinois.

Our mission: Reduce the energy footprint of Illinois and beyond.

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Energy efficiency basics + advanced topics
Take your designs to the next level!

Learn more and register at
smartenergy.illinois.edu/events

5/18/2022 @ 1pm-2:30pm
IL-ECC, IL Stretch Code & CETC Overview

Training delivered by the University of Illinois Smart Energy Design Assistance Center (SEDAC) in partnership with the American Institute of Architects Illinois and the Illinois Green Alliance.

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Energy Code Training Program

- Technical support
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  800.214.7954
- Online resources at
  smartenergy.illinois.edu/energy-code
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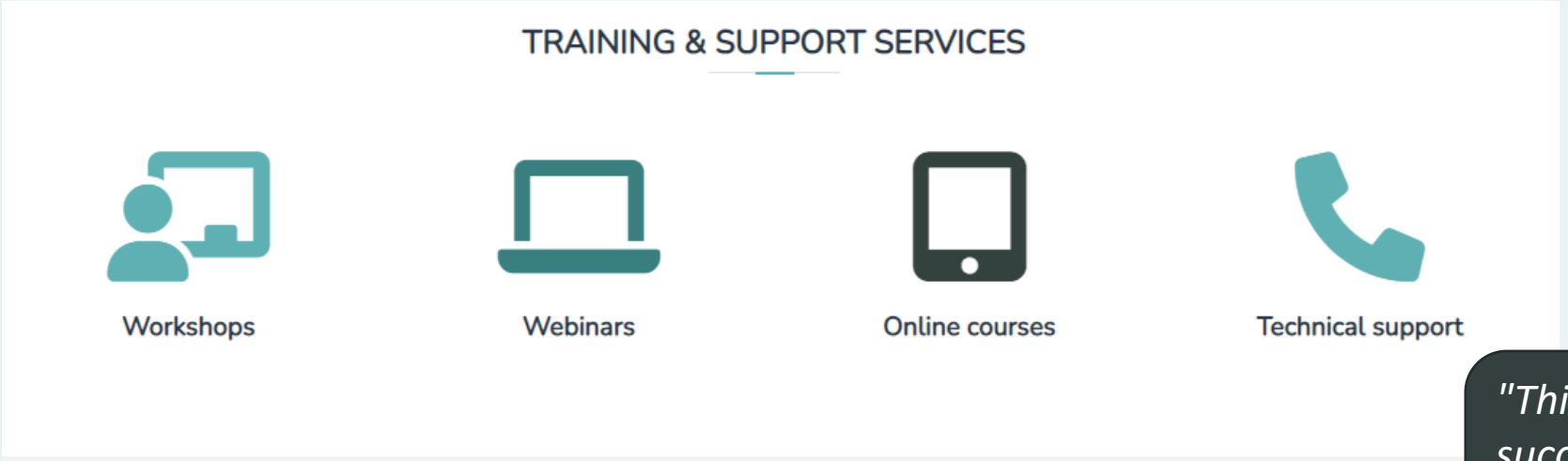
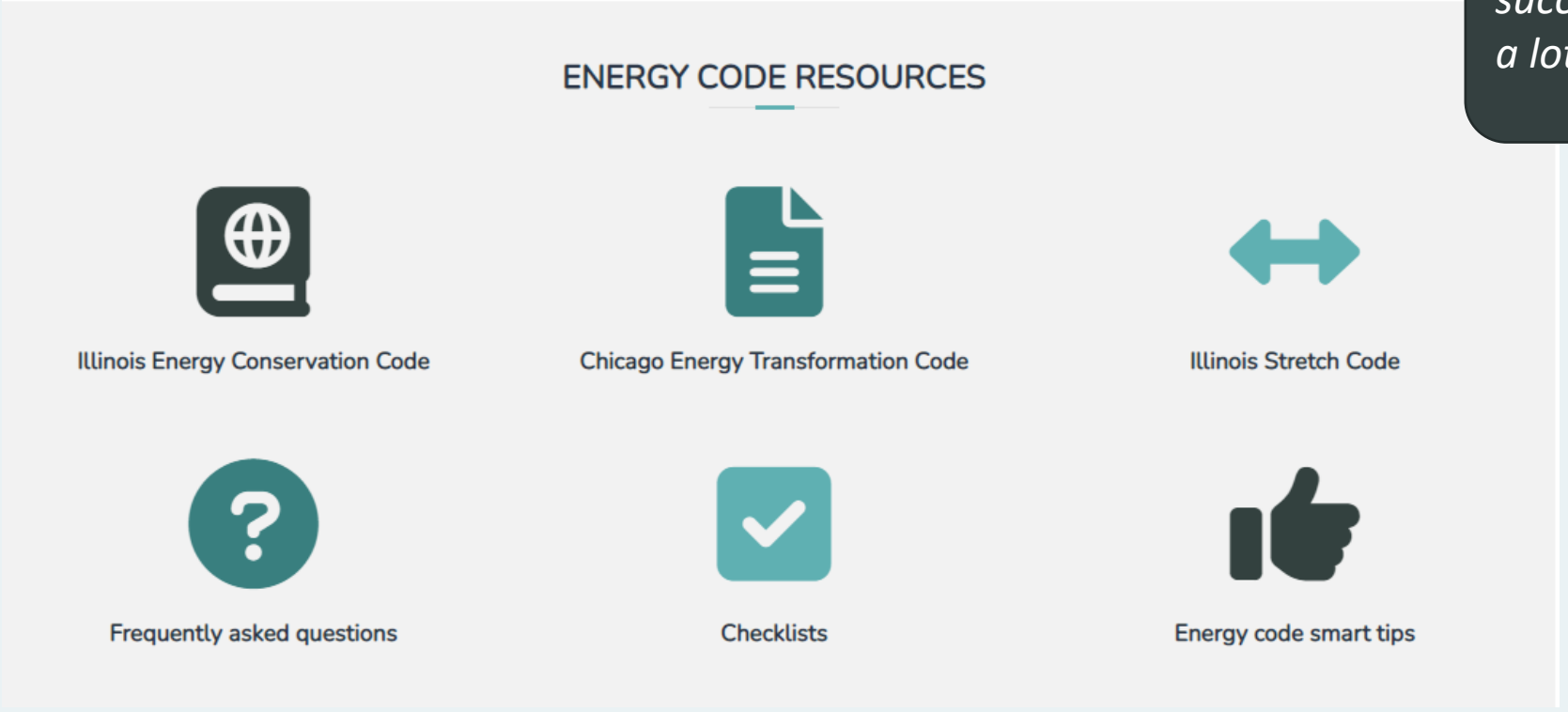
www.smartenergy.Illinois.edu/energy-code/





"Thank you. This is a gold mine of energy code info."
Robert, Mechanical Engineer

"This was probably one of the most successful seminars we've had. I got a lot of good feedback from it."
Harold, Plumbing Inspector

"Thank you! That's the most clear explanation I've gotten on this topic. It's greatly appreciated!"
Brett, Energy Modeler

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2022 CETC Presentation - Outline

- Background of 2022 Chicago Energy Transformation Code
- 2022 Chicago Energy Transformation Code – Commercial
- 2022 Chicago Energy Transformation Code – Residential
- How to comply with Chicago Energy Transformation Code

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Background of 2022 Chicago Energy Transformation Code

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Chicago's Path to Energy Efficiency

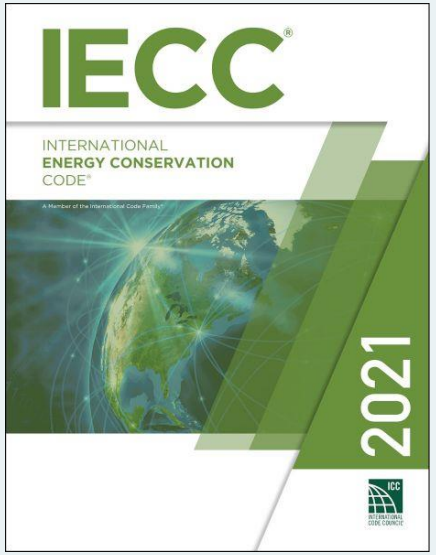
2001: Chicago's first energy-efficient construction requirements

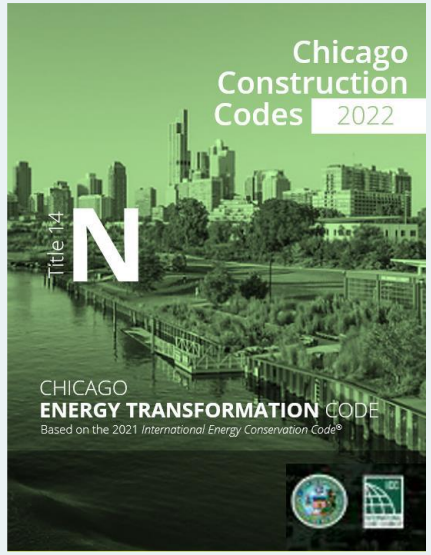
Regularly strengthened along with IECC's 3-year cycle

Most recent: 2019 Chicago Energy Code based on 2018 IECC

2001
Chicago
Energy Code

~40%
Efficiency
Improvement





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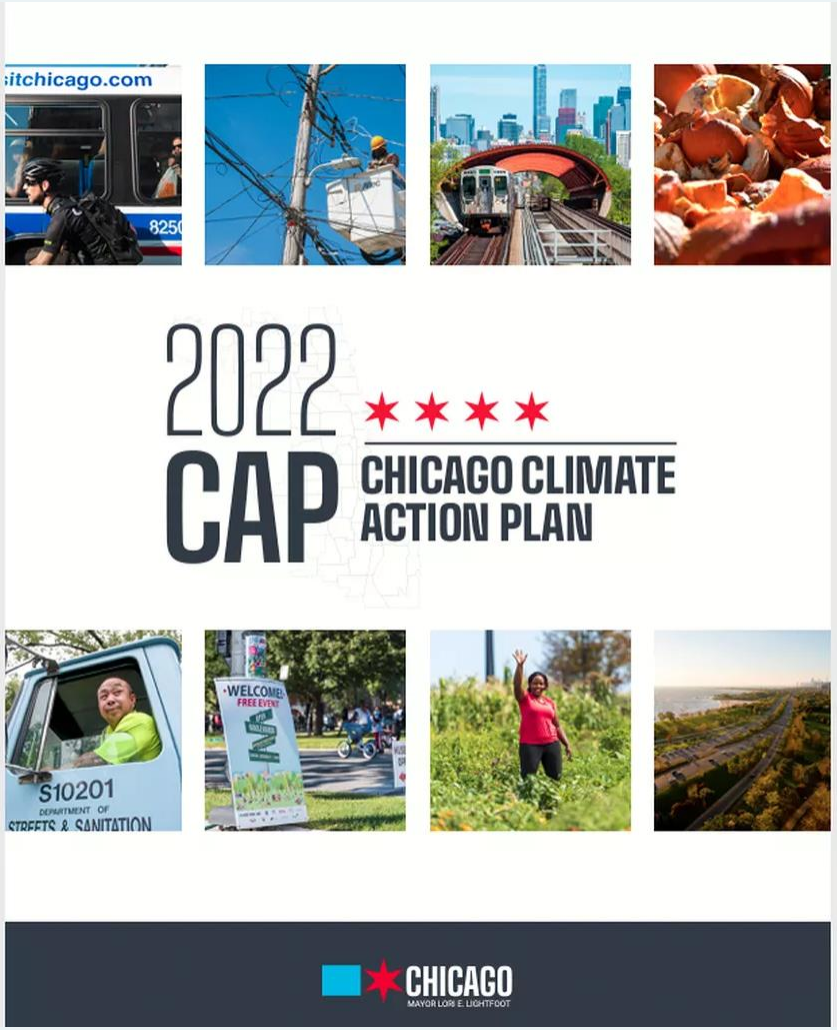
Chicago's Energy & Climate Commitment

February 2022: Climate Crisis Resolution

April 2022: 2022 Chicago Climate Action Plan

Overall goal

By 2040, reduce city's carbon emissions by 62% from 2017 levels



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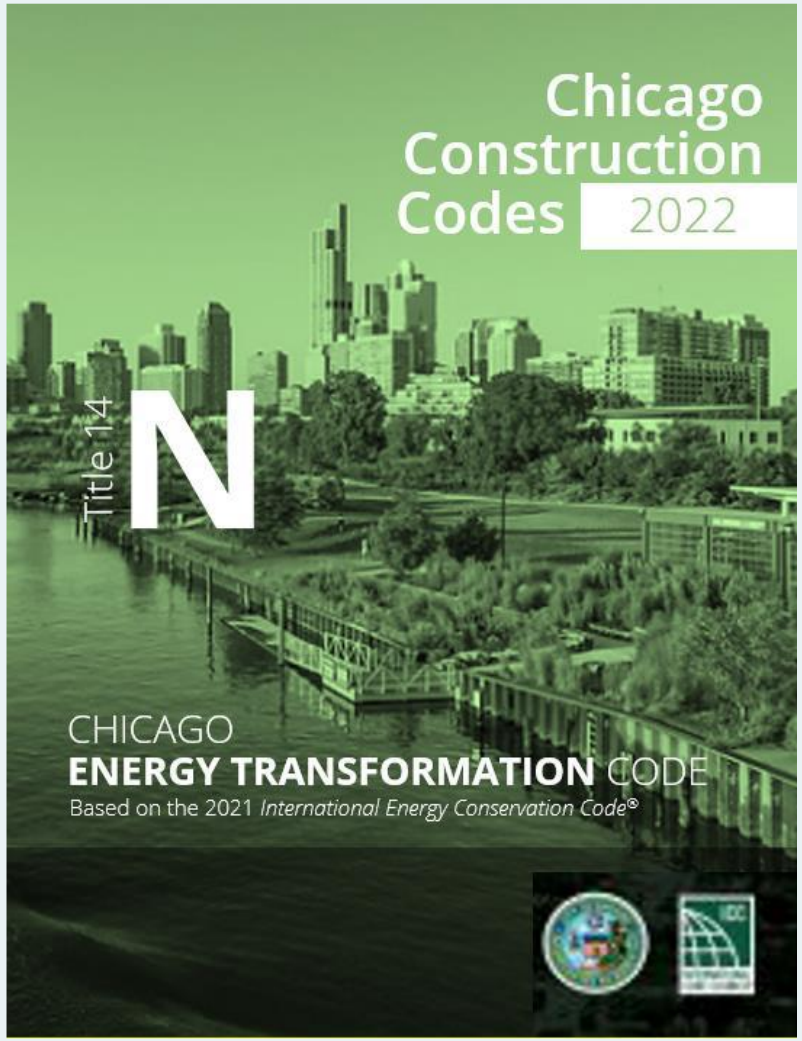
Chicago's Energy Transformation

Energy Efficiency + Clean Energy =
Energy Transformation

-Save energy first

-Prepare for clean energy transition

-Make it easy to harness solar energy



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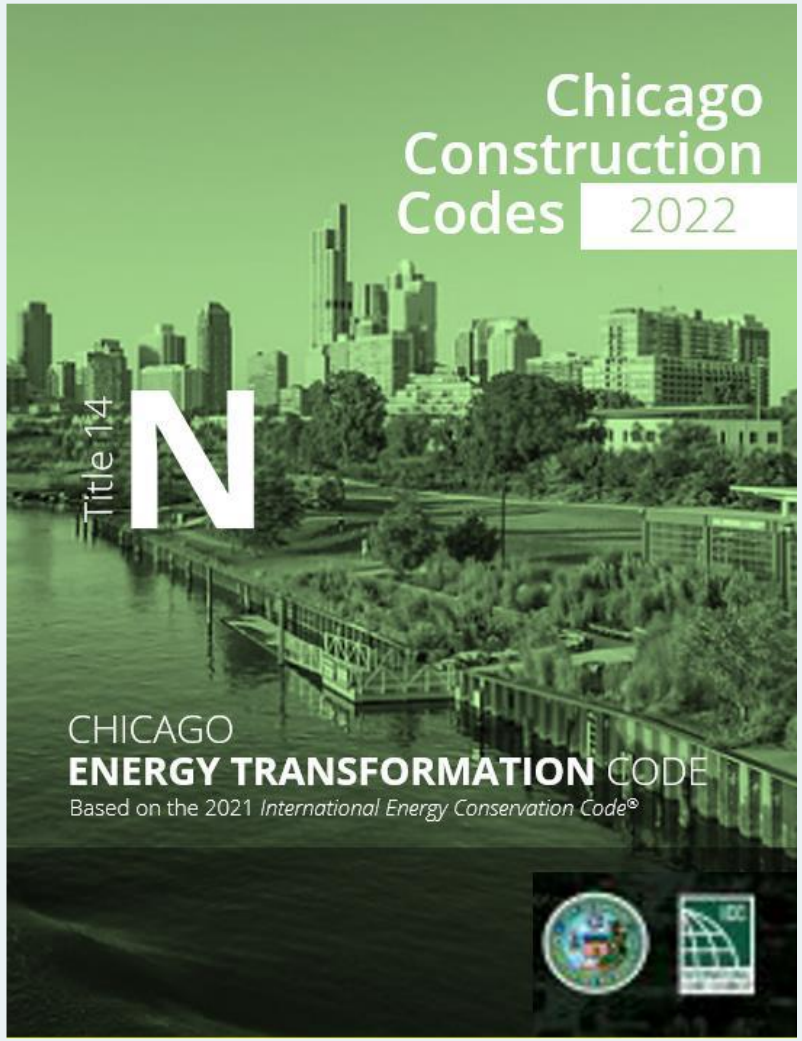
Energy Savings and More

Energy conservation requirements are proven to provide monetary savings.

2021 IECC: 9.4% energy savings improvement over 2018 IECC for residential buildings

= $2,320 average savings over life of typical residential mortgage

2021 IECC: 5% energy savings improvement over 2018 IECC for commercial buildings



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Poll #1

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2022 Chicago Energy Transformation Code - Commercial

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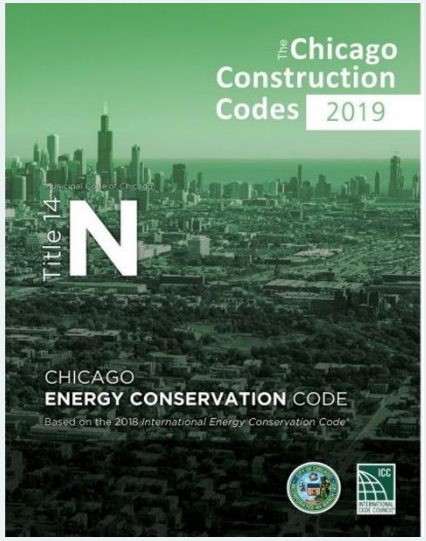
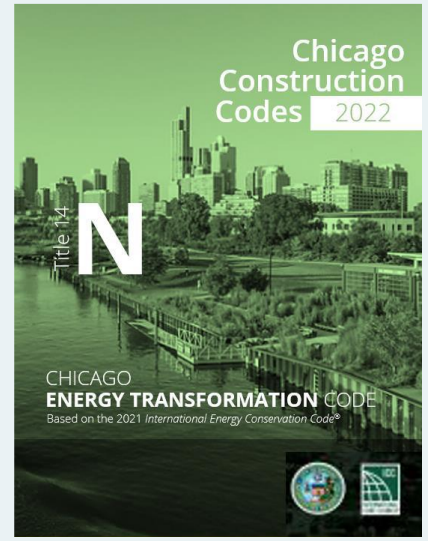
Chicago Energy Transformation Code



2019 Chicago Energy Conservation Code	2022 Chicago Energy Transformation Code
Model Code: 2018 IECC	Model Code: 2021 IECC
	+
	Solar-ready Roof
	Electrification-ready Residence
	Balcony & Parapet Insulation
	Prohibition on Installing Gas-fired Lighting Appliances
	Roof Reflectance Requirements [from Chicago Bldg Code]
	EV Supply Equipment Ready Requirements



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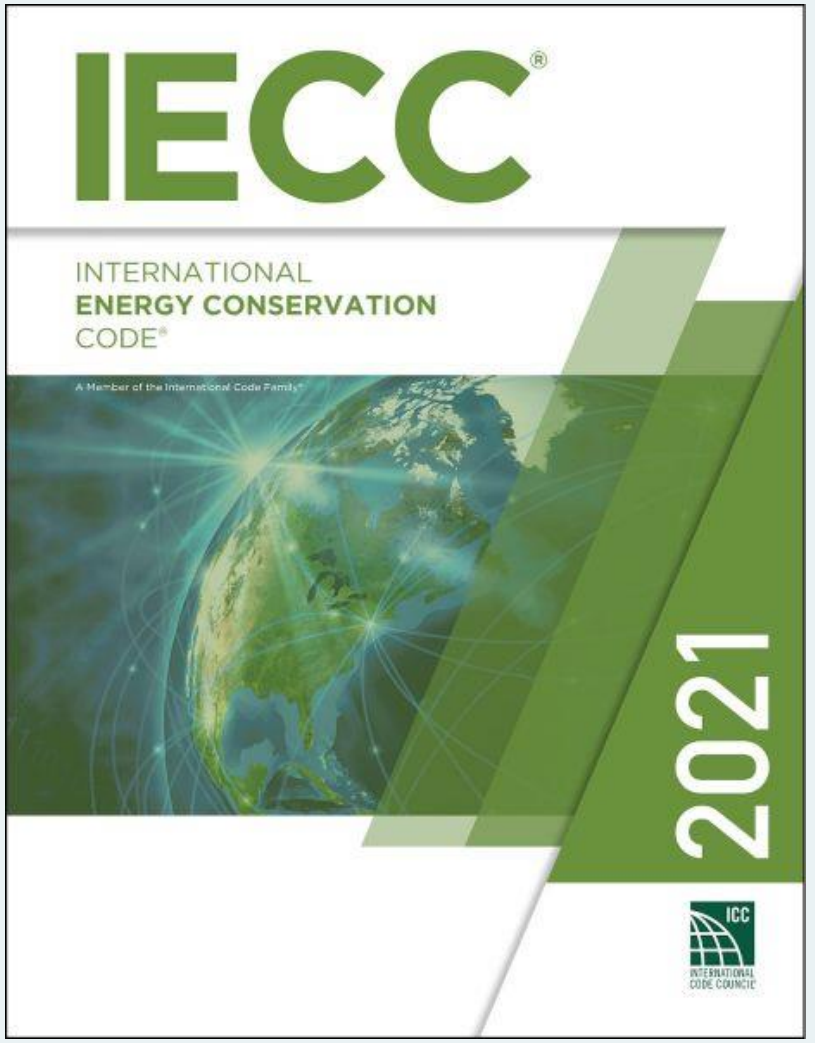
2021 IECC – Model Code

- Model Code adopted *without* weakening amendments

- New requirements added including:
  - Recognizing Phius and NGBS certification
  - Ban on new gas lighting
  - Thermal break requirements
  - Electrification-ready requirements
  - Solar-ready Roofs



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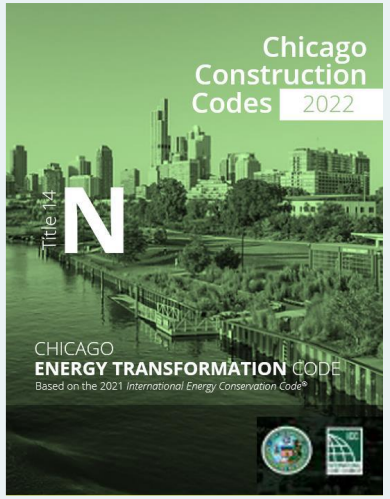
Commercial vs. Residential

Section C
C1: Scope and Purpose
C2: Definitions
C3: General Requirements
C4: Commercial Energy Efficiency
C5: Existing Buildings
C6: Chicago-specific Requirements
C7: Referenced Standards



Everything Else

Non-transient residential up to 4 stories

Section R
R1: Scope and Purpose
R2: Definitions
R3: General Requirements
R4: Residential Energy Efficiency
R5: Existing Buildings
R6: Chicago-specific Requirements
R7: Referenced Standards

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Table C402.1.3

Excerpts: Insulation Component Min. R-Values

Climate Zone & Group	Roofs			Walls				
	Above Deck	Metal Building	Attic/ Other	Mass	Metal Building	Metal Framed	Wood Framed	Below Grade
CZ 5 Other	R-30 ci	R-19 + R-11 LS	R-49 (R-38)	R-11.4ci	R-13 + R-14ci (+R-13ci)	R-13 + R-10ci (+R-7.5ci)	R-13 + R-7.5ci or R-20 + R-3.8ci (R-13 + R-3.8ci or R-20)	R-7.5 ci
CZ 5 Group R	R-30 ci	R-19 + R-11 LS	R-49	R-13.3ci	R-13 + R-14ci (+R-13ci)	R-13 + R-10ci (+R-7.5ci)	R-13 + R-7.5ci or R-20 + R-3.8ci	R-10 ci (R-7.5ci)

Values are 2022 CETC requirements.

Original 2019 CECC values in white text (R-value)

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Table C402.1.3

Excerpts: Insulation Component Min. R-Values

Climate Zone & Group	Floors			
	Mass	Joist /Framed	Unheated Slab	Heated Slab*
CZ 5 Other	R-14.6ci (R-10ci)	R-30	R-15 24” below (R-10 24”)	R-15 36” below grade + R-5 under
CZ 5 Group R	R-16.7ci (R-12.5ci)	R-30	R-20 24” below (R-10 24”)	R-15 36” below grade + R-5 under

*Note that for heated slab-on-grade construction, insulation is permitted to stop at the bottom of the slab edge

Requirements for doors in the 2019 R-value table have been moved to the U-factor table in 2022 CETC

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Table C402.1.4

Excerpts: Insulation Component Max. U-Factors

Climate Zone & Group	Roofs			Walls				
	Above Deck	Metal Building	Attic/ Other	Mass	Metal Building	Metal Framed	Wood Framed	Below Grade
CZ 5 Other	U-0.032	U-0.035	U-0.021 (U-0.027)	U-0.090	U-0.050 (U-0.052)	U-0.055 (U-0.064)	U-0.051 (U-0.064)	C-0.119
CZ 5 Group R	U-0.032	U-0.035	U-0.021	U-0.080	U-0.050 (U-0.052)	U-0.055 (U-0.064)	U-0.051 (U-0.064)	C-0.092 (C-0.119)

Values are 2022 CETC requirements.

Original 2019 CECC values in white text (U-factor)

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Table C402.1.4

Excerpts: Insulation Component Max. U-Factors

Climate Zone & Group	Floors				Doors		
	Mass	Joist /Framed	Unheated Slab	Heated Slab*	Non-Swinging**	Swinging	Garage <14% Glazing
CZ 5 Other	U-0.057 (U-0.074)	U-0.033	F-0.52 (F-0.54)	F-0.62 (F-0.79 + 0.64)	U-0.31 (R-4.75)	U-0.37 (U-0.61)	U-0.31
CZ 5 Group R	U-0.051 (U-0.064)	U-0.033	F-0.51 (F-0.54)	F-0.62 (F-0.79 + 0.64)	U-0.31 (R-4.75)	U-0.37 (U-0.61)	U-0.31

*Corrected 2019 CECC heated slab F-factor listings to match ASHRAE 90.1 Appendix A – not actual heated slab improvement

**Non-swinging doors in the 2019 R-value table have been moved to the U-factor table in 2022 CETC, and requirement relaxed

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C402.2.8 & C605

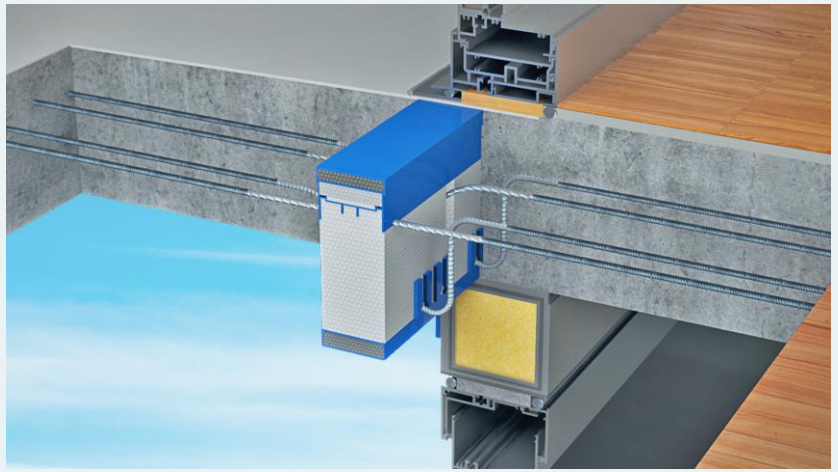
Balconies and Parapets

In new construction, exterior balconies and parapets that interrupt the building thermal envelope shall comply with **one** of the following:

- Insulated with continuous insulation (Min R-value = continuous insulation requirement of adjacent wall listed in Table C402.1.3) *"Where more than one wall assembly is interrupted by an adjacent balcony, the higher thermal resistance (R-value) shall be followed."*
- Incorporate a minimum R-3 thermal break at the location where the element penetrates the thermal envelope

Exception: Penetrations in thermal envelope that do not exceed 1sf

https://www.jlconline.com/how-to/insulation/insulating-a-roof-parapet_o



https://www.schoeck.com/en-us/balcony

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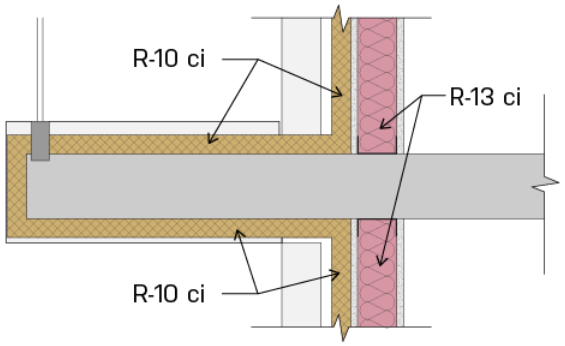
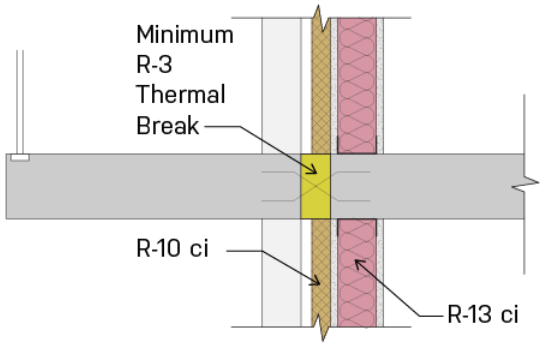
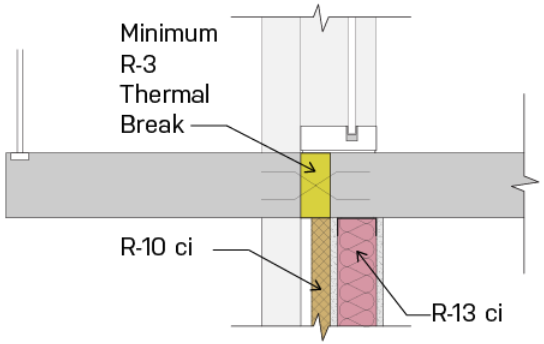
C402.2.8 & C605

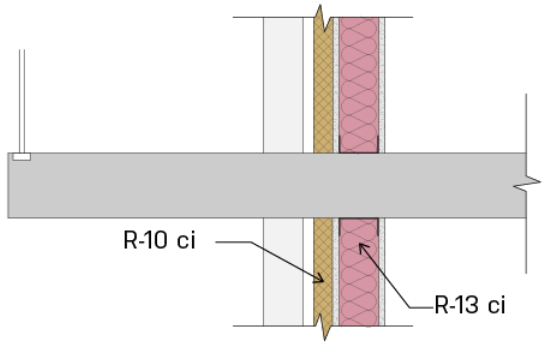
Balconies







COMPLIANT with C402.2.8 & C605



NOT COMPLIANT

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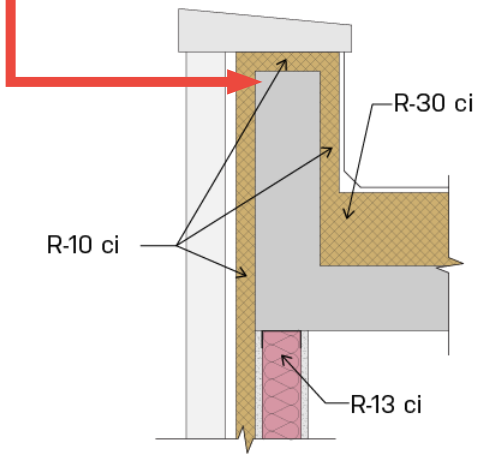
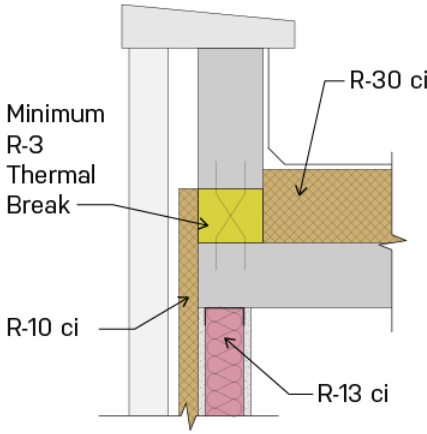
C402.2.8 & C605

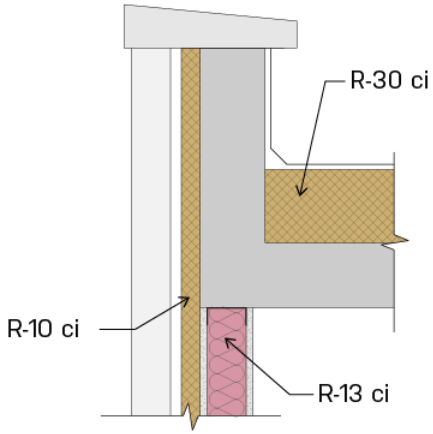
Parapets

Caution: risk of condensation and moisture, especially within narrow/tall parapet assemblies





Best Practice



COMPLIANT with C402.2.8 & C605

NOT COMPLIANT

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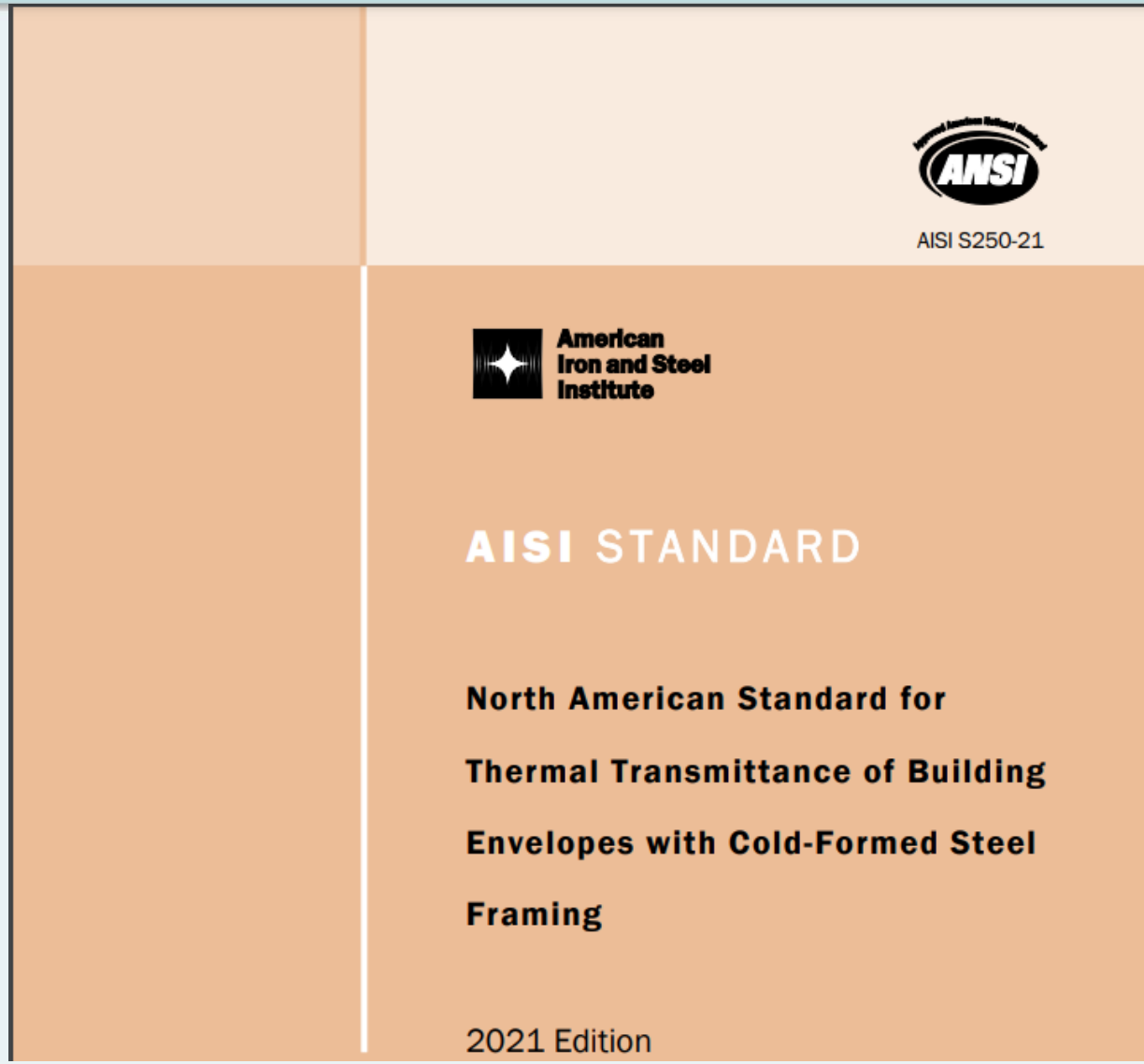
C402.1.4.2

Thermal resistance of cold-formed steel assemblies

2021 IECC Table C402.1.4.2 Effective R-values for Steel Stud Wall Assemblies: **REMOVED from CETC**

Replaced with AISI S250-21 formulas

https://steelnetwork.com/cold-formed-steel-framing/



https://thermalbridgingsolutions.com/wp-content/uploads/2022/02/AISI-S250-21S250-21-C_s.pdf

C402.1.4.2

Thermal resistance of cold-formed steel assemblies

U-factors of walls shall be determined in accordance with AISI S250

- Any framing spacing can be used with continuous insulation satisfying U-factor max with **NO** cavity insulation
- Walls at 24” O.C. or 16” O.C., use next lowest spacing factors
- For greater spacing, use AISI S250 without modification
- Walls using non-standard framing members: use AISI S250 option for non-standard framing

Table B3.1.1-1
OTZ Coefficients

Member Spacing (inches)	Designation Thickness (mils)	C_0	C_1	C_2	C_3	C_4	C_5
6	33	1.8583	0.07478	0.1488	-0.001859	-0.005103	0.002013
6	43	1.9826	0.07360	0.1501	-0.001816	-0.005314	0.002149
6	54	2.0814	0.07131	0.1522	-0.001713	-0.005295	0.002050
6	68	2.2110	0.06816	0.1508	-0.001652	-0.005576	0.002300
12	33	2.1584	0.05118	0.2079	-0.001384	-0.005367	0.002253
12	43	2.2077	0.06381	0.1992	-0.001713	-0.006235	0.003499
12	54	2.2974	0.06439	0.2043	-0.001686	-0.006908	0.003943
12	68	2.4136	0.05185	0.2166	-0.001216	-0.006840	0.003748
16	33	2.2771	0.03843	0.1964	-0.001141	-0.005237	0.003197
16	43	2.3769	0.04037	0.2011	-0.001195	-0.005677	0.003714
16	54	2.4945	0.04089	0.1996	-0.001161	-0.005719	0.003927
16	68	2.5917	0.04614	0.1922	-0.001391	-0.005884	0.004606
24	33	3.1820	-0.02946	0.2432	0.000000	-0.007520	0.003572
24	43	2.7510	0.01280	0.1965	-0.000740	-0.006709	0.005169
24	54	2.5720	0.00426	0.2285	0.000000	-0.006100	0.003509
24	68	2.9360	-0.00324	0.2256	0.000000	-0.006430	0.004190

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Table C402.4

Fenestration Max. U-Factor & SHGC Requirements

2018 IECC & 2019 CECC

CLIMATE ZONE	5 AND MARINE 4	
Vertical Fenestration		
U-Factors		
Fixed fenestration	0.38	
Operable fenestration	0.45	
Entrance doors	0.77	
SHGC		
Orientation[a]	SEW	N
PF < 0.2	0.38	0.51
0.2 ≤ PF < 0.5	0.46	0.56
PF ≥ 0.5	0.61	0.61
Skylights		
U-factor	0.50	
SHGC	0.40	

2021 IECC & 2022 CETC

CLIMATE ZONE	5 AND MARINE 4	
Vertical Fenestration		
U-Factors		
Fixed fenestration	0.36	
Operable fenestration	0.45	
Entrance doors	0.63	
SHGC		
	Fixed	Operable
PF < 0.2	0.38	0.33
0.2 ≤ PF < 0.5	0.46	0.40
PF ≥ 0.5	0.61	0.53
Skylights		
U-factor	0.50	
SHGC	0.40	

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C402.4.1.1

Increased vertical fenestration area

Vertical fenestration can be increased to a maximum of 40% of above-grade wall area when all the following are met:

https://bhhscaliber.com/commercial/

- Buildings no more than 2 stories above-grade: not less than 50% of net floor area is within daylight zone.
- Buildings 3 or more stories above-grade: not less than 25% of the net floor area is within daylight zone.
- Daylight responsive controls are installed in daylight zones.
- Visible transmittance of vertical fenestration is not less than 1.1 times solar heat gain coefficient (SHGC)

Exception: Fenestration outside scope of NFRC 200

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C402.4.1.3

SHGC/U-Factor Performance Enhancement

Buildings with more east/west fenestration than north/south fenestration have increased performance criteria depending on the ratio

Aw * SHGCw ≤ (At * SHGCc)/5
And
Ae * SHGCe ≤ (At * SHGCc)/5

Area west/east/total
SHGC west/east/code table
C402.4 value

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Poll #2

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C603

Solar-Ready Roofs

C603: Applies to new construction buildings and additions larger than 7,500 sf and less than 60 ft tall.

https://www.aia.org/articles/6198582-solar-ready-design-for-low-slope-roofs--

Exceptions:

- Buildings with permanently installed on-site renewable energy systems
- A roof shaded by structures or vegetation for more than 50% of daylight hours
- A roof with insufficient solar radiation available
- A roof with extensive rooftop equipment, skylights, occupiable rooftop areas, vegetative roof areas or similar obstructions
- Group H occupancies

C603.4

Solar-ready zone area

C603.4: Solar-ready zone (SRZ) surface area shall be not less than 40% of available roof area. Either a single area or smaller, separated sub-zones. Narrowest dimension of each sub-zone shall be not less than 5ft.

Exception: Available roof area is less than 2,000sf

40% of horizontally projected gross roof area

Not including:

- Skylights
- Rooftop parking or helipads
- Occupiable roofs
- Vegetative roofs
- Mandatory access or set back areas (Section 1204 of Chicago fire prevention code)

Solar-ready zone must be indicated on Construction Documents (C603.3)

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C603.5 – C603.7

Solar-Ready Roofs – Additional Requirements

C603.5: Obstructions – SRZs shall be free from obstructions (pipes, vents, HVAC equipment, skylights, roof-mounted equipment)

C603.6: Roof loads and documentation – Additional collateral dead load of ≥5 psf to be included in design calculations and indicated on construction documents

C603.7: Interconnection pathway – Construction documents shall indicate pathways for future conduit or piping connecting SRZs to electrical service panel, energy storage system ready area, or service water heating area.

https://solarbuildermag.com/featured/conduit-tubing-solar-commercial-installation/

Photo courtesy of Das Energy

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C603.8 – C603.10

Solar-Ready Roofs – Additional Requirements

C603.8: Energy storage system-ready area – Minimum 2’-0” x 4’-0” clear floor area for future energy storage system. Located in accordance with Chicago Fire Prevention Code.

C603.9: Electrical service reserved space – Reserved space for dual-pole breakers for future solar system and energy storage system labeled appropriately.

C603.10: Permanent certificate – A permanent certificate recording all information from section C603 shall be posted near the electrical panel or other approved location.

https://www.energy-storage.news/commercial-and-utility-battery-storage-launches-offer-all-in-one-and-plug-and-play-options/

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C604

Electrification-Ready Residences

C604: Equipment within Group R-2 occupancy *dwelling units*, rooms and spaces with domestic cooking appliances shared by the occupants of more than one *dwelling unit.*

Applies to:

- New construction
- Change of occupancy

Does NOT apply to: alterations, additions, repairs or changes of occupancy within existing Group R occupancies.

https://www.thespruce.com/electrical-service-size-of-my-home-1152752

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C604

Electrification-Ready Residences

C604.2 – Indoor cooking appliances

- 40amp receptacle within 3ft of each gas-fired appliance

C604.3 – Domestic clothes dryer

- 30amp receptacle within 3ft of each gas-fired clothes dryer

C604.4 – Water Heaters

- 30amp receptacle within 3ft of each gas-fired water heater

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R603

Solar-ready roofs

R603.1: Applies to new construction residential buildings with more than 3 stories above grade plane and low-slope roofs. Comply with Section C603 – CETC Commercial Provisions.

Exception: Buildings with ground-level footprint of 7,500 square feet or less.

https://ny.curbed.com/2017/4/13/15264890/nyc-apartments-guide-tips-new-york

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C606

Gas Lighting - Prohibited

New permanently installed fuel gas-fired lighting appliances shall be **prohibited**.

https://www.tempesttorch.com/

http://www.historyoflighting.net/lighting-history/history-of-gas-lighting/

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C607

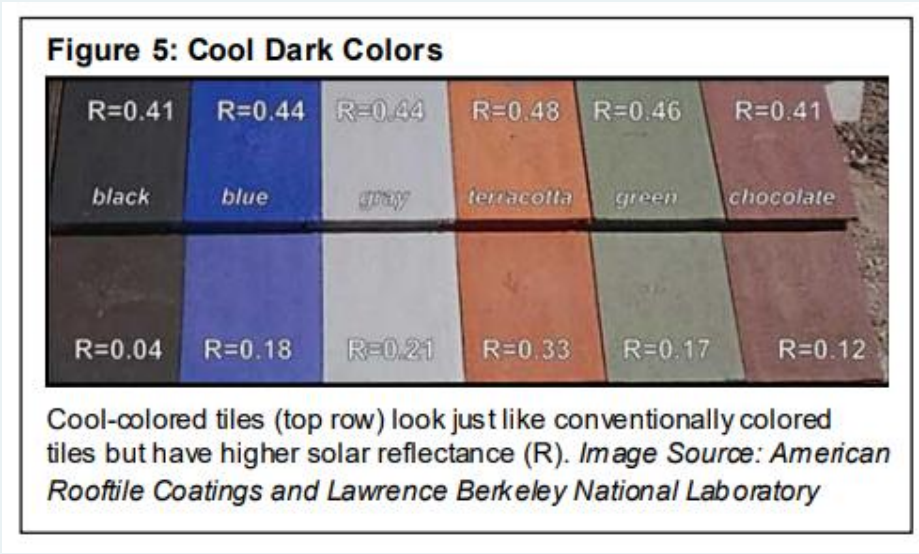
Roof Solar Reflectance

Roof coverings shall comply with Section 1515 of the Chicago Building Code.

Exceptions:

- Walking surfaces of occupiable rooftops
- Vegetative roofs, roof gardens and landscaped roofs.
- Photovoltaic and solar thermal equipment

https://heatisland.lbl.gov/coolscience/cool-roofs



https://www.energy.gov/sites/prod/files/2013/10/f3/coolroofguide.pdf

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C607/
1515.2.1

Roof Solar Reflectance

Chicago Building Code - 1515.2.1
Low-sloped roofs:
Roof coverings on low-slope roofs shall have an initial reflectancee value of 0.72 or a three-year-installed reflectance value ≥0.5

https://heatisland.lbl.gov/coolscience/cool-roofs

Exceptions:

- Where >50% of the roof area is vegetative roof or roof garden, the remaining roof area shall have a three-year installed reflectance of ≥0.3
- Roofs with 15psf (min) of ballast installed over the entire roof area shall have a three-year installed reflectance of ≥0.3

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C607/
1515.2.2

Roof Solar Reflectance

Chicago Building Code - 1515.2.2 Other than low-sloped roofs:
Roof coverings on other than low-slope roofs shall have an initial reflectance value ≥0.15

https://www.lyonsroofing.com/blog/2020/april/form-and-function-of-roof-types-pitched-roofs/

Exceptions:

- Roof coverings installed with a slope ≥5:12 (41%)
- Historic buildings

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C608

Electric Vehicle Supply Equipment

Electric vehicle supply equipment (EVSE) -Installed or -Ready parking spaces shall be provided in accordance with Section 17-10-1011 of the Chicago Zoning Ordinance.

Refer to 17-10-1011 for accessible parking requirements

https://www.energy.gov/eere/femp/electric-vehicle-and-electric-vehicle-supply-equipment-tiger-team-support

C608

Electric Vehicle Supply Equipment

Applies to:

- New construction multi-unit residential with 5 or more units and on-site parking provided

  At least 20% of provided spaces, **no less than one**, shall be EVSE-Ready or EVSE-installed

- New construction for uses other than residential with 30 or more parking spaces provided.

  At least 20% of provided spaces, shall be EVSE-Ready or EVSE-installed

https://chargedevs.com/newswire/chicago-to-require-evse-ready-parking-spaces/

C405.4

Lighting for Plant Growth

All permanent installed luminaires shall have photon efficiency of not less than 1.7µmol/J per ANSI/ASABE S640 for greenhouses and 2.2 µmol/J for all other indoor growing spaces

Exceptions: buildings with no more than 40kW of aggregate horticultural lighting load and Cannabis facilities subject to 410 ILCS 705/10-45

Image courtesy of DOE

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Poll #3

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2022 Chicago Energy Transformation Code - Residential

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R401.2.5

Additional Energy Efficiency

Modified to include reference to PHIUS or NGBS compliance

→ NO further compliance requirements

If following Prescriptive or Total Building Performance compliance paths: **2 additional efficiency package options must be selected!**

Pick 2

1. Enhanced Envelope Performance
2. More Efficient HVAC Performance
3. Reduced Service Water Energy
4. More Efficient Duct Thermal Distribution
5. Improved Air Sealing and Efficient Ventilation System

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Table R402.1.2

Maximum Assembly U-Factors

	Climate Zone	Fenestration U-Factor	Skylight U-factor	Fenestration SHGC	Ceiling U-Factor	Wood Frame Wall U-Factor	Mass Wall U-Factor	Floor U-Factor	Basement Wall U-Factor	Crawl Space Wall U-Factor
2019 CECC	5	0.30	0.55	NR	0.026	0.060	0.082	0.033	0.050	0.055
2022 CETC	5	0.30	0.55	**0.40**	**0.024**	**0.045**	0.082	0.033	0.050	0.055

2022 CETC addition above 2021 IECC

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Table R402.1.3

Minimum Assembly R-Values

	Climate Zone	Fenestration U-Factor	Skylight U-factor	Fenestration SHGC	Ceiling R-Value	Wood Frame Wall R-Value	Mass Wall R-value	Floor R-value	Basement Wall R-value	Slab R-value & Depth
2019 CECC	5	0.30	0.55	NR	49	20 or 13+5	13/17	30	15/19	10, 2ft
2022 CETC	5	0.30	0.55	**0.40**	**60**	**30, 20+5*, 13+10, or 0+20**	13/17	30	**15ci/19/ 13+5ci**	**10, 4ft**

Updates wood-frame wall R-value requirements with footnote: “To reduce possibility of condensation, ratio of continuous to cavity insulation shall not be less than 0.30 without hygrothermal analysis.”

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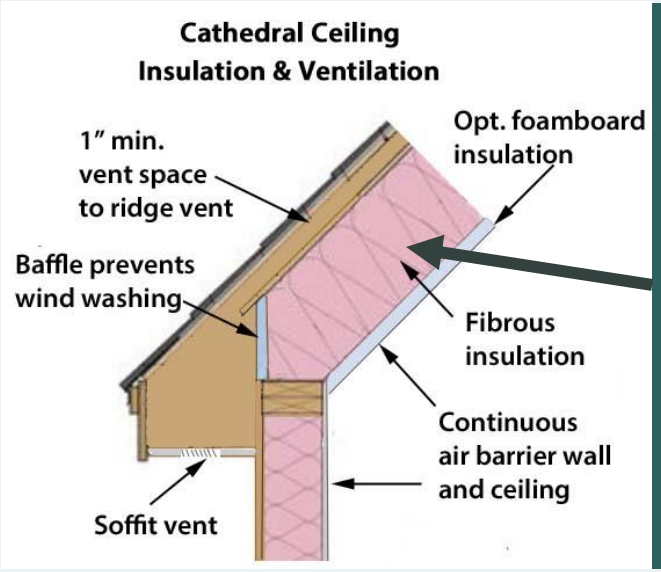
R402.2.2

Specific Roof Insulation Requirements

2021 IECC R402.2.2 sets minimum insulation requirement for ceilings without attics.

- Minimum R-30 required if Table R402.1.2 minimum insulation cannot be installed in space
- Limited to 500sf or 20% of ceiling



Per 2022 CETC: R-60 min. Requires thicker framing or added continuous insulation

---

2022 CETC replaces low-slope roof minimum insulation requirement of R-60 with R-42.

Insulation must be continuous above deck

Must cover 100% of roof area

Per 2022 CETC: R-42 allowable if 100% coverage above deck continuous

R402.2.6

Steel-Frame Assemblies

- As with Commercial section, adds requirement to calculate steel-framed assembly U-factors using AISI S250
  - All exterior continuous insulation can be any framing distance
  - 16” and 24” O.C. framing uses next lower framing member spacing input when calculating U-factor
  - Larger spacings use AISI calculation without modification
  - For custom framing members, use of AISI S250 calculation for other than C-shaped members is allowed

https://www.angi.com/articles/why-use-steel-frame-house.htm

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Table R402.2.6

Steel-Frame Assemblies

- Revised Table R402.2.6 to remove references to type of assembly, and only uses the requirements for 16” and 24” O.C. framing with >30% continuous : cavity insulation ratio

“TABLE R402.2.6
STEEL-FRAME WALL INSULATION *R*-VALUES

WOOD FRAME *R*-VALUE REQUIREMENT	COLD-FORMED STEEL-FRAME EQUIVALENT *R*-VALUE[a]
Steel-frame Wall, 16 inches on center	
R-13&10ci	R-0&20ci or R-13&15ci or R-15&14ci
R-20&5ci	R-13&12.7ci or R-15&12.3ci or R-19&11.6ci or R-21&11.3ci or R-25&10.9ci
Steel-frame Wall, 24 inches on center	
R-13&10ci	R-0&20ci or R-13&13ci or R-15&12ci or R-19&11ci or R-21&11ci
R-20&5ci	R-13&11.5ci or R-15&10.9ci or R-19&10.1ci or R-21&9.7ci or R-25&9.1ci

ci = continuous insulation.

a. The first value is cavity insulation *R*-value; the second value is continuous insulation *R*-value. Therefore, for example, “R-30&3ci” means R-30 cavity insulation plus R-3 continuous insulation.”

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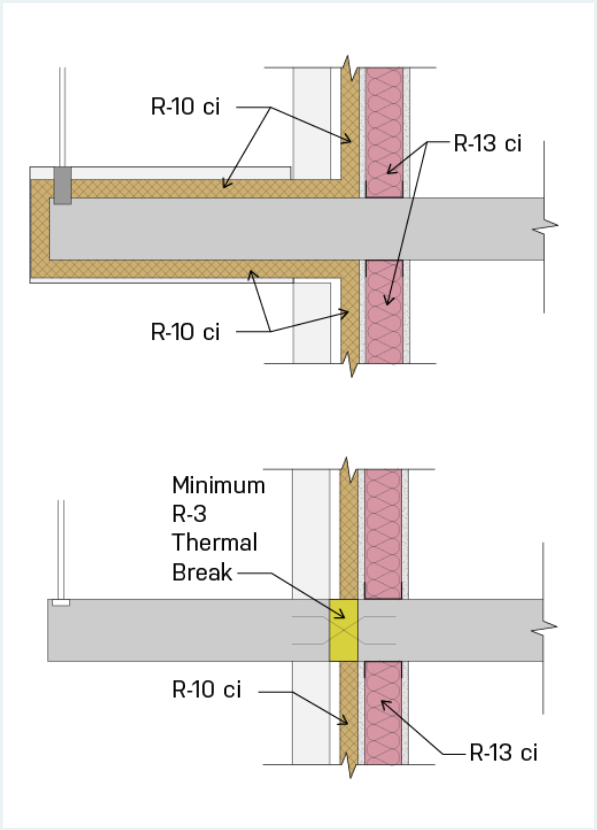
R402.2.13

Parapets and Balconies

- Adds section to IECC model code on specific insulation requirements for these common thermal bridge locations. Refers to R605 in CETC
  - Continuous insulation wrap around balcony or parapet thermal bridge
  - R-3 minimum thermal break between assembly and plane of home thermal envelope.
    - Exceptions for ≤1sf thermal bridge and R-5 occupancies



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R403.3.6

Duct Leakage Exceptions Added

- Rough-in Test: 4.0 cfm/100 sf with AHU installed, 3.0 cfm/100 sf without AHU.
  - Added Exception: 60 cfm for ducts serving ≤1,500 sf
- Postconstruction Test: 4.0 cfm/100 sf
  - Added Exception: 60 cfm for ducts serving ≤1,500 sf
- Ducts within Thermal Envelope: 8 cfm/100 sf
  - Added Exception: 60 cfm for ducts serving ≤750 sf

https://basc.pnnl.gov/resource-guides/total-duct-leakage-tests

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R403.6.2

Whole-House Ventilation Fan Efficacy

- The CETC adds back in requirements for range hoods that IECC grouped into the “other exhaust” category.
- Same requirement, just a clarification and not a modification of the IECC requirement.

TABLE R403.6.2
WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM FAN EFFICACY[a]

SYSTEM TYPE	AIRFLOW RATE (CFM)	MINIMUM EFFICACY (CFM/WATT)
HRV, ERV, or balanced	Any	1.2 cfm/watt
Range hood	Any	2.8 cfm/watt
In-line supply or exhaust fan	Any	3.8 cfm/watt
Other exhaust fan	< 90	2.8 cfm/watt
	≥ 90	3.5 cfm/watt
Air-handler that is integrated to tested and listed HVAC equipment	Any	1.2 cfm/watt

For SI: 1 cubic foot per minute = 28.3 L/min.

a. Design outdoor airflow rate/watts of fan used.

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R403.6.4/5

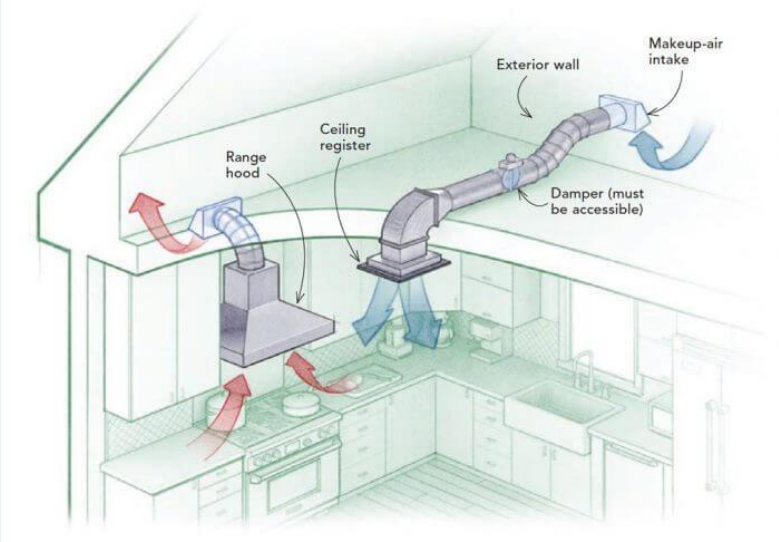
Local Exhaust and Exhaust Discharge

- Additional requirement in CETC R403.6.4
  - Contained in mechanical code, ported to energy code for clarity when designing.

Table 403.6.4
Minimum Required Local Exhaust Rates

Area to Be Exhausted	Exhaust Rate Capacity
Kitchens	100 cfm intermittent or 50 cfm continuous
Bathrooms and toilet rooms	50 cfm intermittent or 20 cfm continuous

For SI: 1 cubic foot per minute = 0.47 L/s.



https://kitchen.services/range-hood-duct-complete-guide/

- Additional requirement in CETC R403.6.5
  - Exhaust must discharge outside the envelope of the building, not in attic or crawl. Can't be near ventilation intake.
  - Exceptions for whole-house fans in private dwellings and kitchen range hoods

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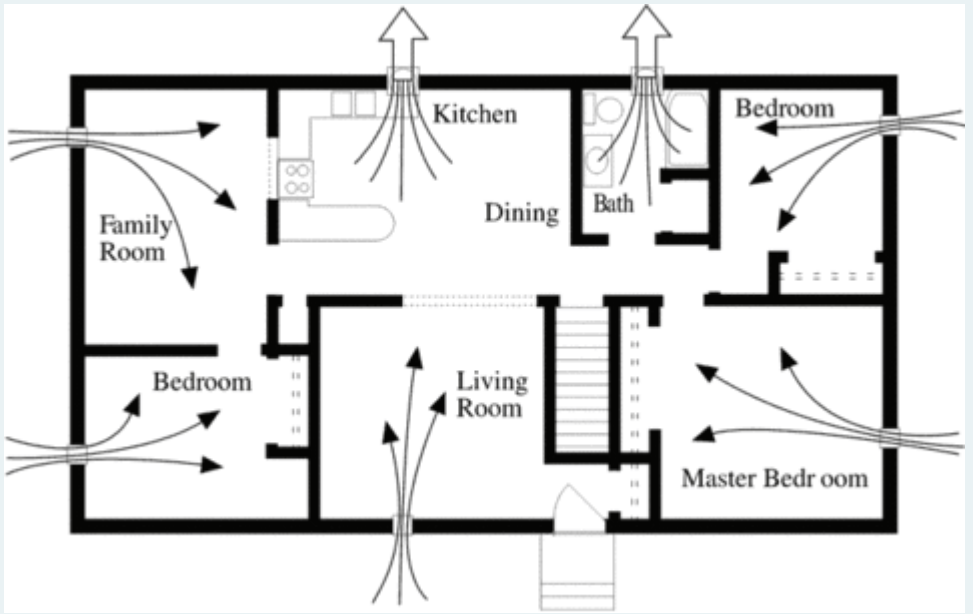
R403.6.7

Ventilation Design

Additional details in 2022 CETC

- Required ventilation rate can be reduced 30% if supply air is ducted to all bedrooms and at least one of: living room, dining room, kitchen. Must be balanced supply/exhaust
- Ports over mechanical code ventilation requirement for clarity
  - CFM=0.03xCFA + 7.5 (N_{br}+1)
  - Can operate ventilation intermittently



https://www.buildinggreen.com/primer/fresh-air-supply-exhaust-only-ventilation

RUN-TIME PERCENTAGE IN EACH 4-HOUR SEGMENT	25%	33%	50%	66%	75%	100%
Factor [a]	4.0	3.0	2.0	1.5	1.3	1.0

a. For run-time percentage values between those given, the factors are permitted to be determined by interpolation.

b. Extrapolation beyond the table is prohibited.

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How to Comply with 2022 Chicago Energy Transformation Code

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Residential Building

- a detached one-family dwelling
- any building that has **four or fewer stories** above grade plane and that contains multiple units in which the occupants reside on a primarily permanent basis.
- If a residential building contains non-residential uses, other than parking, a Commercial Compliance Statement is also required.

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Residential Compliance Statement

- ❑ REScheck
- ❑ Prescriptive Path
- ❑ Total Building Performance
- ❑ Energy Rating Index
- ❑ Phius Certification
- ❑ NGBS Certification

CHICAGO
Department of Buildings

Residential Compliance Statement
2022 CHICAGO ENERGY TRANSFORMATION CODE

Application Details
✶ Project Address

✶ Permit Application Number

Certification of Compliance with Energy Transformation Code
To the best of my knowledge, belief, and professional judgment, all work shown in the construction documents for this application is:

☐ In compliance with the residential requirements of the 2019 Chicago Energy Transformation Code, as detailed below.

☐ Exempt from the energy conservation requirements of the 2019 Chicago Energy Transformation Code as: (select one)

☐ The reconstruction or renewal of any part of an existing building for its maintenance or to correct damage. (No alterations or additions)

☐ The alteration, relocation, or change of occupancy of a historic building, and the report required by Section R501.6 is attached to this statement.

Additionally, the construction documents submitted with this application comply with the specific requirements of the Chicago Energy Transformation Code and the general requirements of the Chicago Construction Codes Administrative Provisions (Title 14A).

I have notified the permit applicant of the requirements to perform post-construction air-leakage testing in Section R402.4.1.2 and duct testing in Section R403.3.3, if applicable.

✶ Signature

✶ Date

✶ Professional Seal

✶ Printed Name

✶ Illinois License Number

✶ Compliance Method
Visit www.energycodes.gov/rescheck for more information.

☐ **RES*check* (Recommended)**
A RES*check* compliance certificate demonstrating the project's compliance with IECC-2021 is attached to this statement. Complete and accurate information about the project was entered into RES*check*.

☐ **Prescriptive Path**
A report or narrative substantiating how the project complies with the prescriptive requirements of the Energy Transformation Code, including Sections R401, R402, R403 and R404 is attached to this statement.

☐ **Total Building Performance**
The project complies with Section R405.
A compliance report meeting the requirements of Section R405.3.2 is attached to this statement.

☐ **Energy Rating Index**
The project complies with Section R406.
A pre-construction compliance report meeting the requirements of Section R406.7.2 is attached to this statement. Proof that the permit applicant has hired a third party to provide a post-construction energy rating is also attached to this statement.

☐ **Phius Certification**
The project will be certified under the 2021 Phius Passive Building Standard Certification Guidebook (v. 3.1) and evidence of certification will be filed with the Department of Buildings within 180 days of project completion.

☐ **National Green Building Standard (NGBS) Certification**
The project will be certified at the Gold or Emerald level under the 2020 National Green Building Standard and evidence of certification will be filed with the Department of Buildings within 180 days of project completion.

Commercial Building

- a non-residential building
- If a mixed occupancy building contains both non-residential occupancy and residential occupancy, up to four stories above grade plane, both Residential and Commercial forms must be filed.

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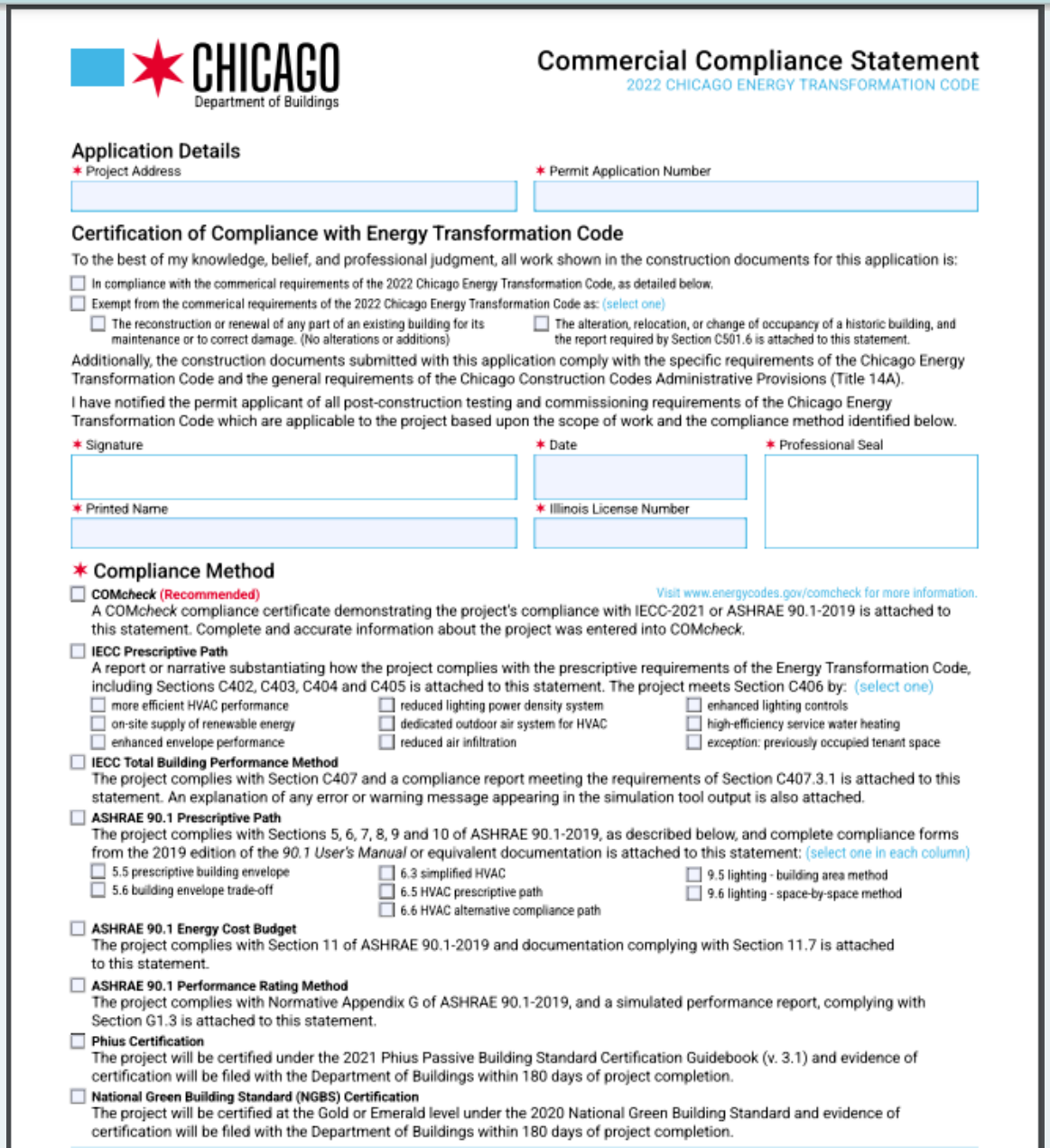
Commercial Compliance Statement

- ❑ COMcheck
- ❑ IECC Prescriptive Path
- ❑ IECC Total Building Performance Method
- ❑ ASHRAE 90.1 Prescriptive Path
- ❑ ASHRAE 90.1 Energy Cost Budget
- ❑ ASHRAE 90.1 Performance Rating Method
- ❑ Phius Certification
- ❑ NGBS Certification



CHICAGO
Department of Buildings

Commercial Compliance Statement
2022 CHICAGO ENERGY TRANSFORMATION CODE

Application Details

* Project Address
* Permit Application Number

Certification of Compliance with Energy Transformation Code

To the best of my knowledge, belief, and professional judgment, all work shown in the construction documents for this application is:

- ☐ In compliance with the commerical requirements of the 2022 Chicago Energy Transformation Code, as detailed below.
- ☐ Exempt from the commerical requirements of the 2022 Chicago Energy Transformation Code as: (select one)
  - ☐ The reconstruction or renewal of any part of an existing building for its maintenance or to correct damage. (No alterations or additions)
  - ☐ The alteration, relocation, or change of occupancy of a historic building, and the report required by Section C501.6 is attached to this statement.

Additionally, the construction documents submitted with this application comply with the specific requirements of the Chicago Energy Transformation Code and the general requirements of the Chicago Construction Codes Administrative Provisions (Title 14A).

I have notified the permit applicant of all post-construction testing and commissioning requirements of the Chicago Energy Transformation Code which are applicable to the project based upon the scope of work and the compliance method identified below.

* Signature
* Date
* Professional Seal
* Printed Name
* Illinois License Number

*** Compliance Method**

☐ **COMcheck (Recommended)** — Visit www.energycodes.gov/comcheck for more information.
A COM*check* compliance certificate demonstrating the project's compliance with IECC-2021 or ASHRAE 90.1-2019 is attached to this statement. Complete and accurate information about the project was entered into COM*check*.

☐ **IECC Prescriptive Path**
A report or narrative substantiating how the project complies with the prescriptive requirements of the Energy Transformation Code, including Sections C402, C403, C404 and C405 is attached to this statement. The project meets Section C406 by: (select one)

- ☐ more efficient HVAC performance
- ☐ on-site supply of renewable energy
- ☐ enhanced envelope performance
- ☐ reduced lighting power density system
- ☐ dedicated outdoor air system for HVAC
- ☐ reduced air infiltration
- ☐ enhanced lighting controls
- ☐ high-efficiency service water heating
- ☐ exception: previously occupied tenant space

☐ **IECC Total Building Performance Method**
The project complies with Section C407 and a compliance report meeting the requirements of Section C407.3.1 is attached to this statement. An explanation of any error or warning message appearing in the simulation tool output is also attached.

☐ **ASHRAE 90.1 Prescriptive Path**
The project complies with Sections 5, 6, 7, 8, 9 and 10 of ASHRAE 90.1-2019, as described below, and complete compliance forms from the 2019 edition of the *90.1 User's Manual* or equivalent documentation is attached to this statement: (select one in each column)

- ☐ 5.5 prescriptive building envelope
- ☐ 5.6 building envelope trade-off
- ☐ 6.3 simplified HVAC
- ☐ 6.5 HVAC prescriptive path
- ☐ 6.6 HVAC alternative compliance path
- ☐ 9.5 lighting - building area method
- ☐ 9.6 lighting - space-by-space method

☐ **ASHRAE 90.1 Energy Cost Budget**
The project complies with Section 11 of ASHRAE 90.1-2019 and documentation complying with Section 11.7 is attached to this statement.

☐ **ASHRAE 90.1 Performance Rating Method**
The project complies with Normative Appendix G of ASHRAE 90.1-2019, and a simulated performance report, complying with Section G1.3 is attached to this statement.

☐ **Phius Certification**
The project will be certified under the 2021 Phius Passive Building Standard Certification Guidebook (v. 3.1) and evidence of certification will be filed with the Department of Buildings within 180 days of project completion.

☐ **National Green Building Standard (NGBS) Certification**
The project will be certified at the Gold or Emerald level under the 2020 National Green Building Standard and evidence of certification will be filed with the Department of Buildings within 180 days of project completion.

Above-code Buildings

Home Innovation
NGBS GREEN CERTIFIED™
EMERALD

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R401.2.4.1

Phius Certification

- Phius 2021 Passive Building Standard Certification Guidebook, version 3.1.
- Phius CORE
- Phius ZERO
- Allowed for Commercial or Residential Code Compliance

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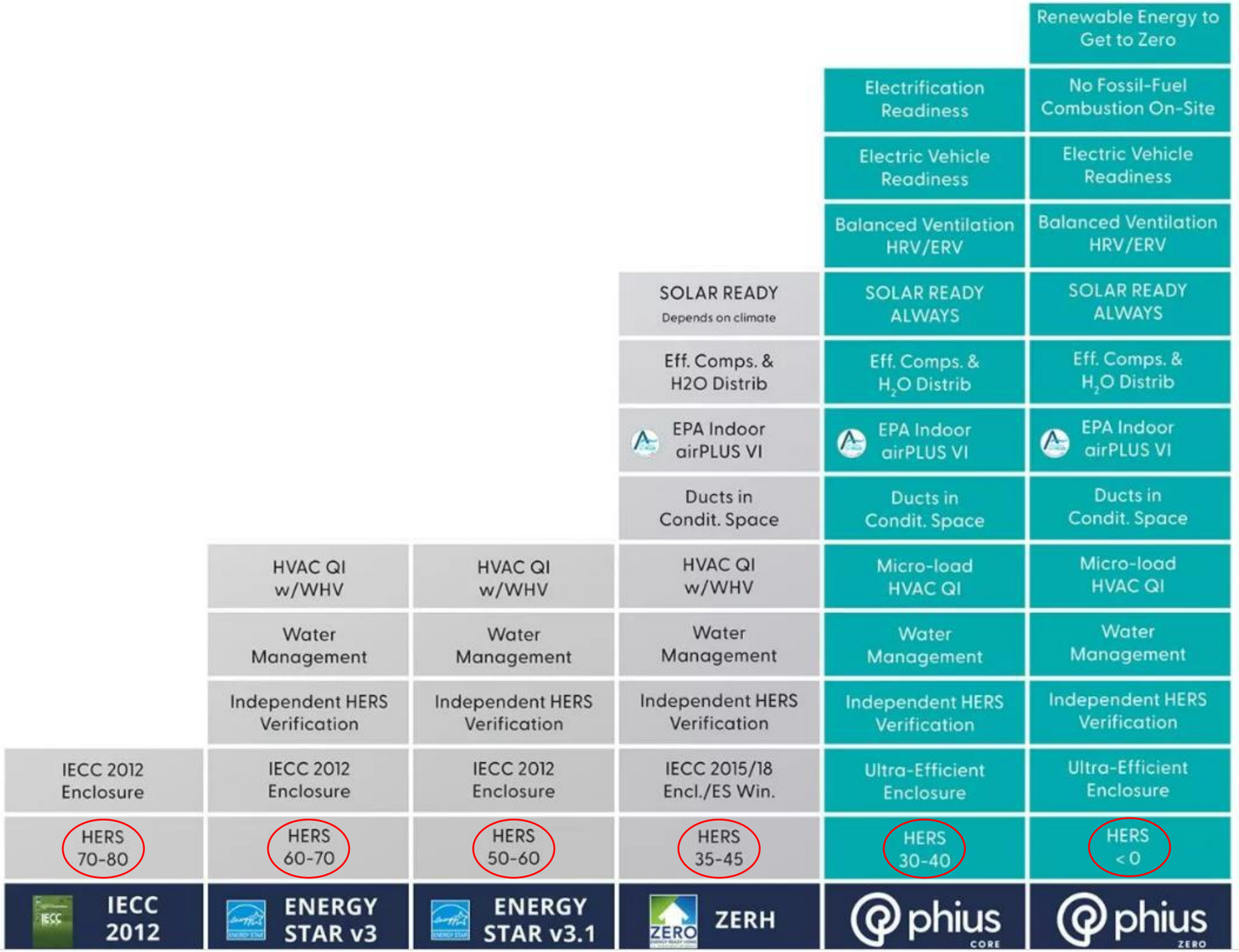
R401.2.4.1

Phius

vs.

other standards

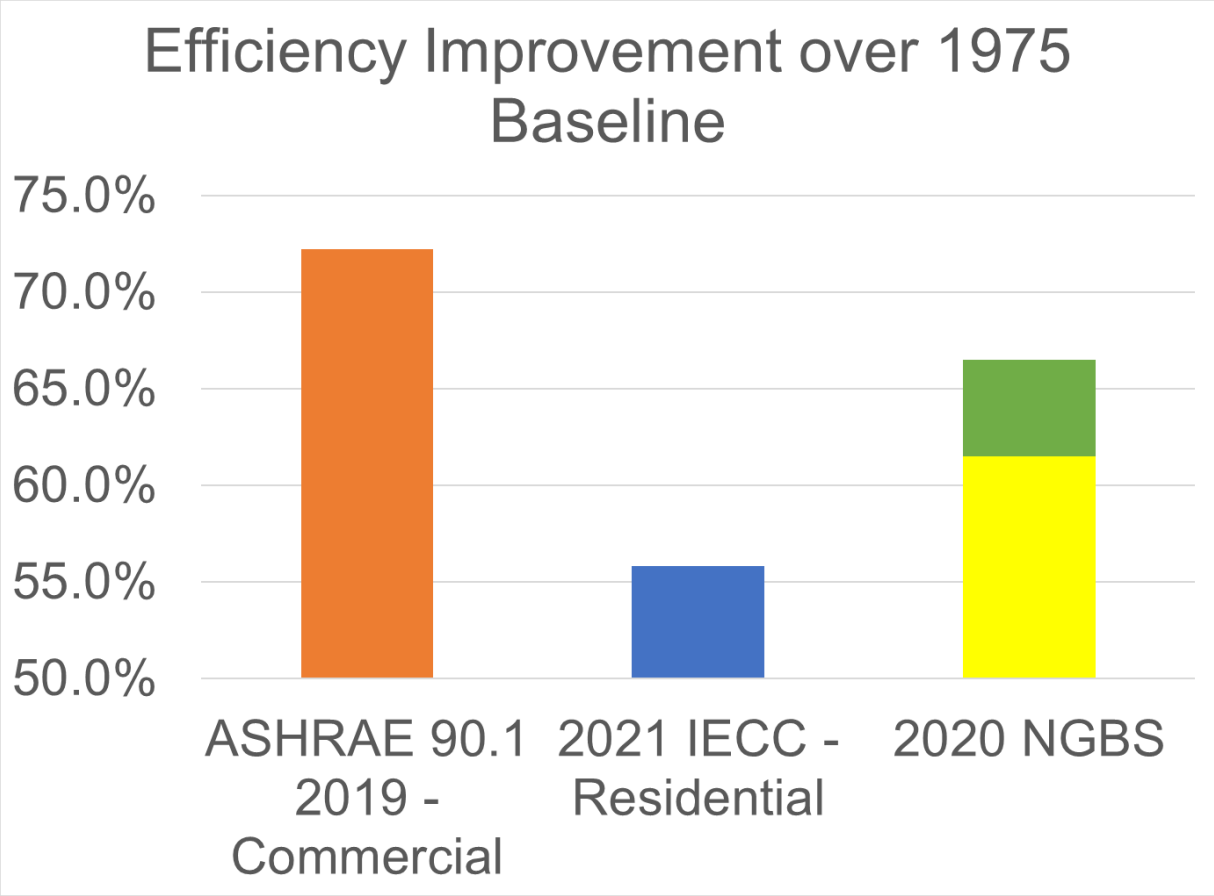
Note: The 2021 IECC Home Energy Performance Index for CZ5 is 55



R401.2.4.2

National Green Building Standard Certification

- 2020 NGBS Certification – Gold
- 2020 NGBS Certification – Emerald



Data from DOE.gov and Home Innovation.com

NGBS GREEN CERTIFIED
GOLD

NGBS GREEN CERTIFIED
EMERALD

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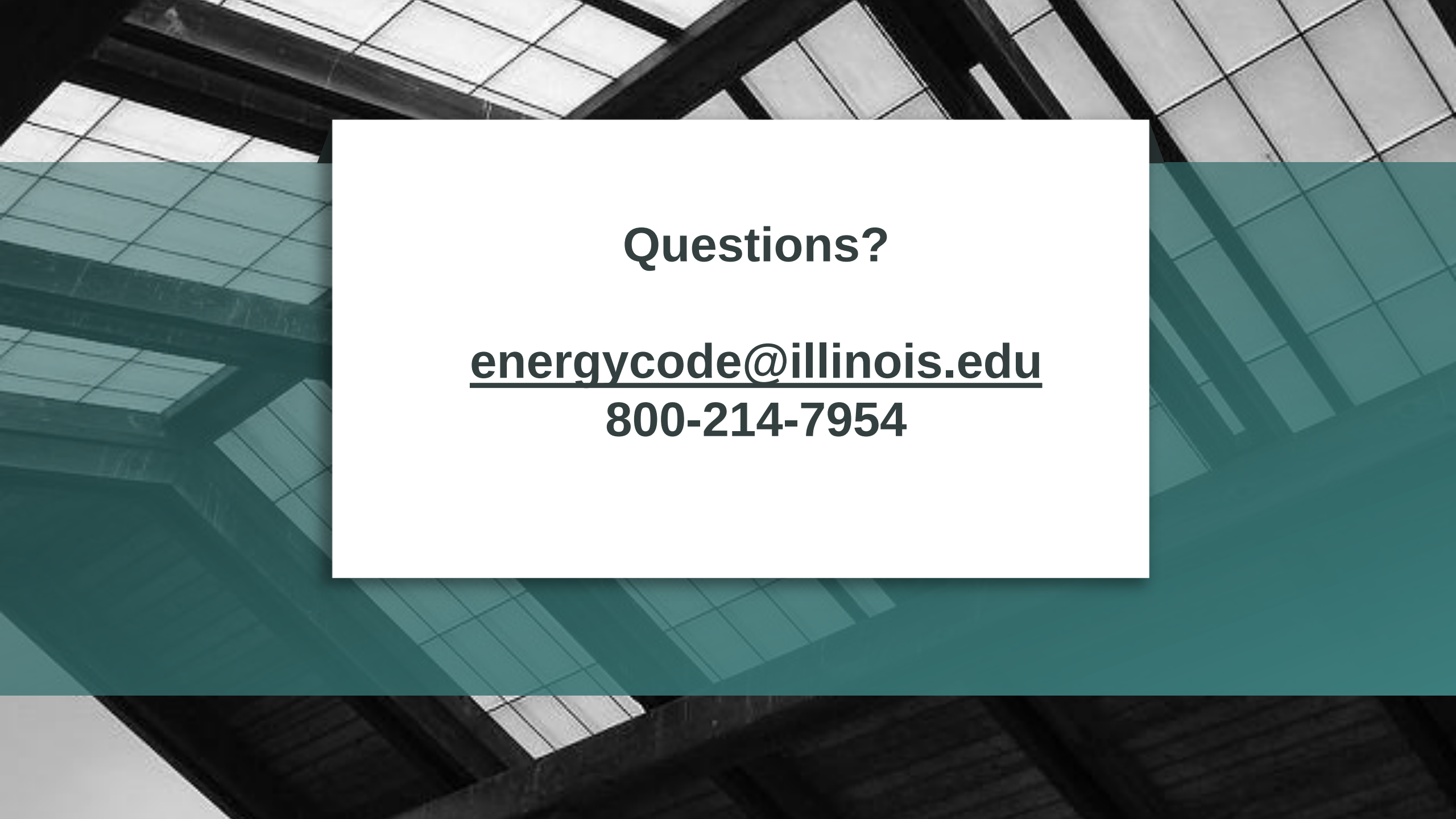

Questions?

energycode@illinois.edu
800-214-7954