

Illinois Residential Stretch Code

11/14/2023



SEDAC

SMART ENERGY DESIGN ASSISTANCE CENTER

Providing effective energy strategies for buildings and communities



SEDAC

SMART ENERGY DESIGN ASSISTANCE CENTER

Presenters:

Robert Schlorff



Ryan Siegel



Who We Are



SEDAC

SMART ENERGY DESIGN ASSISTANCE CENTER

Our mission: Reduce the energy footprint of Illinois and beyond



What We Do

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

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

We help facilities become more energy efficient.

We educate.

We research.

We advocate for a greener future.



SEDAC is the Illinois Energy Conservation Code Training Provider



This training program is sponsored by **Illinois EPA Office of Energy**

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.



This workshop is approved for 1 LU/HSW CES credits from the American Institute of Architects (AIA). Credits earned on completion will be reported for AIA members.



Energy Code Assistance



Technical support

- energycode@sedac.org
- 800.214.7954

Online resources at

smartenergy.illinois.edu/energy-code

- Workshops
- Webinars
- Online on-demand training modules

SEDAC Energy Code Training Series

Energy Code Webinar Schedule

08.22.23 – ARCHIVED – Energy Code Basics

09.26.23 – ARCHIVED - Existing Residential Buildings

11.07.23 – ARCHIVED – Field Applications of Mechanical Insulation

11.14.23 – TODAY! - Residential Stretch Code

12.12.23 – Q&A Review – How We Answer Energy Code Questions

02.20.24 – Commercial Stretch Code

04.09.24 – Simplified Code Compliance

05.21.24 – Existing Commercial Buildings

06.11.24 – Q&A Review – How We Answer Energy Code Questions

Registration: <https://smartenergy.illinois.edu/events>

SEDAC Energy Code In-person Workshops

10.17.23 - Energy Code Basics and Q&A review – Workshop 1

(Thanks for joining us in Springfield last month!)

03.19.24 – Workshop 2

Energy Code Basics, Simplifying Code Compliance & Q&A Review

– Location: TBD

Registration: <https://smartenergy.illinois.edu/events>

Illinois Energy Conservation Code

2021 Illinois Energy Conservation Code (2021 IECC with IL Amendments) is anticipated to become effective for permit applications beginning January 1st, 2024.



Access to 2021 IECC & IL Amendments

Menu Search all of Digital Codes

All Codes <

Legend Information

CODE SECTIONS MY NOTES

2021 INTERNATIONAL ENERGY CONSERVATION CODE (IECC)

COPYRIGHT

PREFACE

▶ ARRANGEMENT AND FORMAT OF THE 2021 IECC

ABBREVIATIONS AND NOTATIONS

IECC—COMMERCIAL PROVISIONS

▶ CHAPTER 1 [CE] SCOPE AND ADMINISTRATION

▶ CHAPTER 2 [CE] DEFINITIONS

▶ CHAPTER 3 [CE] GENERAL REQUIREMENTS

▶ CHAPTER 4 [CE] COMMERCIAL ENERGY EFFICIENCY

2021 International (IECC) Add to Favorites

The 2021 IECC® addresses energy efficiency on several resources and the impact of energy usage on the environment.

Related Titles

2021 Complete Revision History to the 2021 I-Codes - IECC: Successful Changes and Public Comments >

2021 Significant Changes to the International Energy Conservation Code >

IL Amendments DRAFT:
CDB May 2023 Board Book
pp 026-069

**CHAPTER 1 [CE]
SCOPE AND ADMINISTRATION**

**SECTION C101
SCOPE AND GENERAL REQUIREMENTS**

C101.1 Title. This code shall be known as the *International Energy Conservation Code of [NAME OF JURISDICTION]* and shall be cited as such: *Illinois Energy Conservation Code* or "this Code" and shall mean:

With respect to the State facilities covered by 71 Ill. Adm. Code 600.Subpart B:

This Part, all additional requirements incorporated within Subpart B (including the 2018 International Energy Conservation Code, including all published errata but excluding published supplements that encompass ASHRAE 90.1-2016), and any statutorily authorized adaptations to the incorporated standards adopted by CDB are effective July 1, 2019.

With respect to the privately funded commercial facilities covered by 71 Ill. Adm. Code 600.Subpart C:

This Part, all additional requirements incorporated within Subpart C (including the 2018 International Energy Conservation Code, including all published errata and excluding published supplements that encompass ASHRAE 90.1-2016), and any statutorily authorized adaptations to the incorporated standards adopted by CDB are effective July 1, 2019.

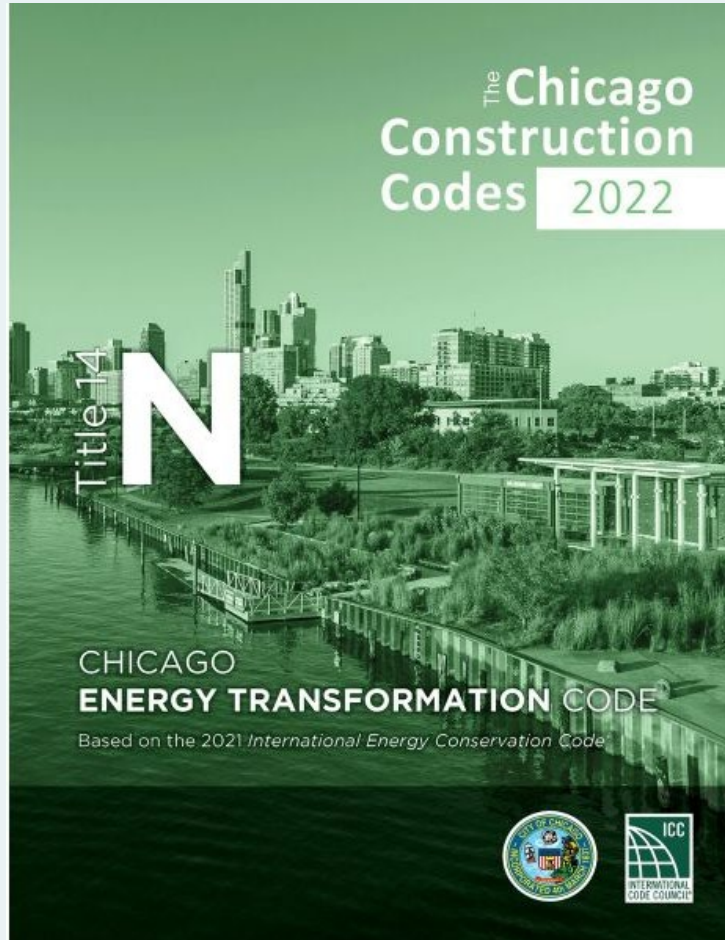
C101.3 Adaptation. The Board may appropriately adapt the International Energy Conservation Code to apply to the particular economy, population, distribution, geography and climate of the State and construction within the State, consistent with the public policy objectives of the EEB Act.

C101.5 Compliance. Residential buildings shall meet the provisions of IECC—Residential Provisions. Commercial buildings shall meet the provisions of IECC—Commercial Provisions—the *Illinois Energy Conservation Code* covered by 71 Ill. Adm. Code 600.Subpart C. The local authority having jurisdiction (AHJ) shall establish its own procedures for enforcement of the Illinois Energy Conservation Code. Minimum compliance shall be demonstrated by submission of:

1. Compliance forms published in the ASHRAE 90.1 User's Manual; or
2. Compliance Certificates generated by the U.S. Department of Energy's COMcheck™ Code compliance tool; or
3. Other comparable compliance materials that meet or exceed, as determined by the AHJ, the compliance forms published in the ASHRAE 90.1 User's Manual or the U.S. Department of Energy's COMcheck™ Code compliance tool; or
4. The seal of the architect/engineer as required by Section 14 of the Illinois Architectural Practice Act [225 ILCS 305], Section 12 of the Structural

<https://codes.iccsafe.org/content/IECC2021P2>

Access to Chicago Energy Transformation Code



ARTICLE XIII. CHICAGO ENERGY CONSERVATION CODE

SECTION 1. The Municipal Code of Chicago is hereby amended by inserting a new Title 14N, as follows:

TITLE 14N ENERGY CONSERVATION CODE

PART I – COMMERCIAL PROVISIONS

CHAPTER 14N-C1 SCOPE AND PURPOSE

14N-C1-C001 Adoption of the commercial provisions of the International Energy Conservation Code by reference.

The commercial provisions of the *International Energy Conservation Code*, 2018 edition, second printing, and all erratum thereto identified by the publisher (hereinafter referred to as "IECC-CE"), except Appendix CA, are adopted by reference and shall be considered part of the requirements of this title except as modified by the specific provisions of this title.

If a conflict exists between a provision modified by this title and a provision adopted without modification, the modified provision shall control.

14N-C1-C002 Citations.

Provisions of IECC-CE which are incorporated into this title by reference may be cited as follows:

14N-C[IECC-CE chapter number]-[IECC-CE section number]

14N-C1-C003 Global modifications.

The following modifications shall apply to each provision of IECC-CE incorporated into this title:

1. Replace each occurrence of "International Codes" with "Chicago Construction Codes."
2. Replace each occurrence of "International Building Code" with "Chicago Building Code."
3. Replace each occurrence of "ASME A17.1" or "ASME A17.1/CSA B44" with "the Chicago Conveyance Device Code."
4. Replace each occurrence of "NFPA 70" with "the Chicago Electrical Code."

<https://codes.iccsafe.org/codes/illinois/Chicago>

Learning Objectives

By the end of the presentation, participants will be able to:

1. Identify the amendments drawn from the 2024 IECC that constitute the new Illinois Stretch Code
2. Describe the stretch code adoption process for local municipalities
3. Interpret the requirements of the new Illinois Stretch Code
4. Summarize the different compliance paths available in the Illinois Stretch Code

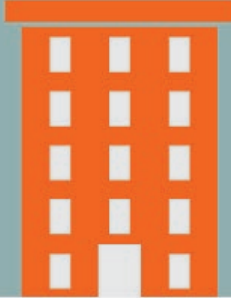



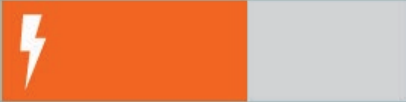




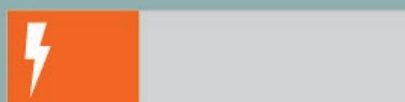


What is the Illinois Stretch Code?

What is the IL Stretch Code?



- A **stretch code** is a more demanding code than a base energy code, resulting in greater energy savings.
- The stretch code generally emphasizes performance over prescriptive compliance.
- In Illinois, the Climate and Equitable Jobs Act (CEJA) establishes the energy efficiency levels required by the stretch code.

CEJA Minimum Stretch Code Performance

Stretch Code Site Energy Index Targets				
	Commercial		Residential	
2006 IECC Baseline		100%		100%
2024 Stretch		60%		50%
2026 Stretch		50%		40%
2029 Stretch		44%		33%
2032 Stretch		39%		25%

This Presentation:
Residential

What is the IL Stretch Code?

The Illinois Energy Code Advisory Council (ILECAC) has made the following decisions:

- The 2024 residential stretch energy code will be based on the 2021 IECC language
- It will include some improvements from the 2024 IECC public drafts
 - 1st draft released November 2022
 - 2nd draft released July 2023

How is it Adopted?

- Local permitting jurisdictions may pass resolutions adopting stretch code
 - IL Stretch Code slated to be available spring 2024 enabling enforcement beginning July 1
- Resolutions may split residential and commercial
- Resolutions may include additional appendices

What is the IL Stretch Code?

Concept	Short Description
Compliance Pathways	Allows PHIUS, PHI and Appendix RC, the Zero Energy Appendix as compliance pathways in the Illinois Stretch Code.
Section R408 and Prescriptive Pathways	Requires buildings to either install heat pumps for space heating and water heating and have a tight building envelope (2 ACH50 + ERV/HRV) or achieve [24 or 29] credits from a new credits table in Section R408.
Electric-Ready	Require mixed-fuel residential buildings to be electric-ready for water heating, space heating, cooking and clothes drying.
EV-Ready or EV Charger Installed	Require residential buildings to be EV-ready or EV Charger installed and multifamily buildings to comply with commercial stretch code EV infrastructure requirements.
Solar-ready	Require residential buildings to be solar-ready and multifamily buildings to comply with commercial stretch code solar readiness and installation requirements.
Demand response capable thermostats and water heaters	Require thermostats and electric water heaters to be demand response capable.
Performance Pathway Metric	Revises the performance pathway and baseline building so that it is based on a site energy metric instead of a utility cost metric and meets Climate & Equitable Jobs Act (CEJA) requirements.
ERI Pathway	Revise ERI ventilation calculation and ERI metric to comply with CEJA requirements.
Existing Building Requirements	Requires several important existing building measures in the 2024 IECC: (1) Energy credits from table required for alterations and additions; (2) Duct testing requirement; (3) HVAC load calculation/right-sizing requirement; (4) HVAC controls requirement.
All-Electric Appendix	This appendix was approved by the IECAC because of a recommendation from a public comment.

*Note that highlighted content is pending review from IECAC.

IL Stretch Code Compliance Paths

Passive House Institute (PHI) or Passive House Institute U.S. (PHIUS) Passive Building Standards programs or buildings that comply with Appendix RC (Zero Energy) comply with Stretch Code



Image source: <https://www.phius.org/certified-project-database/starry-nights-farmhouse>

Residential buildings shall comply with sections:

- R401.2.1 (prescriptive compliance)
or
- R401.2.2 (performance compliance)
or
- R401.2.3 (Energy Rating Index (*ERI*) compliance)

R401.2.1 Prescriptive Compliance Option:

Requires compliance with:

- Sections R401 *through* R404,
and
- R408 (additional efficiency).



Image source:
www.basc.pnnl.gov

- Where applicable, the additional efficiency measures selected for compliance with R408 shall be included on the required Energy Code Certificate

Energy Code Certificate

Name of Designer/Builder: _____ DATE: _____
 Energy Code edition: _____ Compliance Path: _____

1. Insulation Rating		R-Value	R-Value
Ceiling /Roof	Attic	_____	Vaulted _____
Walls	Frame	_____	Mass _____
	Basement	_____	Crawl space _____
Floors	Over unconditioned space	_____	Slab edge _____
Ducts	Attic	_____	Other _____

2. Fenestration Rating	NFRC U-Factor	NFRC SHGC
Window	_____	_____
Opaque door	_____	_____
Skylight	_____	_____

3. Air Leakage Test Results

Blower door _____ ACH/50 Pa. Duct testing _____ Cfm/100 ft²

4. Equipment Performance	Type	Size	Efficiency
Heating system	_____	_____	_____
Cooling system	_____	_____	_____
Water heater	_____	_____	_____

Indicate if the following have been installed:

Electric furnace Gas-fire unvented room heater Baseboard electric heater

5. Photovoltaic Panel Systems

Array capacity	_____	Panel tilt	_____
Inverter efficiency	_____	Orientation	_____

6. Energy Rating Index Score	Structure Permit
_____	_____

smartenergy.illinois.edu/energy-code/ | 800.214.7954 | energycode@illinois.edu
 Smart Energy Design Assistance Center, 1 St Mary's Road, Champaign, IL 61820

UNIVERSITY OF ILLINOIS **SEDAC**
Smart Energy Design Assistance Center

IL Stretch Code
Section R408: Additional
Efficiency Requirements

This section establishes additional efficiency requirements to achieve additional energy efficiency in accordance with Section R401.2.1 (Prescriptive path).

Buildings shall comply with either:

- **Section R408.2** (prescriptive package)
- or*
- **Section R408.3** (points)



Image source:
www.basc.pnnl.gov

Buildings shall comply with **all** of the following:

1. Heating and cooling equipment shall be **electric heat pump equipment**.
2. Water heating equipment shall be a **heat pump water heater**.
3. The measured air leakage shall be *less than or equal to 2.0 ACH50* with either an **Energy Recovery Ventilator (ERV)** or **Heat Recovery Ventilator (HRV)**

Installed ERV
Image source:
www.basc.pnnl.gov



In Climate Zone 5A, air-source heat pumps shall meet the following requirements for cold climate heat pumps:

- **COP at 5°F \geq 1.75**
 - Meaning at 5°F these units must be able to transfer 1.75x or 175% of the energy they consume.
- **\geq 70% heating capacity at 5°F of that at 47°F**
 - Meaning at 5°F the unit will provide *at least 70%* of the heating capacity provided when the outdoor temperature is 47°F. This demonstrates the unit can still provide usable heat even if it cannot provide 100% of its capacity.



Air-source Heat Pump Condensers

ENERGY STAR V6.1 certification now uses the same performance requirements above to designate cold climate capable heat pump units. Cold climate capable units can be found on their Product Finder database.



Additional efficiency measures shall be selected from Table R408.3 that meet or exceed a total of [**24 or 29**; awaiting final determination] credits.

- For Dwelling units greater than 5,000 square feet: **Achieve 5 additional credits.**
- Each measure selected shall meet the relevant subsections of Section R408 and receive credit as specified in Table R408.3 for the specific Climate Zone. ***Interpolation of credits between measures is not permitted.***

TABLE R408.3
CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value	
		CZ 4	CZ 5
R408.3.1.1 (1)	≥ 2.5% reduction in total UA	<u>1</u>	<u>1</u>
R408.2.1.1 (2)	≥ 5% reduction in total UA	<u>2</u>	<u>3</u>
R408.3.1.1 (3)	> 7.5% reduction in total UA	<u>2</u>	<u>3</u>
R408.3.1.2	0.22 U-factor windows	<u>3</u>	<u>4</u>
R408.3.2 (1)	High performance cooling system option 1	<u>3</u>	<u>3</u>
R408.3.2 (2)	High performance cooling system option 2	<u>3</u>	<u>2</u>
R408.3.2 (3)	High performance gas furnace option 1	<u>5</u>	<u>7</u>
R408.3.2(4)	High performance gas furnace option 2	<u>4</u>	<u>5</u>
R408.3.2(5)	High performance heat pump system option 1	<u>21</u>	<u>31</u>
R408.3.2 (6)	High performance heat pump system option 2	<u>22</u>	<u>32</u>
R408.3.2 (7)	Ground source heat pump	<u>23</u>	<u>33</u>
R408.3.3 (1)	Fossil fuel service water heating system	<u>3</u>	<u>2</u>
R408.3.3 (2)	High performance heat pump water heating system option 1	<u>8</u>	<u>6</u>
R408.3.3 (3)	High performance heat pump	<u>8</u>	<u>6</u>

	water heating system option 2		
R408.3.3 (3)4	Solar hot water heating system	<u>6</u>	<u>6</u>
R408.3.3 (5)	Compact hot water distribution	<u>2</u>	<u>2</u>
R408.3.4 (1)	More efficient distribution system	<u>10</u>	<u>12</u>
R408.3.4 (2)	100% of ducts in conditioned space	<u>12</u>	<u>15</u>
R408.3.4 (3)	Reduced total duct leakage	<u>1</u>	<u>1</u>
R408.3.5 (1)	2 ACH50 air leakage rate with ERV or HRV installed	<u>10</u>	<u>13</u>
R408.3.5 (2)	2 ACH50 air leakage rate with balanced ventilation	<u>4</u>	<u>5</u>
R408.3.5 (3)	1.5 ACH50 air leakage rate with ERV or HRV installed	<u>12</u>	<u>15</u>
R408.3.5 (4)	1 ACH50 air leakage rate with ERV or HRV installed	<u>14</u>	<u>17</u>
R408.3.6	Energy Efficient Appliances	<u>7</u>	<u>5</u>

Additional Credit Options

TABLE R408.3
CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value	
		CZ 4	CZ 5
R408.3.1.1 (1)	≥ 2.5% reduction in total UA	1	1
R408.2.1.1 (2)	≥ 5% reduction in total UA	2	3
R408.3.1.1 (3)	> 7.5% reduction in total UA	2	3
R408.3.1.2	0.22 U-factor windows	3	4
R408.3.2 (1)	High performance cooling system option 1	3	3
R408.3.2 (2)	High performance cooling system option 2	3	2
R408.3.2 (3)	High performance gas furnace option 1	5	7
R408.3.2(4)	High performance gas furnace option 2	4	5
R408.3.2(5)	High performance heat pump system option 1	21	31
R408.3.2 (6)	High performance heat pump system option 2	22	32
R408.3.2 (7)	Ground source heat pump	23	33
R408.3.3 (1)	Fossil fuel service water heating system	3	2
R408.3.3 (2)	High performance heat pump water heating system option 1	8	6
R408.3.3 (3)	High performance heat pump	8	6

Enhanced Envelope Performance



Image source:
www.basc.pnnl.gov

More Efficient HVAC Equipment Options



Image source:
www.basc.pnnl.gov

Reduced Energy in Service Water Heating



Heat Pump Water Heater
Image source: SEDAC

R408.3.3 (1)	Fossil fuel service water heating system	3	2
R408.3.3 (2)	High performance heat pump water heating system option 1	8	6
R408.3.3 (3)	High performance heat pump water heating system option 2	8	6
R408.3.3 (3)4	Solar hot water heating system	6	6
R408.3.3 (5)	Compact hot water distribution	2	2
R408.3.4 (1)	More efficient distribution system	10	12
R408.3.4 (2)	100% of ducts in conditioned space	12	15
R408.3.4 (3)	Reduced total duct leakage	1	1
R408.3.5 (1)	2 ACH50 air leakage rate with ERV or HRV installed	10	13
R408.3.5 (2)	2 ACH50 air leakage rate with balanced ventilation	4	5
R408.3.5 (3)	1.5 ACH50 air leakage rate with ERV or HRV installed	12	15
R408.3.5 (4)	1 ACH50 air leakage rate with ERV or HRV installed	14	17
R408.3.6	Energy Efficient Appliances	7	5

More Efficient Duct Thermal Distribution System



Additional Credit Options

Improved Air Sealing and Efficient Ventilation



Installed HRV

Image source: www.basc.pnnl.gov

	<u>water heating system option 2</u>		
<u>R408.3.3 (3)4</u>	<u>Solar hot water heating system</u>	<u>6</u>	<u>6</u>
<u>R408.3.3 (5)</u>	<u>Compact hot water distribution</u>	<u>2</u>	<u>2</u>
<u>R408.3.4 (1)</u>	<u>More efficient distribution system</u>	<u>10</u>	<u>12</u>
<u>R408.3.4 (2)</u>	<u>100% of ducts in conditioned space</u>	<u>12</u>	<u>15</u>
<u>R408.3.4 (3)</u>	<u>Reduced total duct leakage</u>	<u>1</u>	<u>1</u>
<u>R408.3.5 (1)</u>	<u>2 ACH50 air leakage rate with ERV or HRV installed</u>	<u>10</u>	<u>13</u>
<u>R408.3.5 (2)</u>	<u>2 ACH50 air leakage rate with balanced ventilation</u>	<u>4</u>	<u>5</u>
<u>R408.3.5 (3)</u>	<u>1.5 ACH50 air leakage rate with ERV or HRV installed</u>	<u>12</u>	<u>15</u>
<u>R408.3.5 (4)</u>	<u>1 ACH50 air leakage rate with ERV or HRV installed</u>	<u>14</u>	<u>17</u>
<u>R408.3.6</u>	<u>Energy Efficient Appliances</u>	<u>7</u>	<u>5</u>



ENERGY STAR Certified Clothes Washers

ENERGY STAR certified clothes washers deliver superior efficiency and performance by incorporating advanced features – 25% less energy and 33% less water.



ENERGY STAR Certified Refrigerators

With an ENERGY STAR certified refrigerator you can maximize your energy and dollar savings without sacrificing the features you want.



ENERGY STAR Certified Dishwashers

Visit the [Residential Dishwashers](#) page for usage tips and buying guidelines.

Energy Efficient Appliances



ENERGY STAR Certified Clothes Dryers

ENERGY STAR certified clothes dryers deliver superior efficiency and performance by incorporating advanced features – using 20% less energy than standard models.

Electrification Requirements

New parking spaces for **1 and 2-family dwellings and townhouses** shall be provided in accordance with this section.

All other new residential parking facilities shall be provided with electric vehicle power transfer infrastructure in accordance with Section C405.14 of the Illinois Stretch Energy Conservation Code.



Image source:
www.basc.pnnl.gov

Electric Vehicle Power Infrastructure

Each *dwelling unit* with a designated attached or detached garage or other onsite private parking provided adjacent to the dwelling unit shall be provided with **one** EV ready space.



Cooking products. Minimum 40A, 208/240V branch circuit shall be installed and terminate within 3 feet (304mm) of conventional cooking tops, conventional ovens or cooking products combining both.

- Exception: Cooking products **not** installed in an individual dwelling unit.



Image source: rawpixel.com

Household Clothes Dryers: Minimum 30A, 208/240V branch circuit shall be installed, and terminate within 3 feet (304mm) of each household clothes dryer.

- Exception: Clothes dryers that serve more than one dwelling unit and are located outside of a dwelling unit.



Image source:
nfm.com

Water heaters: Locations of fossil fuel water heaters shall comply with *all* of the following:

1. Minimum 30A, 208/240V branch circuit shall be installed, and terminate within 3 feet (304 mm) of each fossil fuel water heater
2. Minimum space for future water heater: 7ft x 3ft x 3ft (Min volume: 700 ft³)

Exceptions:

1. Water heaters in centralized systems serving multiple R-2 dwelling units complying with C405.17
2. Min. volume not required if space provides sufficient air circulation

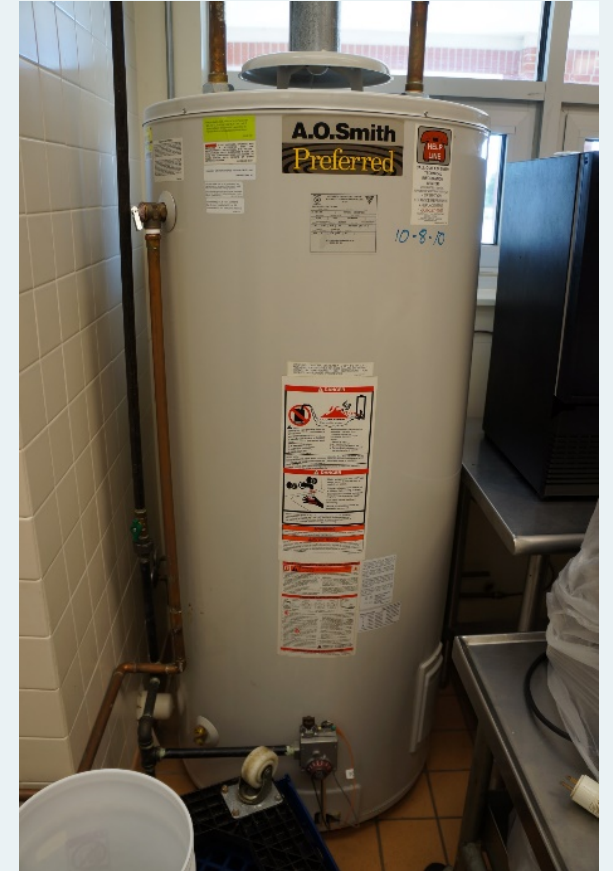


Image source: SEDAC

Combustion space heating: Provide designated exterior space including:

- Natural drainage for condensate from cooling equipment heat pump operation or a condensate drain located within 3 feet
- Dedicated branch circuit terminating within 3 feet of the location with no obstructions. Both ends of the branch circuit shall be labelled "for future heat pump space heater". Circuit must be:
 - IRC Section E3702.11 compliant
 - Capacity meeting heat pump sizing from R403.7



Image source:
www.basc.pnnl.gov

Electrification-ready circuits:

The unused conductors required by Sections R404.5.1 through R404.5.4 shall be labeled with the word “spare.”

Space shall be reserved in the electrical panel in which the branch circuit originates for the installation of an overcurrent device.

Capacity for the circuits required by Sections R404.5.1 through R404.5.4 shall be included in the load calculations of the original installation.



Construction documents shall include the following:

- Dedicated solar ready roof area
- Structural design for roof dead and live load
- Routing of conduit/pre-wiring from solar-ready zone to electrical service panel

or

- Plumbing from solar-ready zone to service water heating system



Renewable Energy Infrastructure

Buildings shall comply with **R404.6.1** or **R404.6.2** (*Group R Occupancies*).

R404.6.1: One- and two-family dwellings and townhouses shall comply with Sections R404.6.1.1 through R404.6.1.4.

R404.6.2 (*Other Group R Occupancies*) shall comply with commercial provisions (**Section C405.15**)



Solar-Ready Zone Area

Total area of the solar-ready zone shall not be less than **250 square feet**.

Either single area or smaller, separated sub-zones. Narrowest dimension of each sub-zone shall be not less than 5.5ft and each sub-zone must be at least 80 square feet

Exception: Dwelling units in townhouses 3 stories or less in height above grade plane and with a total floor area less than or equal to 2,000 sf/dwelling shall be permitted to have a solar-ready zone area of not less than **150 square feet**.



The Stuyvesant Town, New York

Image source:

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

Obstructions

Solar-ready zones shall be free from obstructions, including but not limited to **vents, chimneys, and roof-mounted equipment.**



Electrical Service Reserved Space

The main electrical service panel shall have a reserved space for a dual pole circuit breaker and shall be labeled “For Future Solar Electric.”

The reserved space shall be at the opposite (load) end of the busbar from the primary energy source.



Electrical interconnection: An electrical box shall be installed within 24 inches of main electrical panel. Box shall be connected to a capped roof penetration or a location in the attic within 3 feet of the solar-ready zone by a minimum 1-inch nonflexible metallic conduit or permanently installed wire as approved by the code official.

Where the interconnection terminates in the attic, location shall be no less than 12 inches above ceiling insulation.

Both ends of the interconnection shall be labeled *“For Future Solar Electric”*



Image source:
www.basc.pnnl.gov

Group R Occupancies

Buildings in Group R-2, R-3 and R-4 shall comply with commercial provisions (**Section C405.15**) of the Illinois Stretch Energy Conservation Code.



Demand Response Requirements

Not less than one thermostat shall be provided for each separate heating and cooling system.

The primary heating or cooling system serving the dwelling unit shall comply with Sections R403.1.1 and R403.1.2.



Programmable Thermostat

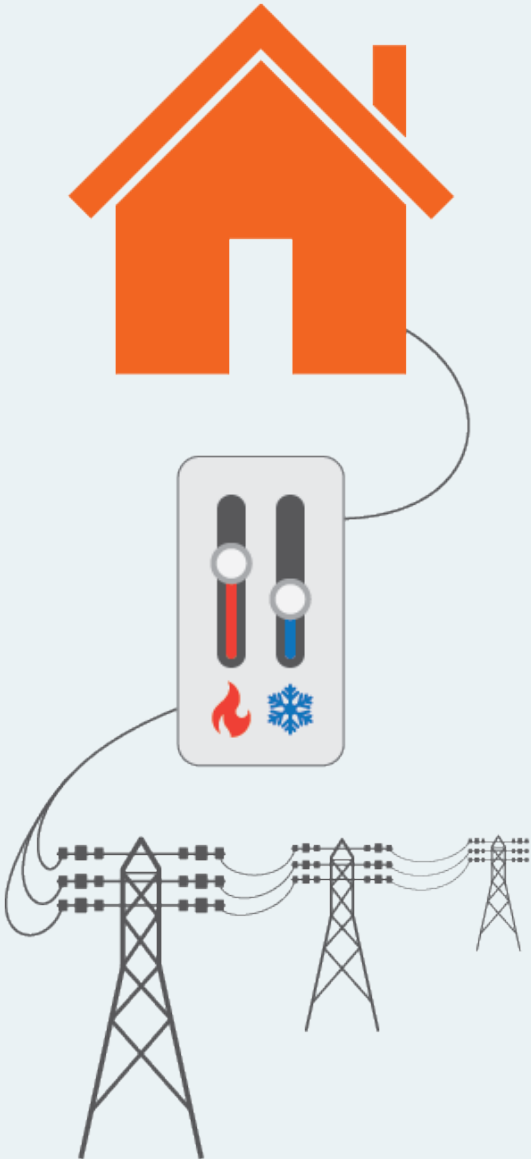
Programmable Thermostat Requirements:

- Must be capable of controlling heating/cooling systems on a **daily schedule**, *maintaining different temperatures at different times of the day.*
- Must be capable of set-backs: **not less than 55°F to not greater than 85°F.**
- Must have initial manufacturer programming with a heating setpoint of **not greater than 70°F** and a cooling setpoint of **not less than 78°F.**



Image source:
www.basc.pnnl.gov

Demand Responsive Thermostat



Programmable thermostat shall include demand responsive controls capable of communicating with the Virtual End Node (VEN) using a wired or wireless bi-directional pathway.

The thermostat shall be capable of executing the following actions in response to a demand response signal:

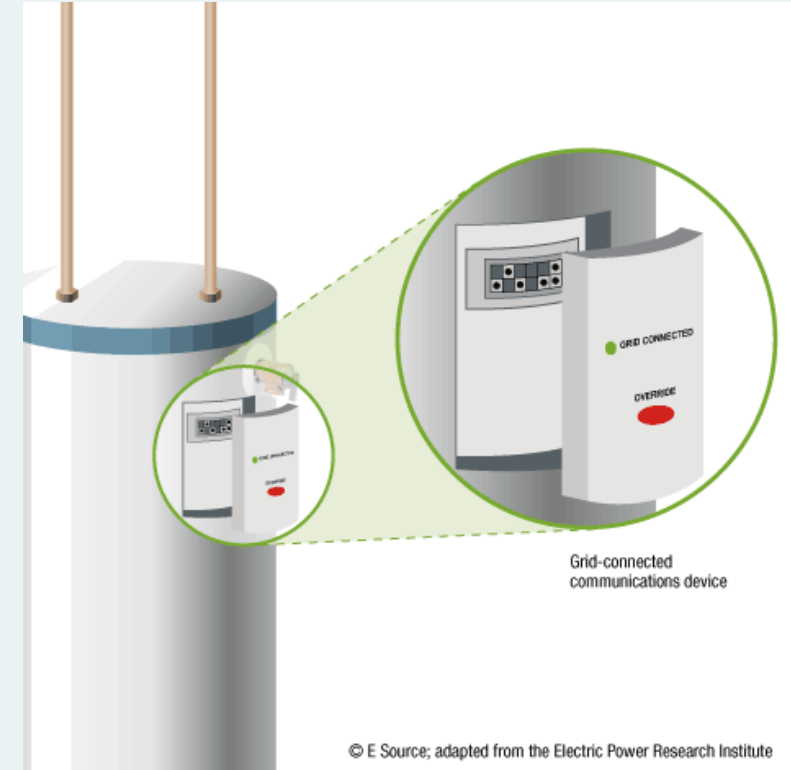
1. Automatically increasing cooling set point by: **1°F, 2°F, 3°F, and 4°F.**
2. Automatically decreasing heating set point by: **1°F, 2°F, 3°F, and 4°F.**

Demand Responsive Water Heating

Electric storage water heaters (40 gal - 120 gal) with input rating **equal to or less than 12kW** shall be provided with demand responsive controls in accordance with Table R403.5.5.

Exceptions:

1. Water heaters that can deliver water at a temperature of 180°F or greater
2. Water heaters that comply with Section IV, Part HLW or Section X of the ASME Boiler and Pressure Vessel Code
3. Water heaters that use 3-phase electric power

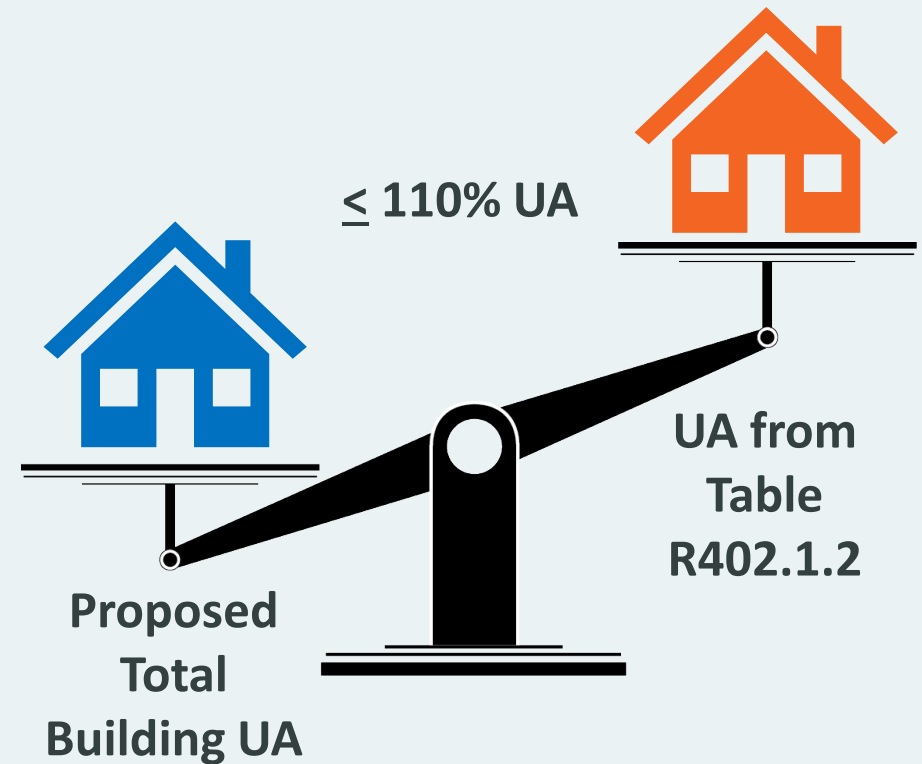


Performance Based Compliance

Performance-based compliance

Compliance based on total building performance requires that a proposed design meets **all** of the following:

1. The requirements of the sections indicated within Table R405.2.
2. Proposed total building UA shall be less than or equal to the building UA using the prescriptive U-factors from Table R402.1.2 multiplied by 1.10 in accordance with Equation 4-1.



ERI Pathway Alignment

Maximum Energy Rating Index
(highlighted values are still pending):

TABLE R406.5 MAXIMUM ENERGY RATING INDEX

CLIMATE ZONE	ENERGY RATING INDEX WITHOUT COMBUSTION EQUIPMENT ^a	ENERGY RATING INDEX WITH COMBUSTION EQUIPMENT ^b
4	54	51
5	55	50

- a. Any building that contains no combustion equipment.
b. Any building that contains combustion equipment.

Existing Building Requirements

New definition: SUBSTANTIAL ENERGY ALTERATION. An alteration that includes replacement of **two or more** of the following:

1. **50% or more** of the area of interior wall-covering material of the building thermal envelope or fenestration.
2. **50% or more** of the area of the exterior wall-covering material of the building thermal envelope or fenestration.
3. Space-conditioning equipment constituting **50% or more of the total input capacity** of the space heating or space cooling equipment serving the building.
4. Water-heating equipment constituting **50% of more of the total input capacity** of all the water heating equipment serving the building.
5. **50% or more** of the luminaires in the building

Additional Efficiency Requirements

Additions shall comply with Table R408.2 to achieve **not less than 10 credits**. Alterations to the existing building that are not part of the addition, *but permitted with the addition*, shall be permitted to be used to achieve this requirement.

Exceptions:

1. Additions that increase the building's total conditioned floor area by *less than 25 percent*.
2. Additions that *do not* include the addition or replacement of equipment covered in Sections R403.5 or R403.7
3. Additions that *do not* contain conditioned space
4. Where the addition *alone* or the *existing building and addition together* comply with Section R405 or R406

Heating and Cooling Systems

Duct systems that are part of the alteration shall comply with **Section R403 and this section.**

Alterations to **heating, cooling and duct systems** shall comply with this section.



Image source:
www.basc.pnnl.gov

HVAC ducts newly installed as part of an alteration shall comply with Section **R403**.

Exception: Where ducts from an existing heating and cooling system are extended to an addition.



Image source:
www.basc.pnnl.gov

System Sizing

New heating and cooling equipment that is part of an alteration shall be sized in accordance with Section R403.7 based on the existing building features as modified by the alteration.

Exception: Where it has been demonstrated to the code official that compliance with this section would result in heating or cooling equipment that is incompatible with the remaining portions of the existing heating or cooling system.



Duct Leakage

Where an alteration includes **any** of the following, ducts shall be tested per Section R403.3.5 and shall have a total leakage **less than or equal to 12cfm/100sf of conditioned floor area:**

1. Where *25% or more* of the registers in the system are relocated.
2. Where *25% or more* of the total length of all ducts in the system are relocated.
3. Where the total length of all ducts in the system is increased by *25% or more*

Exception: Duct systems located entirely inside a conditioned space in accordance with Section R403.3.2.



Image source:
www.basc.pnnl.gov

Substantial Energy Alterations shall comply with Table R408.2 to achieve **not less than 2 credits**.

1 credit may be obtained by complying with Section R503.1.5.1.

Exceptions:

1. Alterations that are permitted with an addition complying with Section R502.3.5
2. Alterations that comply with Section R405 or R406.

R503.1.5.1 High efficacy lighting. **All spaces** shall be provided with hard wired lighting with a lamp efficacy of 90 lm/W or a luminaire efficacy of 55 lm/W

TABLE R408.3
CREDITS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Credit Value	
		CZ 4	CZ 5
R408.3.1.1 (1)	≥ 2.5% reduction in total UA	1	1
R408.2.1.1 (2)	≥ 5% reduction in total UA	2	3
R408.3.1.1 (3)	> 7.5% reduction in total UA	2	3
R408.3.1.2	0.22 U-factor windows	3	4
R408.3.2 (1)	High performance cooling system option 1	3	3
R408.3.2 (2)	High performance cooling system option 2	3	2
R408.3.2 (3)	High performance gas furnace option 1	5	7
R408.3.2(4)	High performance gas furnace option 2	4	5
R408.3.2(5)	High performance heat pump system option 1	21	31
R408.3.2 (6)	High performance heat pump system option 2	22	32
R408.3.2 (7)	Ground source heat pump	23	33
R408.3.3 (1)	Fossil fuel service water heating system	3	2
R408.3.3 (2)	High performance heat pump water heating system option 1	8	6
R408.3.3 (3)	High performance heat pump	8	6



Image source:
www.basc.pnnl.gov

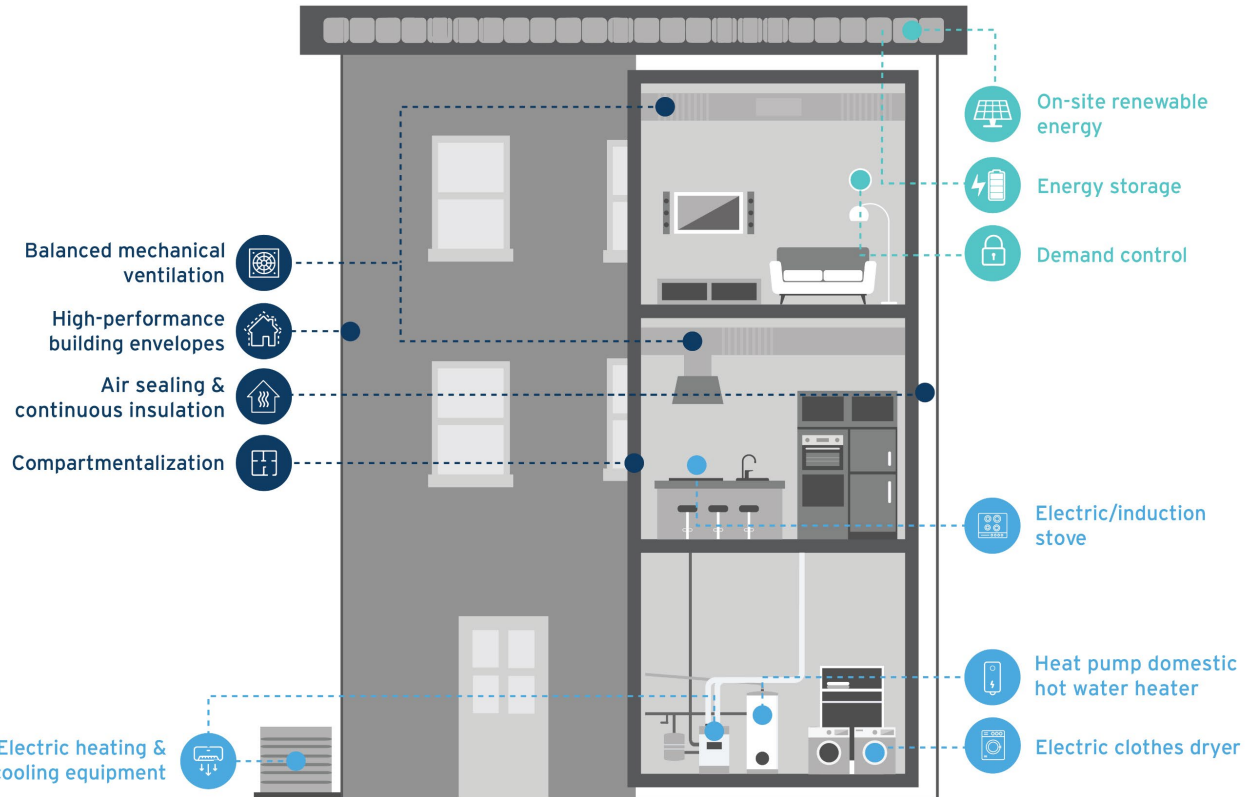
**APPENDIX RE ALL
ELECTRIC RESIDENTIAL
BUILDINGS**

Intent: The intent of this Appendix is to amend the Illinois Stretch Energy Conservation Code to reduce greenhouse gas emissions and improve the safety and health of buildings by *not permitting combustion equipment in new buildings.*



RE101.2 Scope: This appendix applies to residential buildings. Section RE103 applies to new residential buildings. Section RE104 applies to existing residential buildings.

New Residential Buildings



Application: Residential buildings shall be *all-electric buildings* and comply with:

- Section R401.2.5
and
- *either* Sections R401.2.1, R401.2.2, *or* R401.2.3.

Image source:
<https://rmi.org/how-to-upgrade-and-electrify-millions-of-us-homes-and-buildings/>

Existing Residential Buildings

Cooling Equipment: New and replacement ACs shall be *electric heat pump equipment* sized/configured to provide *both* cooling and heating.

Any other heating systems serving same zone shall be configured as supplementary heat complying with Sections R403.1.2 and RE104.3.

Exception: Where a space heating system serves multiple dwelling units the system is not required to be configured to supplementary heat



Image source:
www.basc.pnnl.gov

RE104.3 Heat pump supplementary combustion equipment. Heat pumps with supplementary heating shall have controls that limit supplemental heat operation to only those times when one of the following applies:

1. The heat pump is operating in defrost mode.
2. The vapor compression cycle malfunctions.
3. For space heating systems, the thermostat malfunctions
4. For space heating systems, the vapor compression cycle cannot provide the necessary heating energy to satisfy the thermostat setting
5. For water heating, the heat pump water heater cannot maintain an output water temperature of at least 120°F.

New supplementary space and water heating systems for heat pump equipment shall not be permitted to have a heating input capacity greater than the heating input capacity of the heat pump equipment.



Questions?

energycode@illinois.edu

800-214-7954