

HVAC Updates 2022

Ryan Hoyer
Director of Training
rhoyer@tecmungo.com



Agenda

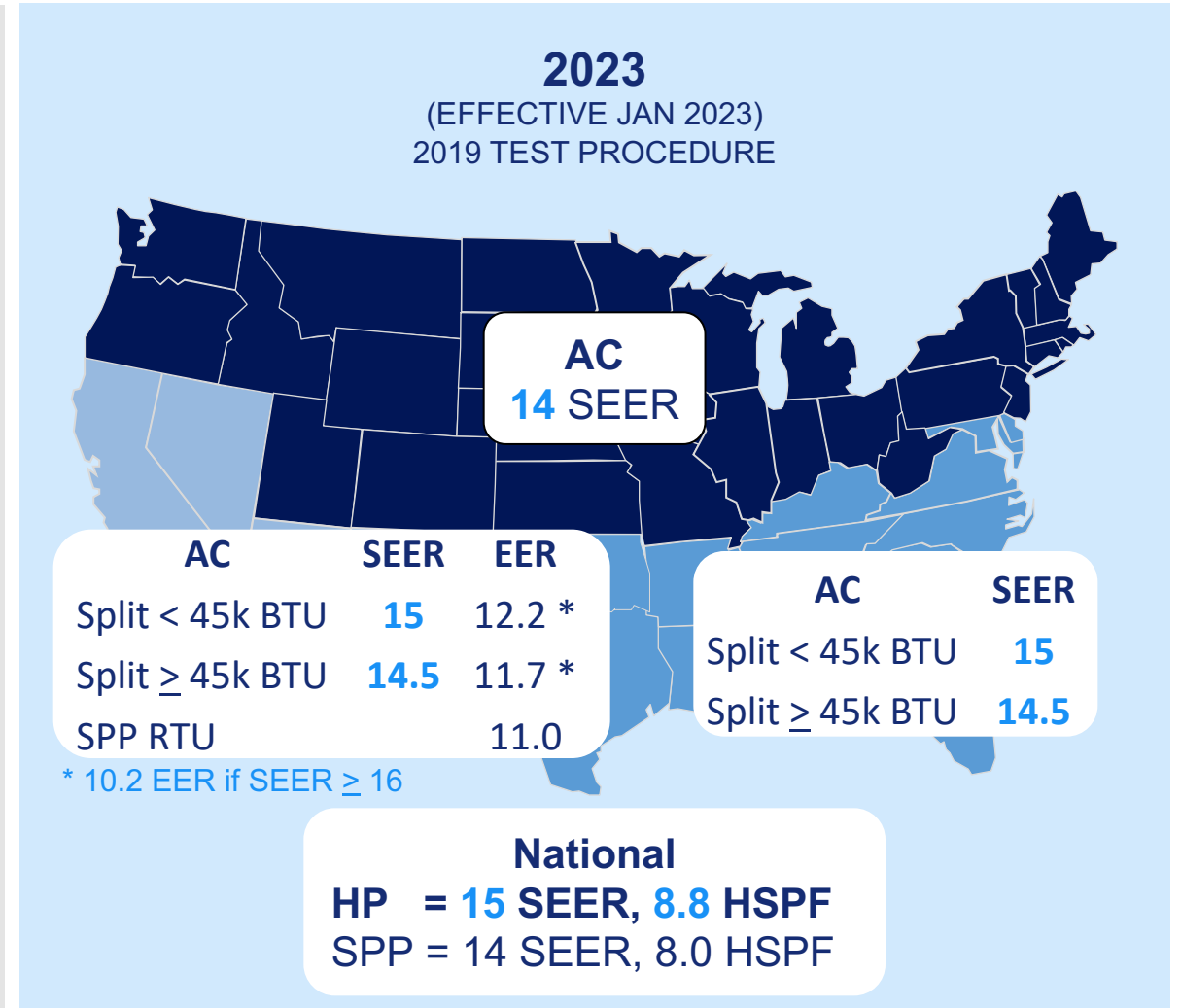
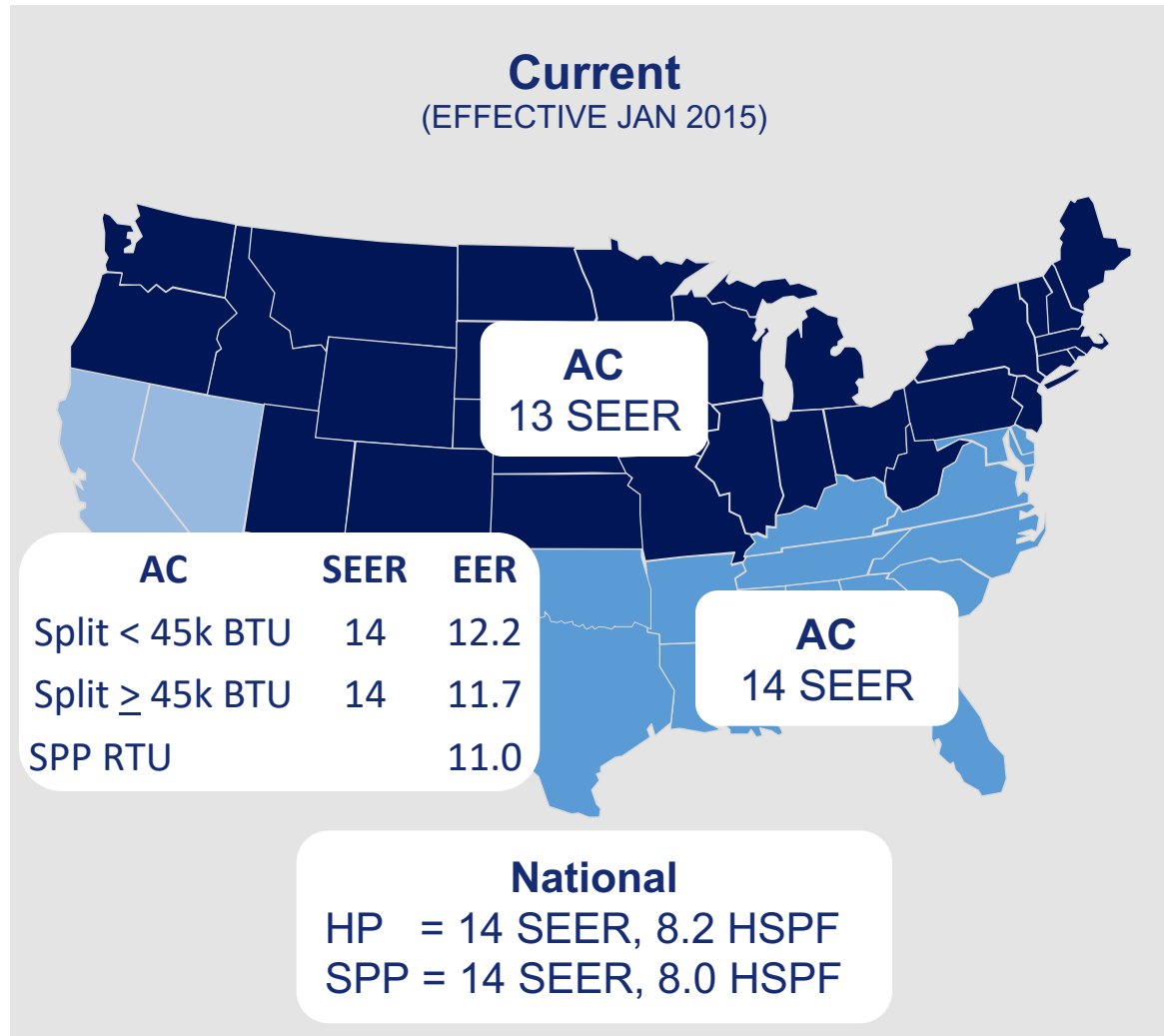
- DOE 2023 Efficiency Changes
- Energy Code Updates
- Bonus: Refrigerant Changes
- Bonus: Tax Credits & ComEd Utility Rebates

Equipment Efficiency

DOE Schedule

- 2021 (Jan.1) - small boilers (84% water and 82% steam)
- 2023 (Jan.1) – small A/C splits and packaged RTUs - 14 SEER (North region)
- 2023 (Jan.1) - small heat pump minimum efficiency - 15 SEER & 8.8 HSPF
- 2023 (Jan.1) - RTU 15% IEER increase
- 2023 (Jan.1) - RTU gas heat increase to 81% (and any other gas fired "furnaces")
- 2023 (Jan.10) - commercial boilers increase to 84 or 85% depending on size (81-82% for steam)
- 2025 - furnace fans
- 2026 - 3-phase A/C split systems
- 2026 – PTAC, WSHP, VPAC
- 2029 - large RTU and splits
- Repeat above pattern approx. every 8 years

2023 Small Tonnage Minimum Efficiency Change



Canada proposing similar requirements to North

2023 Small Tonnage Test Procedure Change

Heat Pump Test Procedure Example

Current Test Procedure
SEER, EER, HSPF

New 2023 Test Procedure
SEER2, EER2, HSPF2

Test Procedure Change

Increased external static pressure by 5X = increase blower motor watts = reduced efficiency rating

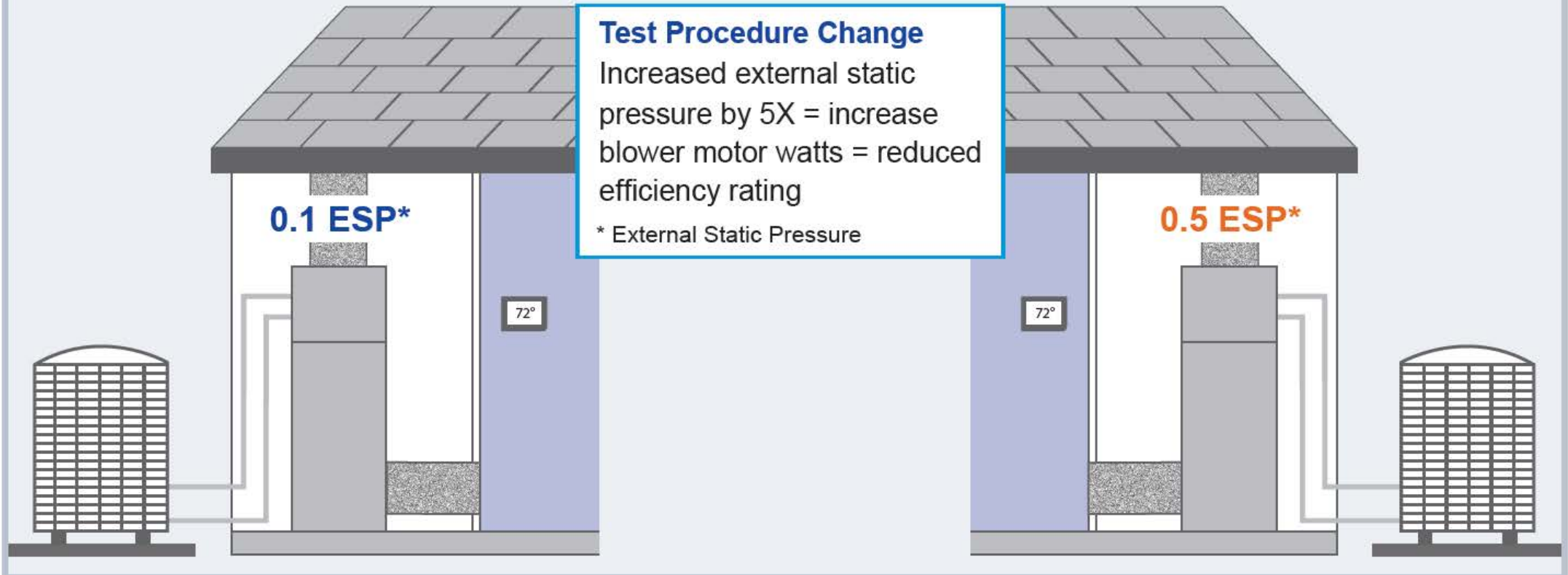
* External Static Pressure

0.1 ESP*

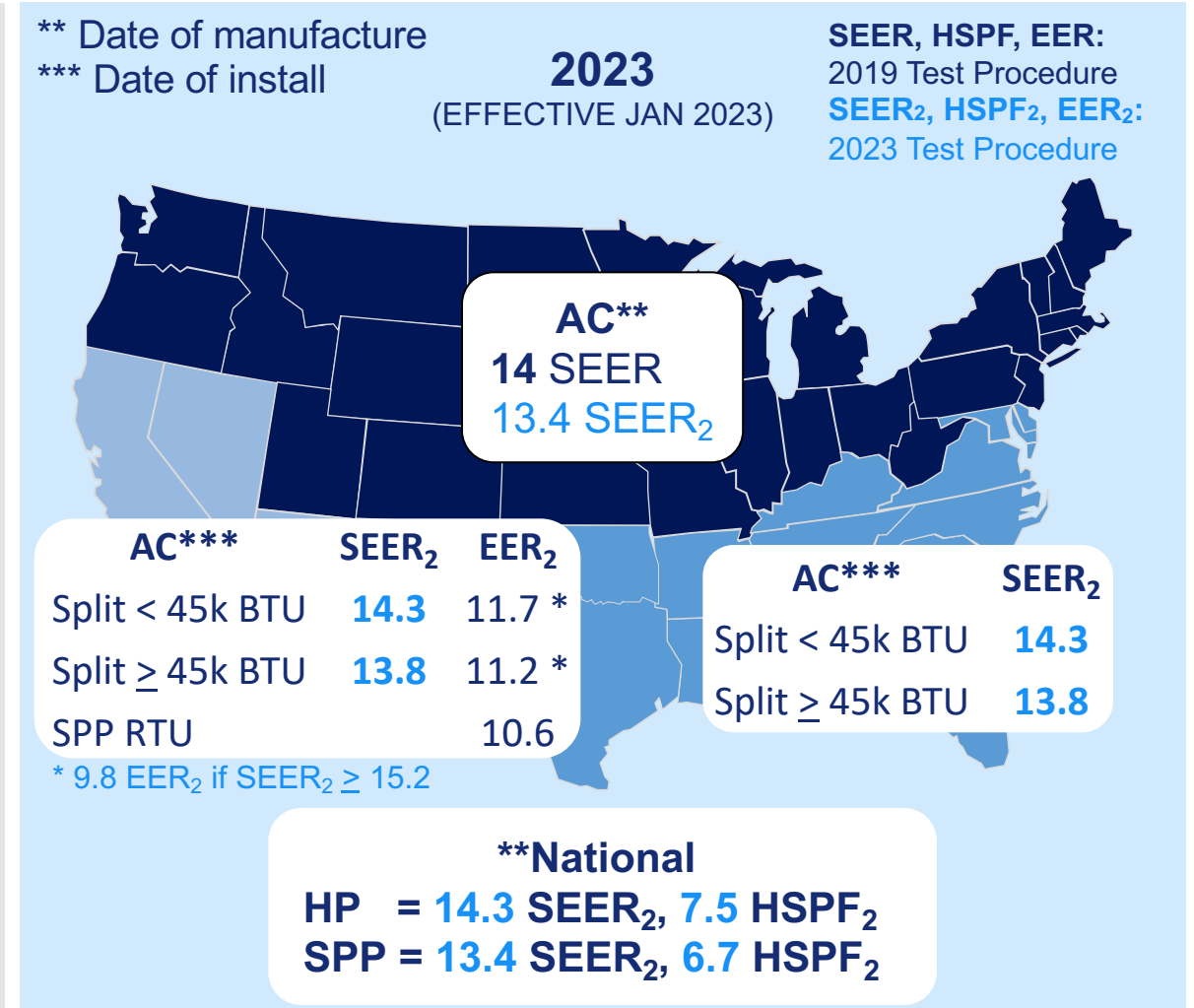
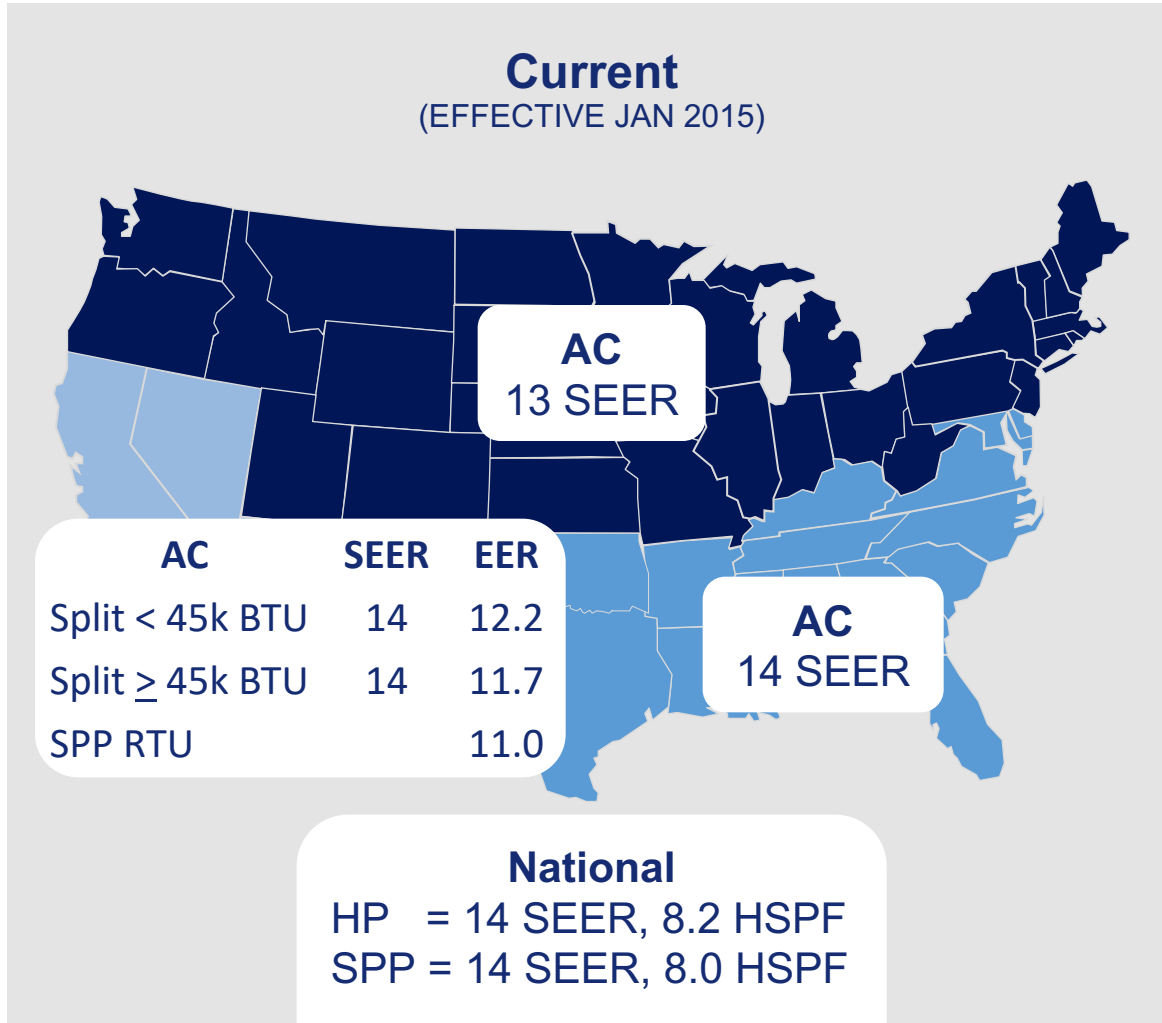
72°

0.5 ESP*

72°



2023 Minimum Efficiency & Test Procedure



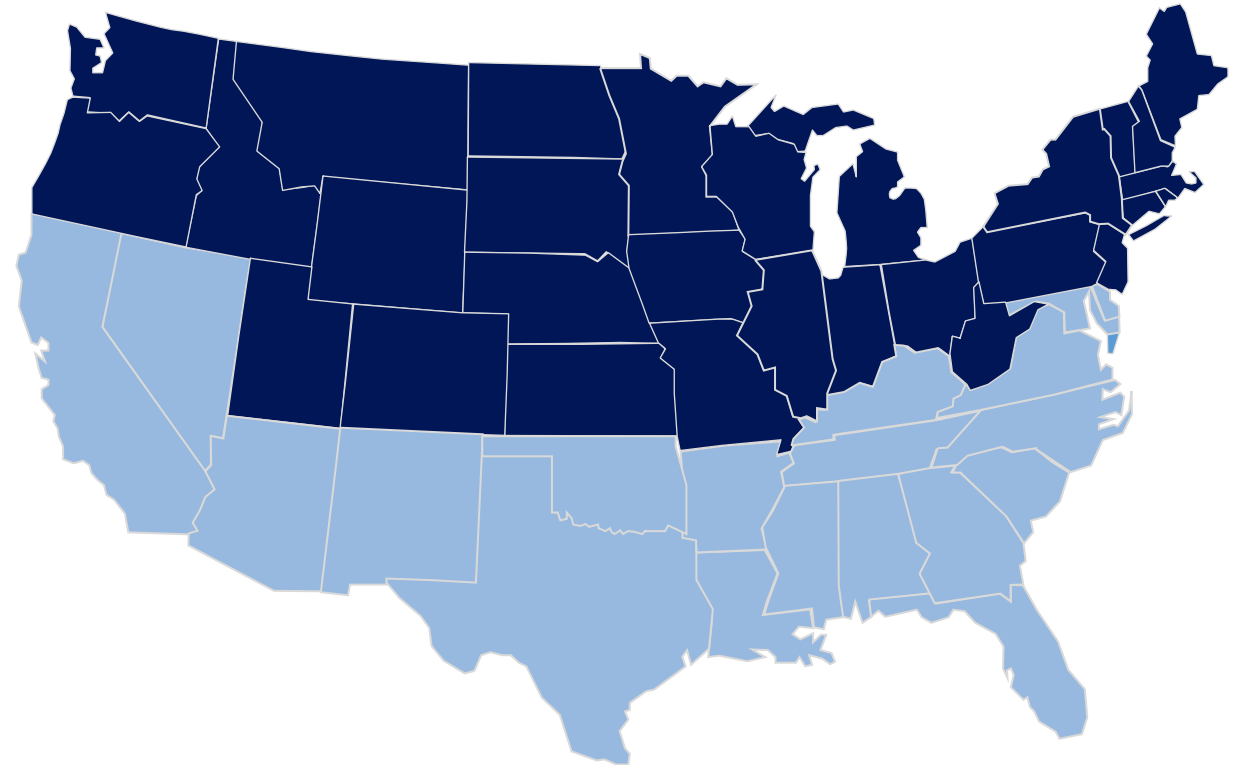
Canada proposing similar requirements to North

2023 Small Tonnage Sell Through Requirements

North

South

Air Conditioner	Date of Manufacture	Date of Install
Heat Pump	Date of Manufacture	Date of Manufacture
SPP RTU	Date of Manufacture	Date of Manufacture



Small Tonnage Market Impact

INCREASE IN SEER

7-8%

from current minimums.

APPROXIMATELY

70%

of current products will
not meet new minimum
efficiency standards.

100%

of current products will
need to be retested using
the new procedures.

Large RTU Efficiency Changes



2023 US DOE increase IEER 15%

Start Date 1/1/2023 Date

Manufacturers **MUST** produce new models 1/1/2023 and beyond

Models built in 2022 or prior can be sold anytime in 2022 and 2023+

Last call for current models will start about mid year 2022.

Efficiency Ratings for RTUs



$$\text{IEER} = (0.02 * A) + (0.617 * B) + (0.238 * C) + (0.125 * D)$$

Where as:

A = EER at 100% net capacity at AHRI standard condition (95 deg F)

B = EER at 75% net capacity and reduced ambient (81.5 deg F)

C = EER at 50% net capacity and reduced ambient (68 deg F)

D = EER at 25% net capacity and reduced ambient (65 deg F)

Large RTU Efficiency Changes

Table I-1. Amended Energy Conservation Standards for Small, Large, and Very Large Commercial Package Air Conditioning and Heating Equipment

Equipment Type		Heating Type	Proposed Energy Conservation Standard	Compliance Date
Small Commercial Packaged AC and HP (Air-Cooled) – $\geq 65,000$ Btu/h and $< 135,000$ Btu/h Cooling Capacity	AC	Electric Resistance Heating or No Heating	12.9 IEER 14.8 IEER	January 1, 2018 January 1, 2023
		All Other Types of Heating	12.7 IEER 14.6 IEER	January 1, 2018 January 1, 2023
	HP	Electric Resistance Heating or No Heating	12.2 IEER 3.3 COP	January 1, 2018
			14.1 IEER 3.4 COP	January 1, 2023
		All Other Types of Heating	12.0 IEER 3.3 COP	January 1, 2018
			13.9 IEER 3.4 COP	January 1, 2023

Large Commercial Packaged AC and HP (Air-Cooled) – $\geq 135,000$ Btu/h and $< 240,000$ Btu/h Cooling Capacity	AC	Electric Resistance Heating or No Heating	12.4 IEER 14.2 IEER	January 1, 2018 January 1, 2023
		All Other Types of Heating	12.2 IEER 14.0 IEER	January 1, 2018 January 1, 2023
	HP	Electric Resistance Heating or No Heating	11.6 IEER 3.2 COP	January 1, 2018
			13.5 IEER 3.3 COP	January 1, 2023
		All Other Types of Heating	11.4 IEER 3.2 COP	January 1, 2018
			13.3 IEER 3.3 COP	January 1, 2023
Very Large Commercial Packaged AC and HP (Air-Cooled) – $\geq 240,000$ Btu/h and $< 760,000$ Btu/h Cooling Capacity	AC	Electric Resistance Heating or No Heating	11.6 IEER 13.2 IEER	January 1, 2018 January 1, 2023
		All Other Types of Heating	11.4 IEER 13.0 IEER	January 1, 2018 January 1, 2023
	HP	Electric Resistance	10.6 IEER	January 1, 2018

Commercial Furnace AND RTU Efficiency Changes

Table I-2. Energy Conservation Standards for Commercial Warm Air Furnaces

Equipment Class	Input Capacity* (Btu/h)	Thermal Efficiency**
Gas-Fired Furnaces	≥225,000 Btu/h	81%
Oil-Fired Furnaces	≥225,000 Btu/h	82%

* In addition to being defined by input capacity, a CWF is “a self-contained oil- or gas-fired furnace designed to supply heated air through ducts to spaces that require it and includes combination warm air furnace/electric air conditioning units but does not include unit heaters and duct furnaces.” CWFs coverage is further discussed in section IV.A.2, “Scope of Coverage and Equipment Classes.”

**Thermal efficiency is at the maximum rated capacity (rated maximum input), and is determined using the DOE test procedure specified at 10 CFR 431.76.

Table I.1—Energy Conservation Standards for Commercial Packaged Boilers

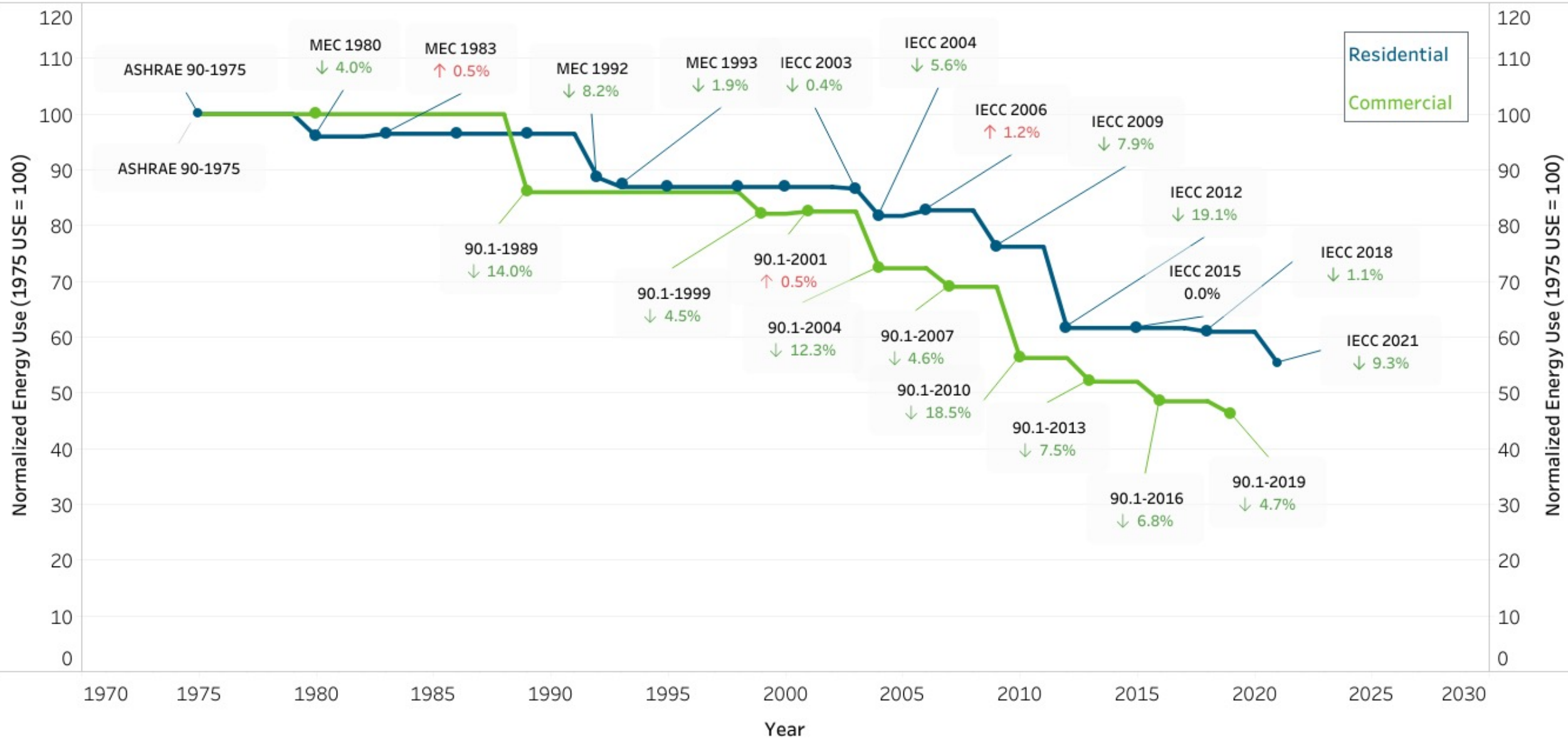
Equipment	Size category(input)	Energyconservationstandard *	Compliance date †
Small Gas-Fired Hot Water Commercial Packaged Boilers	≥300,000 Btu/h and ≤2,500,000 Btu/h	84.0% ET	January 10, 2023.
Large Gas-Fired Hot Water Commercial Packaged Boilers	>2,500,000 Btu/h and ≤10,000,000 Btu/h	85.0% EC	January 10, 2023.
Very Large Gas-Fired Hot Water Commercial Packaged Boilers	>10,000,000 Btu/h	82.0% EC	March 2, 2012.
Small Oil-Fired Hot Water Commercial Packaged Boilers	≥300,000 Btu/h and ≤2,500,000 Btu/h	87.0% ET	January 10, 2023.
Large Oil-Fired Hot Water Commercial Packaged Boilers	>2,500,000 Btu/h and ≤10,000,000 Btu/h	88.0% EC	January 10, 2023.
Very Large Oil-Fired Hot Water Commercial Packaged Boilers	>10,000,000 Btu/h	84.0% EC	March 2, 2012.
Small Gas-Fired Steam Commercial Packaged Boilers	≥300,000 Btu/h and ≤2,500,000 Btu/h	81.0% ET	January 10, 2023.
Large Gas-Fired Steam Commercial Packaged Boilers	>2,500,000 Btu/h and ≤10,000,000 Btu/h	82.0% ET	January 10, 2023.
Very Large Gas-Fired Steam Commercial Packaged Boilers **	>10,000,000 Btu/h	79.0% ET	March 2, 2012.
Small Oil-Fired Steam Commercial Packaged Boilers	≥300,000 Btu/h and ≤2,500,000 Btu/h	84.0% ET	January 10, 2023.
Large Oil-Fired Steam Commercial Packaged Boilers	>2,500,000 Btu/h and ≤10,000,000 Btu/h	85.0% ET	January 10, 2023.
Very Large Oil-Fired Steam Commercial Packaged Boilers	>10,000,000 Btu/h	81.0% ET	March 2, 2012.

Commercial Boiler Efficiency Changes

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Energy Code Update





Illinois Energy Conservation Code

Home > Energy Code Training > Illinois Energy Conservation Code

Click [here](#) for the 2022 Chicago Energy Transformation Code.

Updated Illinois Energy Conservation Code (2021 IECC with IL Amendments) is expected to be effective on December 1, 2022

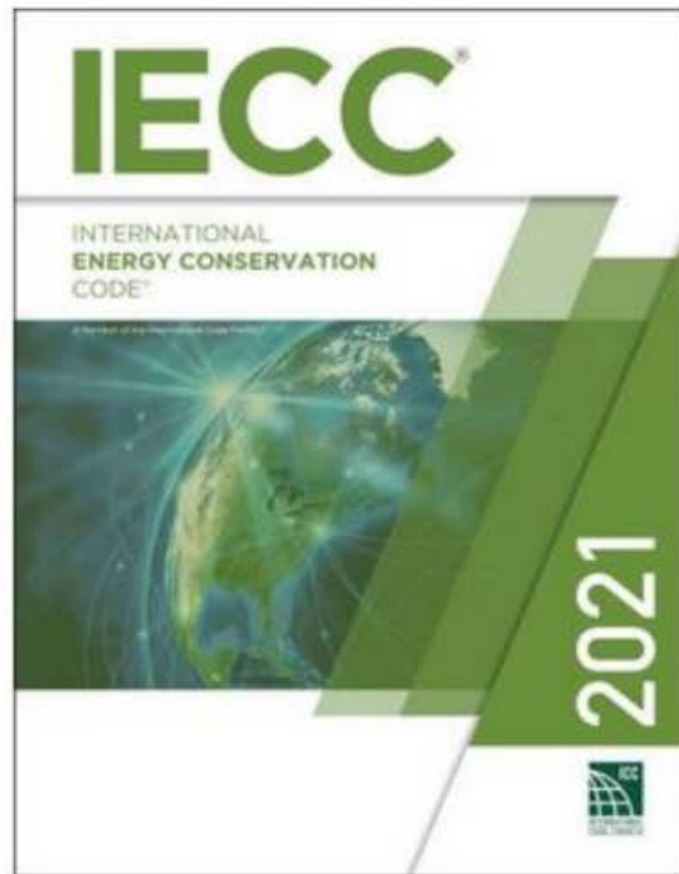
The updated Illinois Energy Conservation Code, based on the 2021 IECC with Illinois Amendments, is expected to become effective **December 1, 2022** (tentative). This Code will apply for permit applications started on or after December 1, 2022.

The separate documents can be accessed here:

- [2021 IECC](#)
- Illinois Amendments are not yet available

A consolidated 2021 IECC with IL Amendments book will be available from ICC in June 2023.

SEDAC is in the process of coordinating with the International Code Council (ICC) to publish a printed and online version of the Illinois Energy Conservation Code Book (Code Book), which incorporates Illinois Amendments into the 2021 IECC. In the past, to fully understand the Illinois Energy Conservation Code, stakeholders needed to refer to two separate documents – IECC and Illinois Amendments. The newly published Code Book will make the Illinois Energy Conservation Code more accessible and easier to comply with. Architects, engineers, contractors, code officials and other related building professionals throughout Illinois will benefit from this resource. This effort is funded by the Illinois EPA Office of Energy.





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Illinois Energy Stretch Code

(target adoption 12/31/23)

Residential Targets

Stretch Code Version	Performance Targets
2024 Residential Stretch Code	At least 50% more efficient than 2006 IECC
2026 Residential Stretch Code	At least 60% more efficient than 2006 IECC
2029 Residential Stretch Code	At least 67% more efficient than 2006 IECC
2032 Residential Stretch Code	At least 75% more efficient than 2006 IECC

Commercial Targets

Stretch Code Version	Performance Targets
2024 Commercial Stretch Code	At least 40% more efficient than 2006 IECC
2026 Commercial Stretch Code	At least 50% more efficient than 2006 IECC
2029 Commercial Stretch Code	At least 56% more efficient than 2006 IECC
2032 Commercial Stretch Code	At least 61% more efficient than 2006 IECC

For example, the residential 2021 IECC without amendments is estimated to be around 40% more efficient than the 2006 IECC. The Residential 2024 Stretch Code would need to be 50% more efficient than the 2006 IECC.

Chicago Energy Transformation Code

The *2022 Chicago Energy Transformation Code*, based on the 2021 edition of the *International Energy Conservation Code*, applies to projects where the first permit application is started on or after November 1, 2022. Additional requirements of this code will apply to projects where the first permit application is started on or after January 1, 2023.

The *2019 Chicago Energy Conservation Code*, based on the 2018 edition of the *International Energy Conservation Code*, applies to permit applications started between June 1, 2019, and October 31, 2022, as well as subsequent phases of projects where the first phase permit is subject to this code.



Chicago Energy Transformation Code

Summary of Compliance Methods

There are multiple methods for demonstrating compliance with the 2022 *Chicago Energy Transformation Code*. The Department of Buildings has prepared the following summary of requirements for each compliance method to assist permit applicants. Different compliance methods are available for [nontransient residential buildings up to 4 stories](#) (Group R-2, R-3, R-4 and R-5 occupancies) and [all other](#) projects.

Compliance Methods (Commercial)

The commercial provisions of the *Chicago Energy Transformation Code* apply to all projects other than Group R-2, R-3, R-4, and R-5 occupancies with no more than four stories above grade plane. Commercial projects must demonstrate compliance with the code using one of the following methods:

COMcheck Compliance Certificate (2021 IECC)	+
COMcheck Compliance Certificate (2019 ASHRAE 90.1)	+
COMcheck Compliance Certificate (2022 CETC)	+
CETC Prescriptive Path	+
CETC Total Building Performance Method	+
ASHRAE 90.1 Prescriptive Path	+
ASHRAE 90.1 Energy Cost Budget	+
ASHRAE 90.1 Performance Rating Method	+
Phius Certification	+
2020 NGBS Certification – Gold	+
2020 NGBS Certification – Emerald	+

Chicago Energy Transformation Code

Compliance Methods (Residential)

The residential provisions of the *Chicago Energy Transformation Code* apply to Group R-2, R-3, R-4, and R-5 occupancies with no more than four stories above grade plane. Residential projects must demonstrate compliance with the code using one of the following methods:

REScheck compliance certificate (2021 IECC)	+
REScheck compliance certificate (2022 CETC)	+
CETC Prescriptive Path	+
CETC Total Building Performance	+
CETC Energy Rating Index	+
Phius Certification	+
2020 NGBS Certification – Gold	+
2020 NGBS Certification – Emerald	+

Chicago Energy Transformation Code

Alternative Compliance Paths: Two New Building Certification Programs

Further, Chicago's new Energy Code will recognize two rigorous building certification programs as alternative ways to comply: the 2021 Phius standard and the gold and emerald certification levels under the 2020 National Green Building Standard (NGBS). The Phius 2021 Standard, sometimes referred to as a "passive building" standard, is maintained by a Chicago-based nonprofit and is widely recognized throughout the United States for balancing aggressive energy and carbon reduction targets with cost-effectiveness. The NGBS is the only residential green building standard developed through a consensus process and approved by the American National Standards Institute (ANSI). Both certification programs require rigorous pre-construction reviews and post-construction verifications by independent third-party reviewers, which supplement the Department's own building permitting and inspection processes.

For more information on the 2022 Chicago Energy Transformation Code, please visit the City of Chicago [webpage](#).

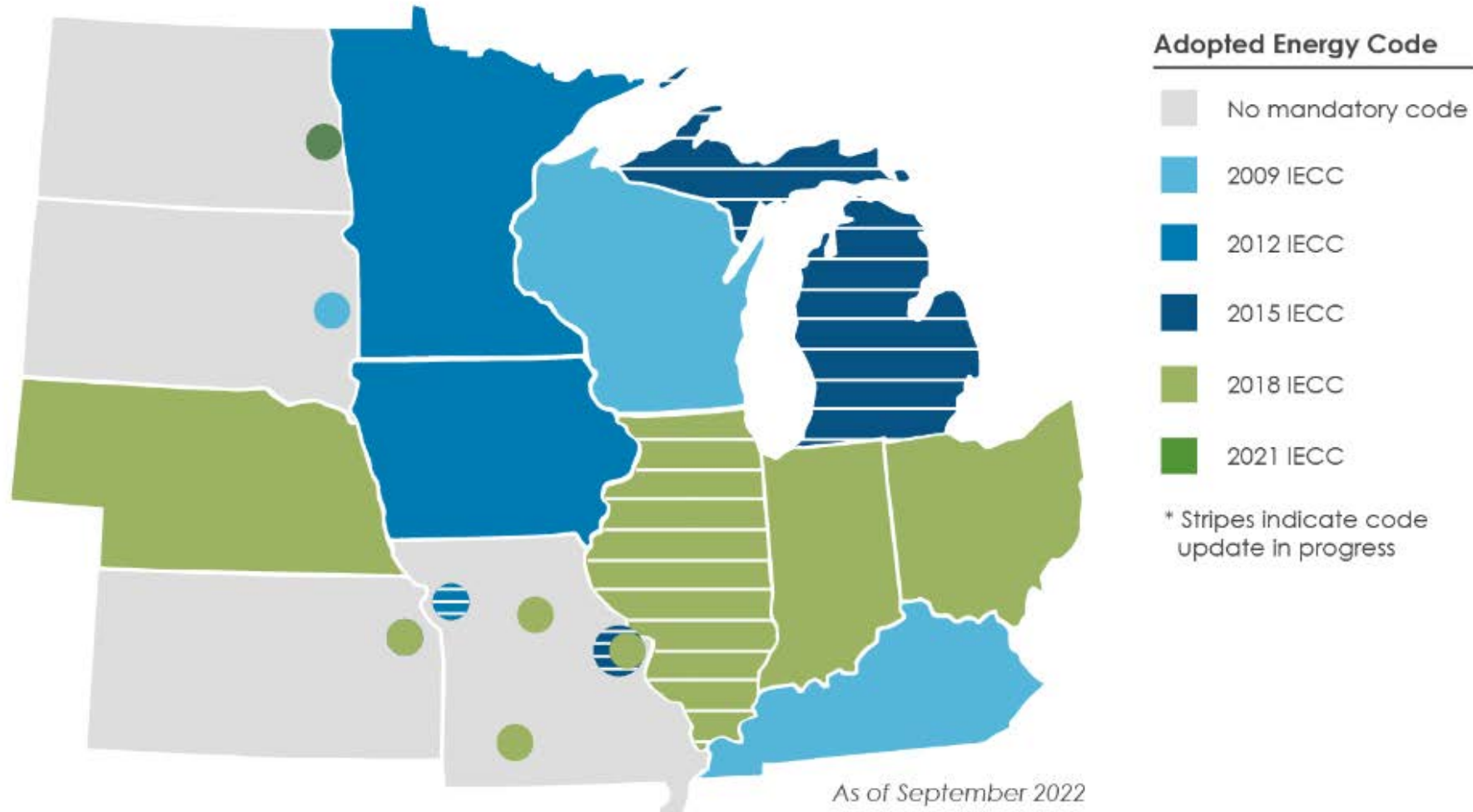
Summary of CETC-specific Requirements

Chapters C6 and R6 of the 2022 *Chicago Energy Transformation Code* contain several Chicago-specific requirements. These requirements apply regardless of the compliance path selected in earlier chapters of the code.

Chicago Solar-ready Roof Requirements	+
Chicago Electrification-ready Residence Requirements	+
Chicago Balcony and Parapet Insulation Requirements	+
Prohibition on Installing Fuel-gas-fired Lighting Appliances	+
Chicago Roof Reflectance Requirements	+
Chicago Electric Vehicle Supply Equipment EVSE Ready Requirements	+

Residential Energy Code

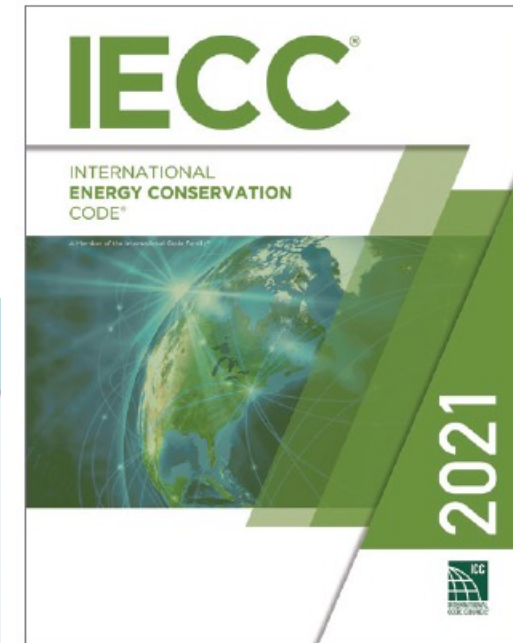
Residential Building Energy Code Adoption



Residential Illinois IECC 2021 Proposed Amendment

Insulation Requirements

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	Crawl Space Wall R-Value
4 (2021)	0.30	0.55	0.40	60	30 or 20+5ci or 13+10ci or 0+20ci	8/13	19	10ci or 13	10, 4 ft	10ci or 13
4 (IL)	0.30	0.55	0.40	49/30ci	20 or 13+5ci	8/13	19	10ci or 13	10, 4 ft	10ci or 13
5 (2021)	0.30	0.55	0.40	60	30 or 20+5ci or 13+10ci or 0+20ci	13/17	30	15ci or 19 or 13+5ci	10, 4 ft	15ci or 19 or 13+5ci
5 (IL)	0.30	0.55	0.40	49/30ci	20 or 13+5ci	13/17	30	10ci or 13	10, 4 ft	15ci or 19 or 13+5ci



Residential IECC 2021 Updates

R-value (U-factor) Table Updates

Component	2018 CZ4		2018 CZ5		2021 CZ4		2021 CZ5	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs								
Attic and Other	R-38 (0.027)	R-38 (0.027)	R-38 (0.027)	R-38 (0.027)	R-49 (0.021)	R-49 (0.021)	R-49 (0.021)	R-49 (0.021)
Above-Grade Walls								
Metal Buildings	R-13 + R-13c.i. (0.052)	R-13 + R-13c.i. (0.052)	R-13 + R-13c.i. (0.052)	R-13 + R-13c.i. (0.052)	R-13 + R-13c.i. (0.052)	R-13 + R-14c.i. (0.050)	R-13 + R-14c.i. (0.050)	R-13 + R-14c.i. (0.050)
Metal Framed	R-13 + R-7.5c.i. (0.064)	R-13 + R-7.5c.i. (0.064)	R-13 + R-7.5c.i. (0.064)	R-13 + R-7.5c.i. (0.064)	R-13 + R-7.5c.i. (0.064)	R-13 + R-7.5c.i. (0.064)	R-13 + R-10c.i. (0.055)	R-13 + R-10c.i. (0.055)
Wood-framed & Other	R-13 + R-3.8c.i. or R-20 (0.064)	R-13 + R-3.8c.i. or R-20 (0.064)	R-13 + R-3.8c.i. or R-20 (0.064)	R-13 + R-3.8c.i. or R-20 (0.064)	R-13 + R-3.8c.i. or R-20 (0.064)	R-13 + R-3.8c.i. or R-20 (0.064)	R-13 + R-7.5c.i. or R-20 + R-3.8 c.i. (0.051)	R-13 + R-7.5c.i. or R-20 + R-3.8 c.i. (0.051)
Below-Grade Walls								
Below-Grade	R-7.5c.i. (C-0.119)	R-7.5c.i. (C-0.119)	R-7.5c.i. (C-0.119)	R-7.5c.i. (C-0.119)	R-7.5c.i. (C-0.119)	R-10c.i. (C-0.092)	R-7.5c.i. (C-0.119)	R-10c.i. (C-0.092)



Residential IECC 2021 Updates

Mechanical Systems

2021 IECC mostly has some organizational updates for clarity of prescriptive measures, with couple notes:

- Duct testing required for ducts within conditioned space!
 - Leakage allowed to be higher, 8cfm/100sf floor area as opposed to 4 cfm/100sf.
- Updates to whole-house fan efficiencies

System	Airflow CFM	2018 Efficacy	2021 Efficacy
HRV/ERV	Any	1.2	1.2
In-line Supply/Exhaust	Any	2.8	3.8
Other Exhaust	<90	1.4	2.8
Other Exhaust	90+	2.8	3.5
Integrated air handler	Any	No Requirement	1.2
Range Hood	Any	2.8	Item Removed



Residential IECC 2021

R403.3.5 &
R403.3.6

Duct Testing & Leakage

- R403.3.5 Duct Testing
 - Duct test requirements unchanged: 25 Pa pressure test
 - Ducts serving non-integral ventilation systems (HRV/ERVs) exempted from testing
- R403.3.6 Duct Leakage
 - 4.0cfm/100sf floor area with air handler, 3.0 cfm without
 - **NEW REQUIREMENT:** 8.0 cfm/100sf floor area for ducts entirely within thermal envelope.



Image source: SEDAC

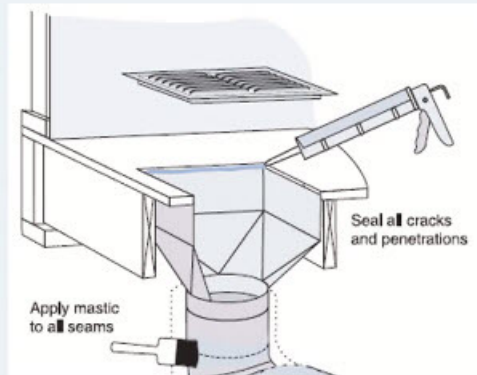
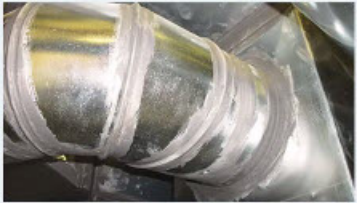
**DUCT TESTING NOW REQUIRED
REGARDLESS OF LOCATION!**



Residential Illinois IECC 2021 Proposed Amendment

Duct Leakage Floor

Buildings 1,500 SF or less have allowable duct leakage limit of 60 cfm with the air handler installed



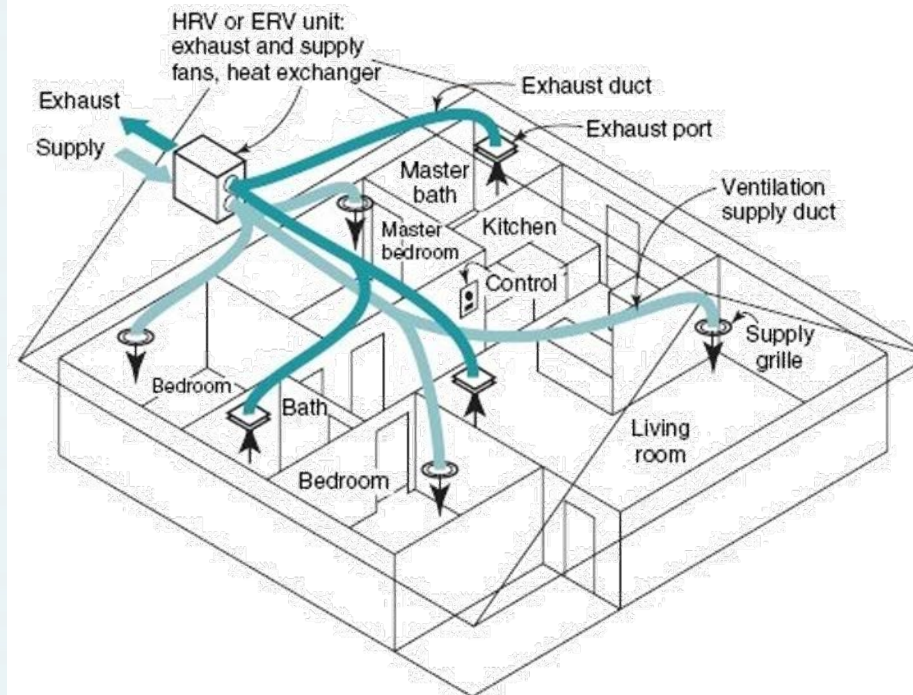
Residential Illinois IECC 2021 Proposed Amendment

Ventilation Credit (30%)

Supplies ventilation directly to each bedroom and 1 of the following: living room, dining room, kitchen

AND

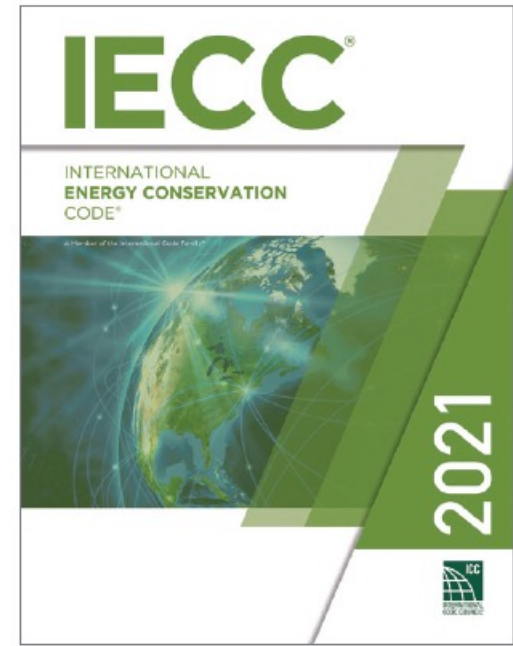
Is a balanced system



Residential Illinois IECC 2021 Proposed Amendment

Ventilation Controls Labeled

Ventilation controls shall include text or symbol indicating their function



Residential IECC 2021 Updates

Efficiency Packages

New to 2021 IECC!

- 1 efficiency package option must be included if complying with prescriptive compliance method
- For performance path, either 1 package option installed, but not modeled, OR:
- 5% decrease in energy cost or ERI of modeled building



Residential IECC 2021 Updates

Efficiency Package Options

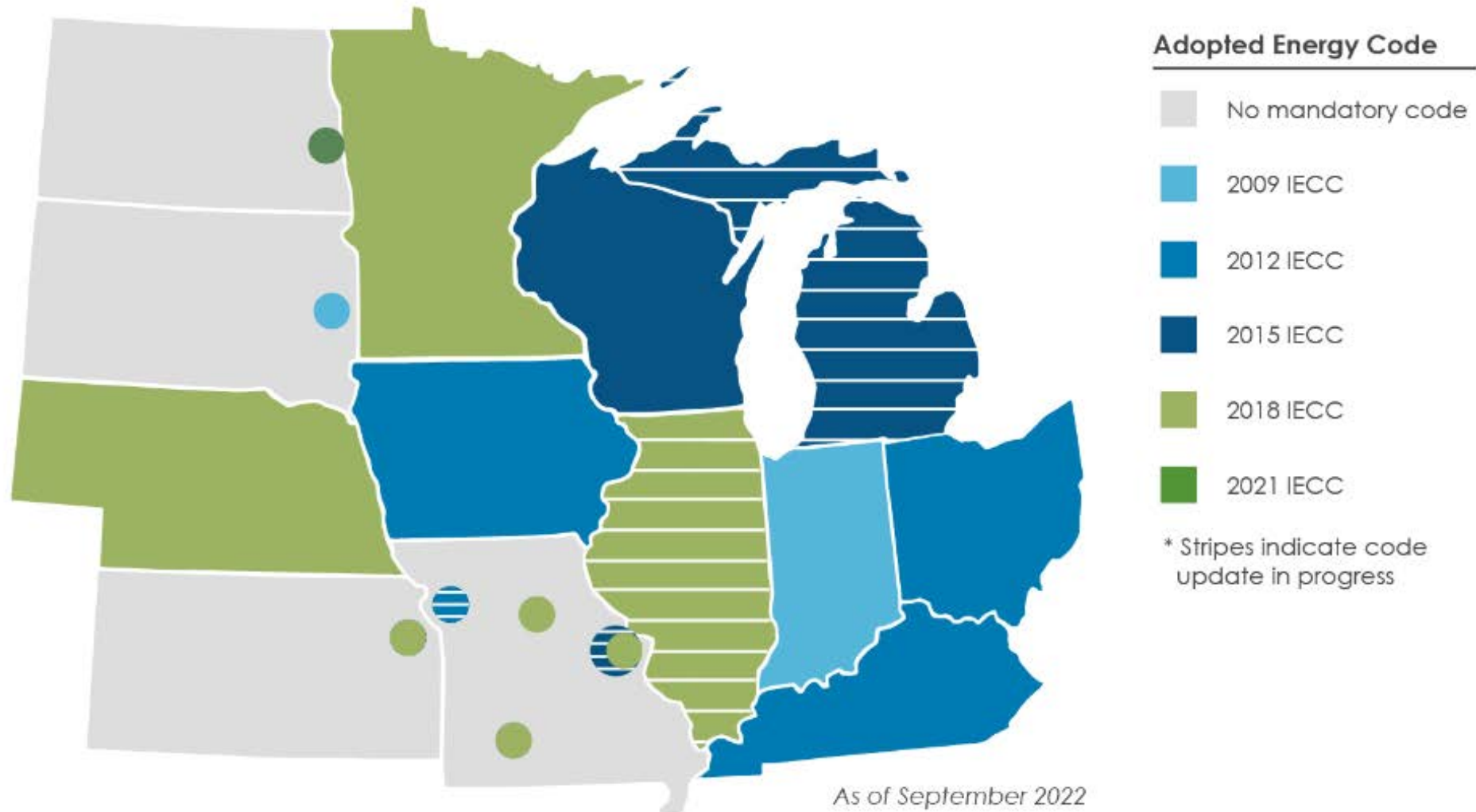
New to 2021 IECC!

- Enhanced Envelope: 5% improvement in UA
- Efficiency HVAC: heating AND cooling meets one of the following
 - 95% AFUE/10 HSPF and 16 SEER
 - 3.5 COP GSHP
- Reduced service water energy:
 - 0.82 EF gas fired, 2.0 EF electric, 0.4 SEF solar
- Efficient Duct Thermal Distribution: all in conditioned space
- Improved Air Sealing & Ventilation:
 - 3.0 ACH₅₀ with H/ERV 75% efficiency
 - 1.1cfm/W or less, no recirculation defrost
 - ERV must have 50% latent recovery



Commercial Energy Code

Commercial Building Energy Code Adoption



IECC 2021 Updates

2021 IECC Commercial Snapshot

- Improved envelope requirements
- Roughly equal to referenced ASHRAE 90.1-2019
- New Points-Based Table
- 8-10% gain in Energy Efficiency over 2018 IECC
- Zero Energy Appendix



IECC 2021 Updates

The following are key changes in the 2021 IECC by building type and system:

IECC, Commercial

Building Envelope

- Increased insulation requirements and reduced fenestration U-factors and solar heat gain coefficients.
- Extended requirements for envelope air leakage testing and verification.
- New provisions for operable openings interlocking and mandatory controls.

Mechanical Systems

- Updated equipment efficiency requirements.
- Refinement of energy recovery ventilation requirements.
- Updated fan efficiency metric.

Electrical Power and Lighting Systems

- Increased lighting efficacy and decreased lighting power density requirements.
- New provisions for plant growth lighting.
- New provisions for automatic receptacle control.
- New provisions for energy metering and monitoring.

Additional Efficiency Requirements

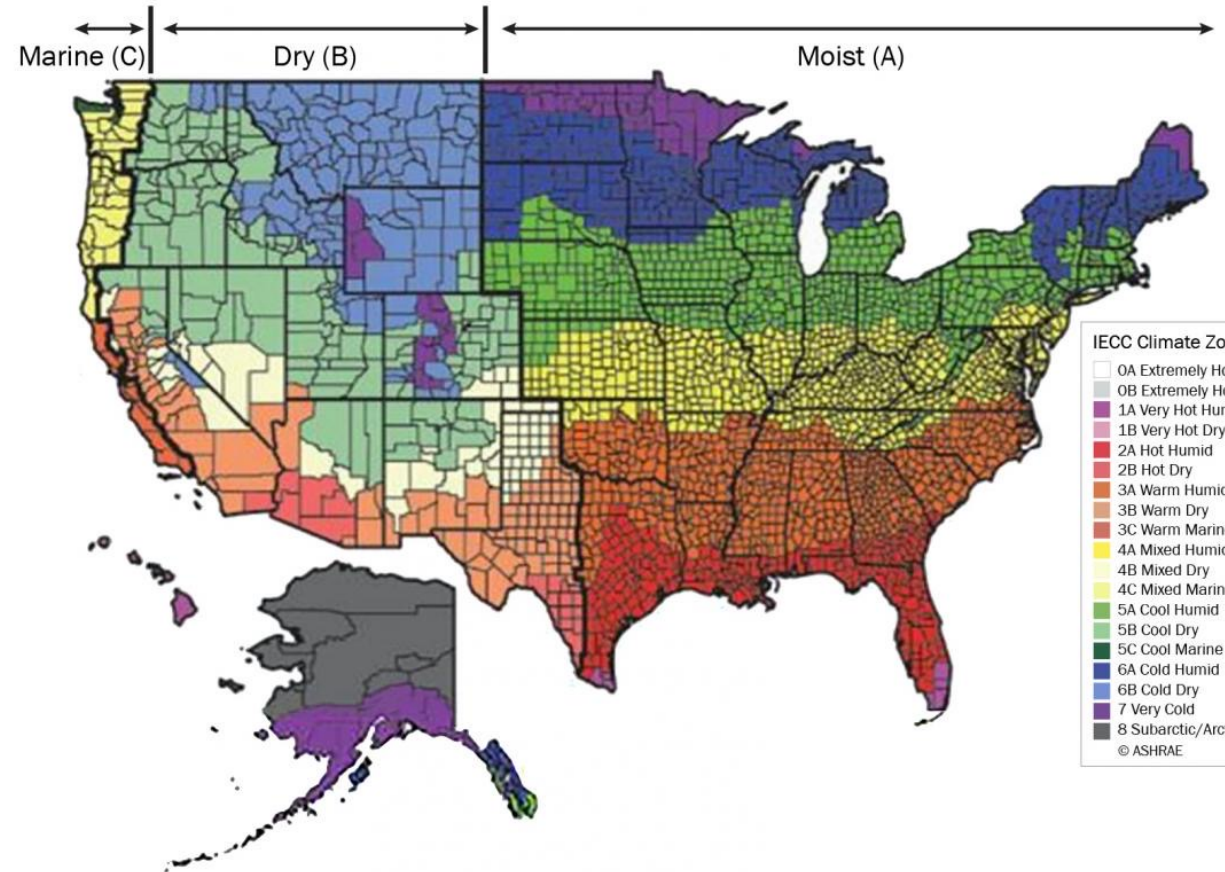
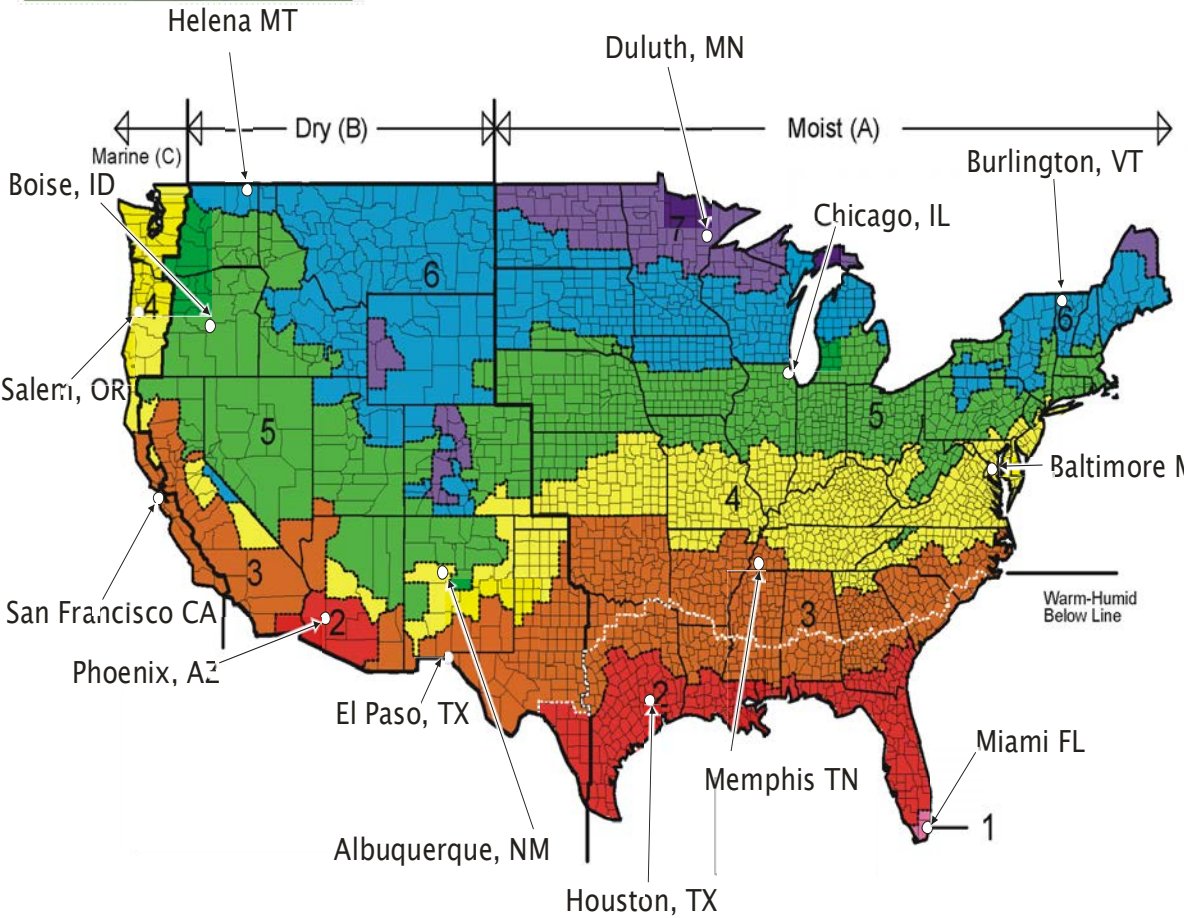
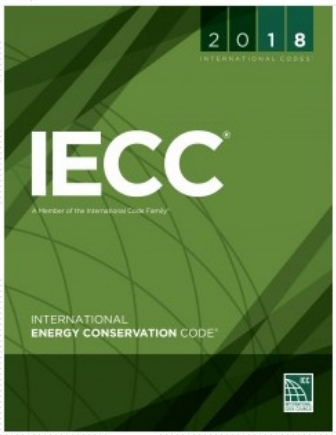
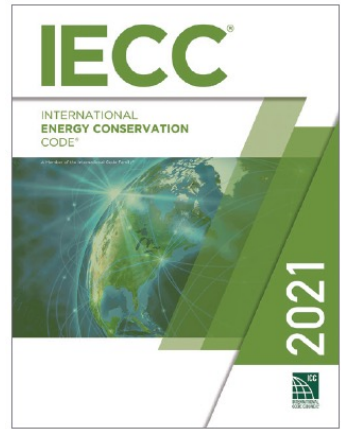
- Increased number of additional efficiency options and revised structure of Section C406.

Appendices

- New Board of Appeals appendix.
- New provision for system-ready area for electrical energy storage added to Solar-Ready Zone appendix.
- New Zero Energy Commercial Building Provisions appendix.



IECC 2018 vs. 2021 Climate Zones

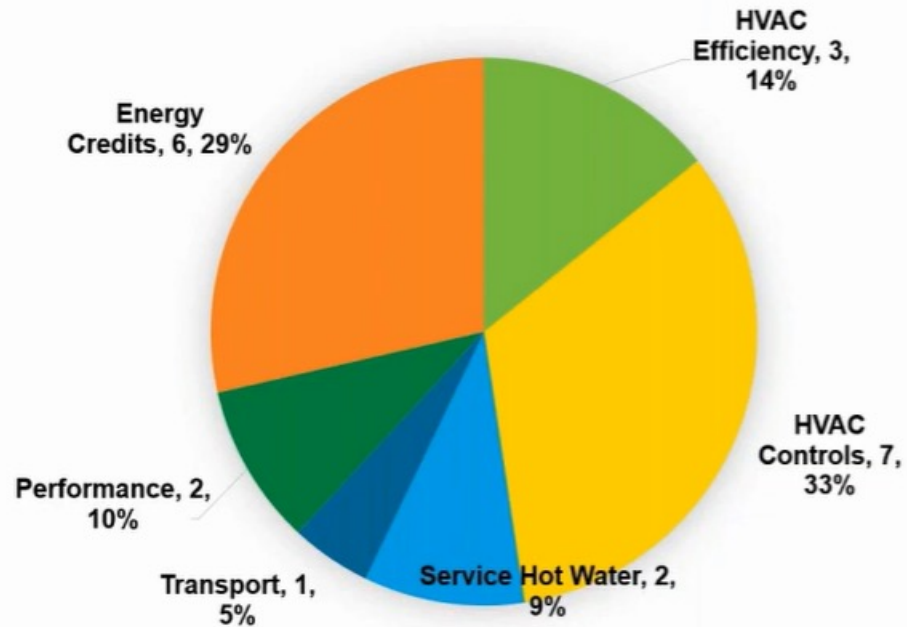


IECC 2021 Updates

2021 IECC Mechanical, Performance & Energy Credits Proposals

U.S. DEPARTMENT OF
ENERGY Energy Efficiency &
Renewable Energy

21 Mechanical, Performance & Energy Credits Proposals approved for IECC 2021



- HVAC Equipment and Controls
- General Mechanical Systems
 - Refrigeration
 - Pools
 - Escalator / Walkway
 - Computer Room
- Performance Path
- Net zero renewable appendix
- Service Hot Water
- Energy Credits



IECC 2021 Updates

HVAC Equipment Efficiency Tables C403.3.2

U.S. DEPARTMENT OF
ENERGY Energy Efficiency & Renewable Energy



CE113

- HVAC equipment efficiency updated to match ASHRAE Tables directly
- Replaces Tables C403.3.2(1) through C403.3.2(10)
- Adding new tables for:
 - DOAS units
 - Water source heat pumps
 - Variable refrigerant flow cooling and heat pumps
 - Heat pump and heat reclaim chiller packages
 - Ceiling mounted computer room air conditioners
 - Commercial refrigerators and freezers
- Many table efficiencies are based on Federal appliance manufacturing requirements

Table 6.5.1-4 Electrically Operated Packaged Terminal Air Conditioners, Packaged Terminal Heat Pumps, Single-Package Vertical Air Conditioners, Single-Package Vertical Heat Pumps, Room Air Conditioners, and Room Air-Conditioner Heat Pumps—Minimum Efficiency Requirements

Equipment Type	Size Category (Input)	Subcategory or Rating Condition	Minimum Efficiency ^a	Test Procedure ^b
Room air conditioners without reverse cycle with lowered coils for applications outside U.S.	<4000 Btu/h		11.0 CEER	ANSI/AHAM PAC-1
	4000 Btu/h and <8000 Btu/h		11.0 CEER	
	8000 Btu/h and <14,000 Btu/h		10.9 CEER	

Table 6.5.1-6 Electrically Operated Variable-Refrigerant-Flow and Applied Heat Pumps—Minimum Efficiency Requirements

Equipment Type	Size Category	Heating Section Type	Subcategory or Rating Condition	Minimum Efficiency	Test Procedure	
VRF air cooled (cooling mode)	<45,000 Btu/h	All	VRF multiple system	13.0 EER	AHRI 1200	
		Electric resistance (or none)		11.0 EER		
	45,000 Btu/h and <135,000 Btu/h		VRF multiple system with heat recovery	12.9 EER/4.6 EER		ANSI/AHAM HAC-1
				10.8 EER		
135,000 Btu/h and <240,000 Btu/h		VRF multiple system	12.7 EER	14.4 EER		
			10.6 EER			
			12.3 EER	13.9 EER		

Table 6.5.1-10 Floor-Mounted Air Conditioners and Condensing Units Serving Computer Rooms—Minimum Efficiency Requirements (Continued)

Equipment Type	Standard Model	Net Sensible Cooling Capacity	Minimum Net Sensible COP	Rating Conditions Return air (dry bulb/wet point)	Test Procedure
Glycol cooled	Downflow	<40,000 Btu/h	2.06	85°F/52°F (Class 1)	AHRI 1360
		40,000 Btu/h and <79,000 Btu/h	2.24		
		79,000 Btu/h	2.21		
	Upflow, ducted	<40,000 Btu/h	2.03		
		40,000 Btu/h and <79,000 Btu/h	2.21		
		79,000 Btu/h	2.18		
Upflow, nonducted	<40,000 Btu/h	2.08	75°F/52°F (Class 1)		
	40,000 Btu/h and <240,000 Btu/h	1.90			
Horizontal	<40,000 Btu/h	1.81		90°F/52°F (Class 3)	
	40,000 Btu/h and <240,000 Btu/h	2.48			
		240,000 Btu/h and <360,000 Btu/h	2.18		

IECC 2021 Updates

Tables C403.3.2(1)-(16) Equipment Efficiency

Increasing Federal Efficiency Standards

Following rating changes occur 1/1/23

- SEER to SEER₂
- HSPF to HSFP₂
- COP to COP₂
- Air-cooled heat pump EER to IEER
- Smaller air combustion heating systems see slight efficiency increase

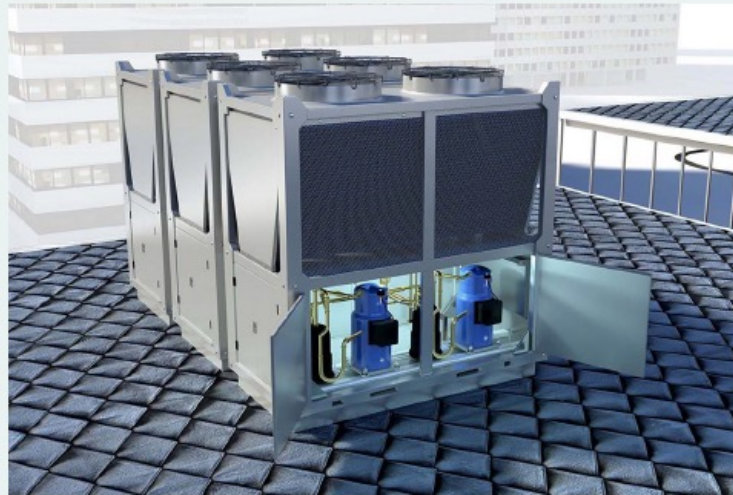


Image sources: danfoss.com, grainger.com



IECC 2021 Updates



TABLE C403.3.2(1)
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS—MINIMUM EFFICIENCY REQUIREMENTS^{c, d}

EQUIPMENT TYPE	SIZE CATEGORY	HEADING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY	TEST PROCEDURE ^a
Air conditioners, air cooled	< 65,000 Btu/h ^b	All	Split system, three phase and applications outside US single phase ^b	13.0 SEER before 1/1/2023 13.4 SEER2 after 1/1/2023	AHRI 210/240—2017 before 1/1/2023 AHRI 210/240—2023 after 1/1/2023
			Single-package, three phase and applications outside US single phase ^b	14.0 SEER before 1/1/2023 13.4 SEER2 after 1/1/2023	
Space constrained, air cooled	≤ 30,000 Btu/h ^b	All	Split system, three phase and applications outside US single phase ^b	12.0 SEER before 1/1/2023 11.7 SEER2 after 1/1/2023	AHRI 210/240—2017 before 1/1/2023 AHRI 210/240—2023 after 1/1/2023
			Single package, three phase and applications outside US single phase ^b	12.0 SEER before 1/1/2023 11.7 SEER2 after 1/1/2023	
Small duct, high velocity, air cooled	< 65,000 Btu/h ^b	All	Split system, three phase and applications outside US single phase ^b	12.0 SEER before 1/1/2023 12.1 SEER2 after 1/1/2023	AHRI 210/240—2017 before 1/1/2023 AHRI 210/240—2023 after 1/1/2023

IECC 2021 Updates



Air conditioners, air cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric resistance (or none)	Split system and single package	11.2 EER 12.9 IEER before 1/1/2023 14.8 IEER after 1/1/2023	AHRI 340/360
		All other		11.0 EER 12.7 IEER before 1/1/2023 14.6 IEER after 1/1/2023	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric resistance (or none)		11.0 EER 12.4 IEER before 1/1/2023 14.2 IEER after 1/1/2023	
		All other		10.8 EER 12.2 IEER before 1/1/2023 14.0 IEER after 1/1/2023	

(continued)

IECC 2021 Updates

C403.2.3 Fault detection and diagnostics. New buildings with an HVAC system serving a gross conditioned floor area of 100,000 square feet (9290 m²) or larger shall include a fault detection and diagnostics (FDD) system to monitor the HVAC system's performance and automatically identify faults. The FDD system shall:

1. Include permanently installed sensors and devices to monitor the HVAC system's performance.
2. Sample the HVAC system's performance at least once every 15 minutes.
3. Automatically identify and report HVAC system faults.
4. Automatically notify authorized personnel of identified HVAC system faults.
5. Automatically provide prioritized recommendations for repair of identified faults based on analysis of data collected from the sampling of HVAC system performance.
6. Be capable of transmitting the prioritized fault repair recommendations to remotely located authorized personnel.

Exception: R-1 and R-2 occupancies.

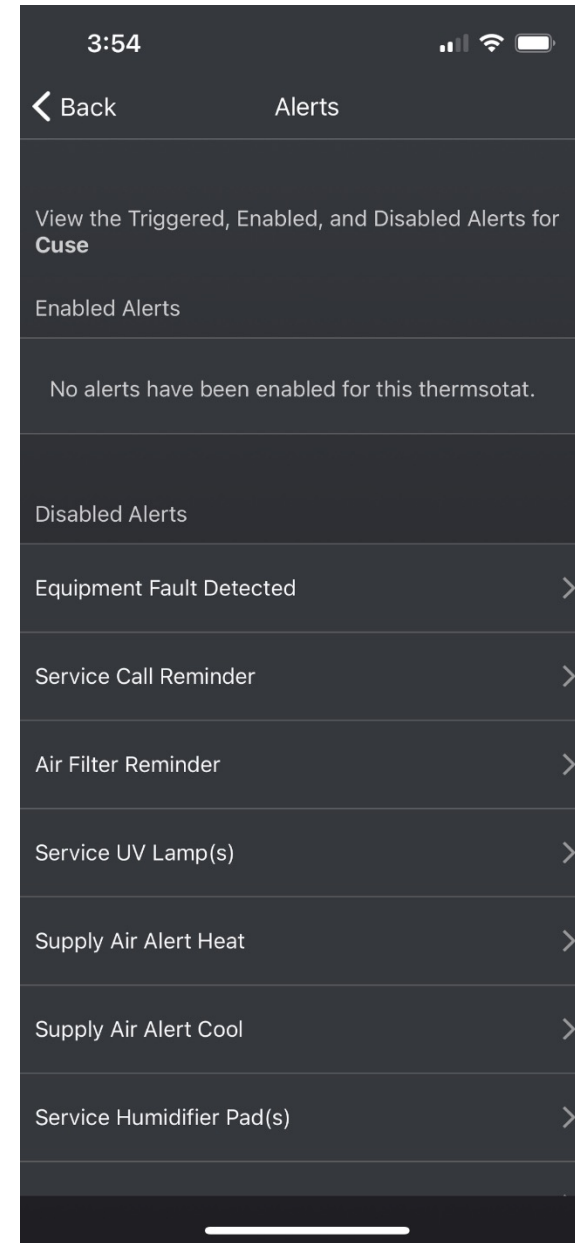


If you need BOTH economizer FDD and 100k building FDD... but not a good candidate for a full BAS (warehouse, tenant leased spaces, common area of multi-family, etc).



Remote Duct Sensor

Model: ACC-DSEN



IECC 2021 Updates

Equipment Efficiency – Small Fans C403.8.5

U.S. DEPARTMENT OF
ENERGY Energy Efficiency &
Renewable Energy



CE140

- New efficiency requirements for small fans
 - Less than 1/12 horsepower
 - Except when part of a listed HVAC appliance
 - Except dryer exhaust, range hood main or booster fans

TABLE C403.8.5
LOW-CAPACITY VENTILATION FAN EFFICACY

FAN LOCATION	AIR FLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)	AIR FLOW RATE MAXIMUM (CFM)
HRV or ERV	Any	1.2 cfm/watt	Any
In-line fan	Any	3.8 cfm/watt	Any
Bathroom, utility room	10	2.8 cfm/watt	< 90
Bathroom, utility room	90	3.5 cfm/watt	Any

5

IECC 2021 Updates

2021 HVAC Controls Updates

- C403.4.2.3 Adds auto-stop to auto-start function (Increase/decrease setpoints by at least 2°F before scheduled unoccupancy)
- C403.5 Economizers: Adds an exception for VRF systems employing DOAS systems.
- C403.6.5 Supply Air Reset Controls: Adds allowance for zone humidity reset-based control in humid climate zones.
 - Also adds that zone max airflow shall be selected based on max reset temperature.



IECC 2021 Updates

2021 HVAC Controls Updates (cont.)

- C403.7.1 Demand Control Ventilation expanded
 - **All single-zone systems** complying with C403.5 through C403.5.3 added to spaces required to have DCV
 - Occupant load requirement reduced from 25 ppl/1000sf to **15 ppl/1000sf**.
 - DCV exception modifications:
 - **Multi-zone systems w/ design OA <750cfm**
 - **Changes 1,200cfm make-up/transfer air exception to 75% of ventilation**
 - **Removed process load exception**
 - **Added occupancy classification exceptions: correctional cells, educational labs, barber, salons, and bowling alley seating.**



IECC 2021 Updates

C402.5.11 Operable Openings Interlocking

New 2021 IECC Requirement!

- Spaces over 40 sf with operable openings to outdoors shall interlock opening with HVAC
 - When open, reset cooling setpoint to 90F and heating setpoint to 55F
 - Setpoint change shall occur within 10min of opening

Exceptions:

1. Separately zones areas associated with food prep that contribute to HVAC loads
2. Warehouses that utilize overhead doors for the function of occupancy (approval by AHJ)
3. First entrance doors in exterior of vestibule wall



IECC 2021 Updates

C403.7.2 Enclosed Garage Ventilation

2018 IECC

- Exceptions
 - Total cap. <22,500 cfm with no heating/mech. cooling
 - Motor nameplate ratio exceeding 1125 cfm/hp and no heating/mech. cooling

2021 IECC

- Exceptions
 - Total cap. <8,000 cfm and no heating/mech. cooling
 - Motor nameplate ratio exceeding 1125 cfm/hp and no heating/mech. cooling



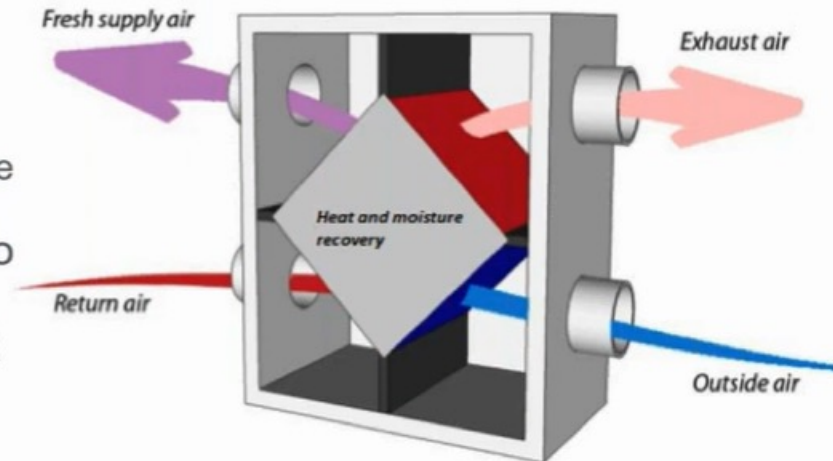
IECC 2021 Updates

Energy Recovery Changes C403.7.4, C403.9.6

U.S. DEPARTMENT OF
ENERGY Energy Efficiency &
Renewable Energy

CE133

- Adds residential (apartment) exhaust energy recovery requirements
 - Climate zone 3C exempt
 - Smaller (<500 ft²) apartments exempt in Climate Zones 0, 1, 2, 3, 4C, 5C
- Defines Enthalpy Recovery Ratio (ERR) to match ASHRAE (not AHRI effectiveness)
- Requires 50% cooling / 60% heating ERR



CE143

- Requires chiller heat recovery for reheat in hospitals
 - 300 or more tons of chiller capacity with simultaneous heating and cooling
 - Except in Climate Zones 5C, 6B, 7, and 8
 - Except where $\geq 60\%$ of reheat is renewable or otherwise recovered



IECC 2021 Updates

C403.1.2 Data Centers

2021 IECC new section!

Data centers must comply with Sections 6 and 8 of ASHRAE 90.4

1. MLC values from 90.4 replaced with Table C403.1.2(1) & (2) values

Climate Zone	4A	5A
MLC @ 100% and 50% ITE Load	0.23	0.22
HVAC Max Annual MLC @ 100% & 50% ITE Load	0.17	0.17



IECC 2021 Updates

C404.2.1 High input service water heating

2018 IECC

Where single heater serves whole building and has input 1 MMBH or more, thermal efficiency shall be 90%

Multiple units with combined input 1 MMBH or more, thermal efficiency shall be 90%

2021 IECC

Where single heater serves whole building and has input 1 MMBH or more, thermal efficiency shall be **92%**

Multiple units with combined input 1 MMBH or more, thermal efficiency shall be 90%



IECC 2021 Updates

Additional Efficiency Options

2018 IECC

1. Efficient HVAC
2. Reduced LPD
3. Enhanced lighting controls
4. On-site renewables
5. DOAS on specific HVAC
6. Efficiency service hot water
7. Enhanced envelope
8. Reduced air infiltration

2021 IECC

- 3 New Options
- Add energy monitoring where not already required
 - Add fault detection where not already required
 - Efficient kitchen equipment



2021 Efficiency Package Updates

Now need to obtain 10 credits in added efficiency

Multiple tables of available credits for efficiency options based on building type and climate zone

TABLE C406.1(5) ADDITIONAL ENERGY EFFICIENCY CREDITS FOR OTHER^a OCCUPANCIES

SECTION	CLIMATE ZONE																
	0A & 1A	0B & 1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
C406.2.1: 5% heating efficiency improvement	NA	NA	NA	NA	1	1	1	1	1	2	1	2	1	2	2	3	3
C406.2.2: 5% cooling efficiency improvement	5	5	4	4	3	3	2	2	2	1	1	2	1	1	1	1	1
C406.2.3: 10% heating efficiency improvement	NA	NA	NA	1	1	1	1	2	2	3	3	3	3	4	3	5	5
C406.2.4: 10% cooling efficiency improvement	8	9	8	7	5	5	3	4	4	2	2	3	2	2	2	2	2
C406.3: Reduced lighting power	8	8	9	9	9	9	10	8	9	9	7	8	8	8	8	8	7
C406.4: Enhanced digital lighting controls	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	2	1
C406.5: On-site renewable energy	8	8	8	8	8	8	8	8	8	7	7	7	7	7	7	7	7

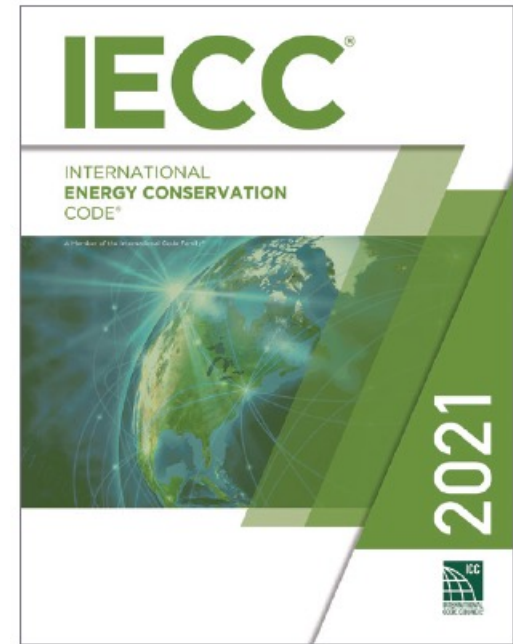
Commercial Illinois IECC 2021 Proposed Amendment

Code Stringency

Local governments can not enforce an Energy Code more or less stringent for both commercial and residential buildings

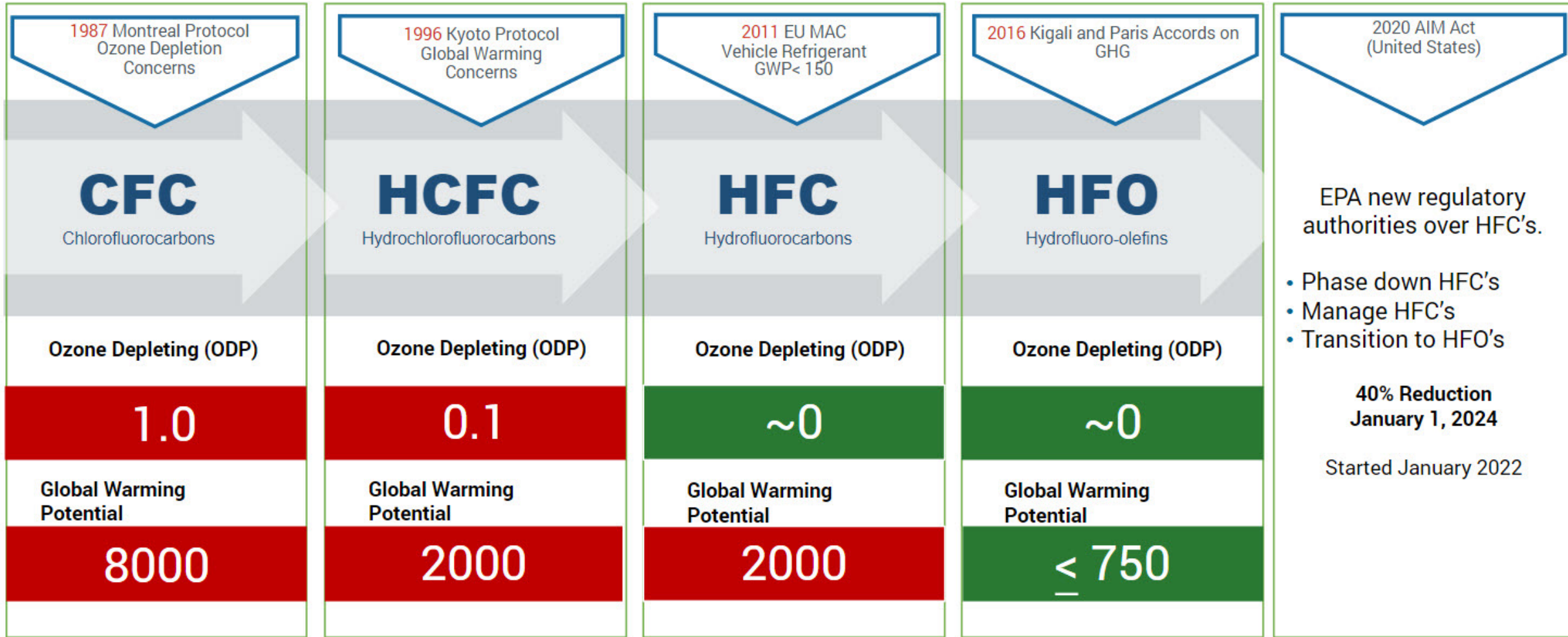
Excludes those that had adopted 2006 or newer IECC before May 15, 2009

Stretch Energy Code becoming available 2024



Refrigerant Changes

Refrigerant Regulation History



Unlike prior phase-outs, this reduction in HFC production and consumption is not directed toward a single product but instead a group of high GWP HFCs.

Refrigerant Phasedown

- 2019 (Dec.31) - R-22 refrigerant production ended for service work
- 2019 (Dec.31) - R-123 ended in all new equipment
- 2022 – HFC (R-410a, R-134a, R-407C, etc) production cap dropped by 10%
- 2023 (Dec.31) - R-134a & R-410a ends in new chillers (in 12 states and possibly all states)
- 2024 – HFC (R-410a, R-134a, R-407C etc) production cap dropped by 40%
- 2024 (Dec.31) - R-410a (and all HFCs) ends for new unitary equipment
- 2025 (Dec.31) - R-410a (and all HFCs) end in VRF
- 2029 – HFC (R-410a, R-134a, R-407C etc) production cap dropped by 70%
- 2029 (Dec.31) - R-123 refrigerant production ends for service work
- 2036 – HFC (R-410a, R-134a, R-407C, etc) production cap dropped by 85%

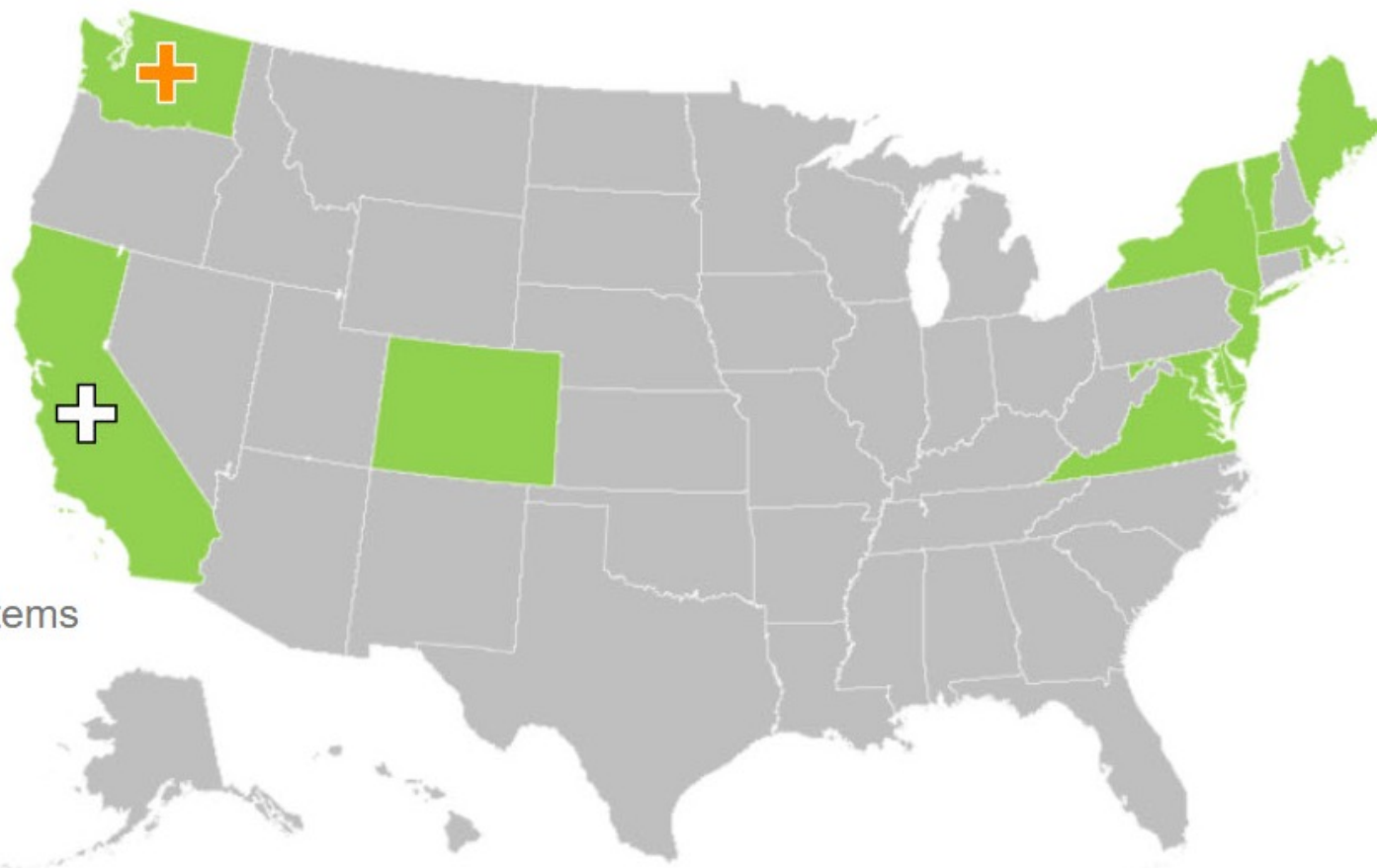
12 states are taking action to phase down HFCs

Implemented EPA SNAP 21 Chillers - 2024

+ Restrictions on:
-VRF (2026)
-Unitary HVAC systems (2025)

+ Pursuing restrictions on VRF & Unitary HVAC systems

Chillers January 2024 (750 GWP) (12 states)
CA, CO, DE, MA, MD, ME, NJ, NY, RI, VA, VT, WA



AIR CONDITIONING AND INDUSTRIAL PROCESS REFRIGERATION (IPR)

Chillers

AR4 GWP Limit

Transition Date

Chillers (designed for chilled fluid leaving temperature $> +35^{\circ}\text{F}$)

750

January 1, 2024

Chillers (designed for chilled fluid leaving temperature $\leq +35^{\circ}$ and $> -10^{\circ}\text{F}$)

1500

January 1, 2024

Chillers (designed for chilled fluid leaving temperature $\leq -10^{\circ}$ to -50°F)

2200

January 1, 2024

Chillers ($< 20\text{lbs}$ charge) (designed for chilled fluid leaving temperature $< +35^{\circ}\text{F}$)

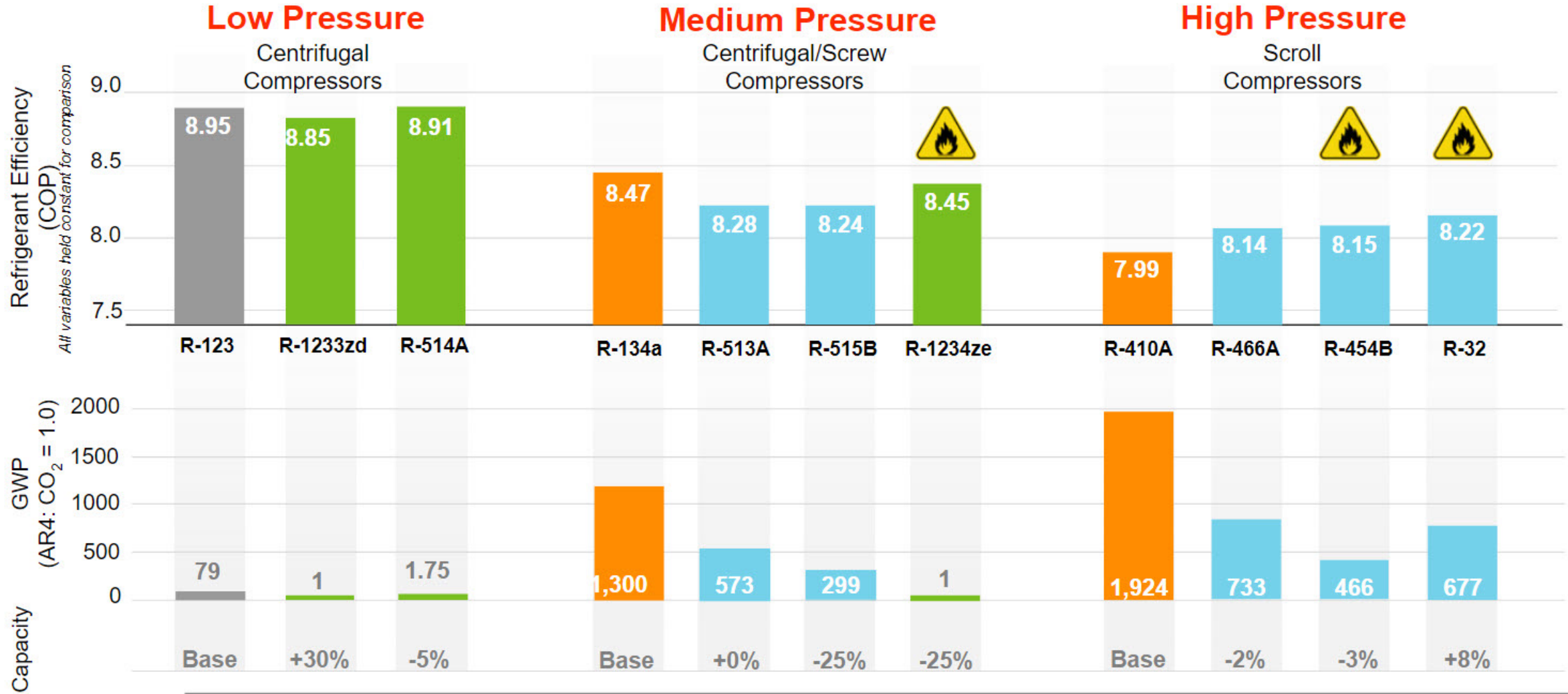
2200

January 1, 2024

Exceptions: Chillers $< -50\text{F}$, Medical, Scientific and Research Applications



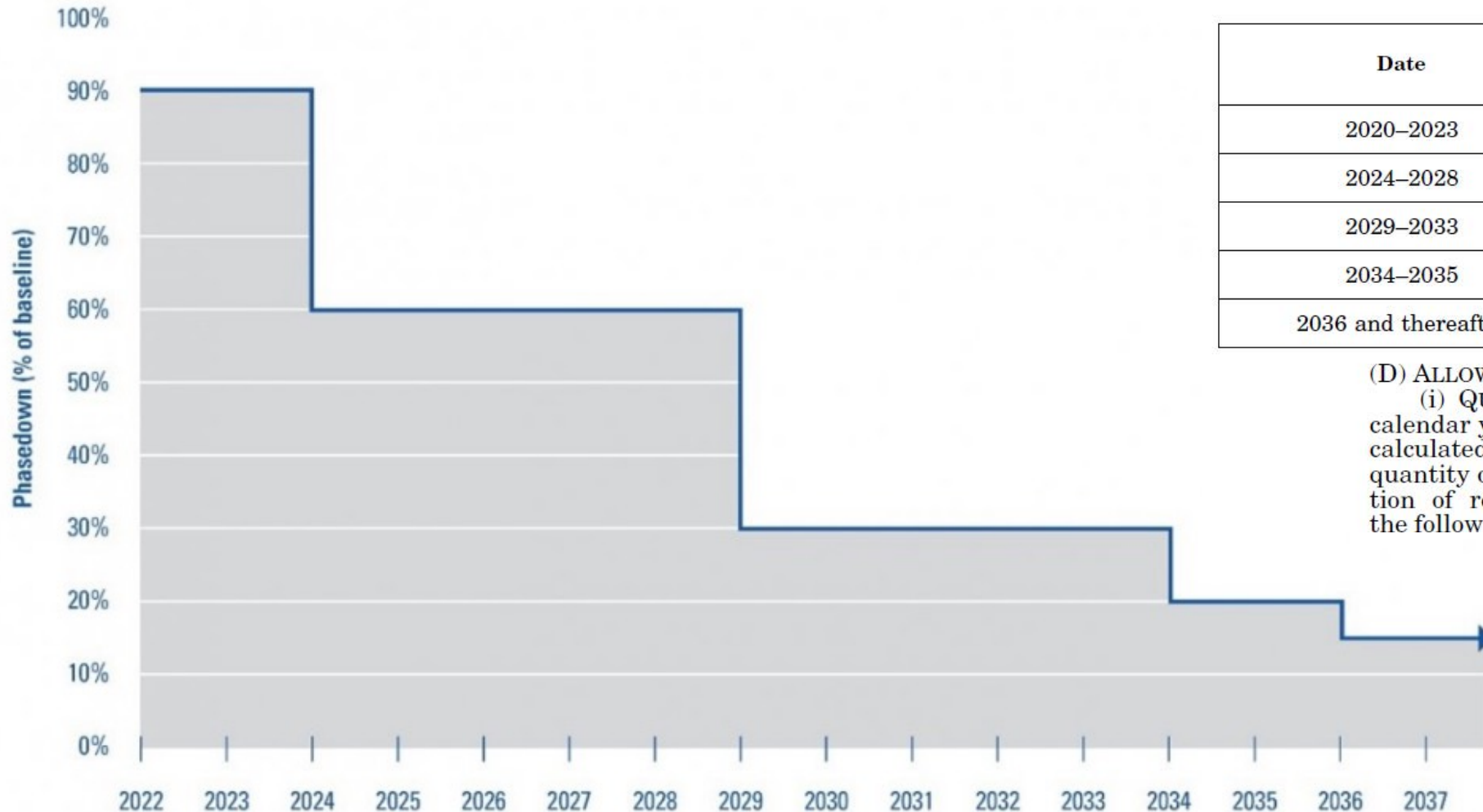
Efficiency and GWP Comparison



Industry choices offer options & trade-offs; New options evolving.

Refrigerant Phasedown

The following illustrates the HFC production and consumption phasedown schedule as outlined in the AIM Act.



(C) RELATION TO BASELINE.—On January 1 of each year listed in the following table, the Administrator shall apply the applicable percentage, as described in subparagraph (A):

Date	Percentage of Production Base-line	Percentage of Consumption Baseline
2020–2023	90 percent	90 percent
2024–2028	60 percent	60 percent
2029–2033	30 percent	30 percent
2034–2035	20 percent	20 percent
2036 and thereafter	15 percent	15 percent

(D) ALLOWANCES.—

(i) QUANTITY.—Not later than October 1 of each calendar year, the Administrator shall use the quantity calculated under subparagraph (B) to determine the quantity of allowances for the production and consumption of regulated substances that may be used for the following calendar year.

U.S. EPA - SNAP Rule 23 Published in the Federal Register

ACCEPTABLE ALTERNATIVES, WITH USE CONDITIONS

End-Use	Substitutes	Decision
Refrigeration & Air Conditioning		
Residential and light commercial air conditioning and heat pumps (New)	R-452B, R-454A, R-454B, R-454C, R-457A	Acceptable Subject to Use Conditions*
Residential and light commercial air conditioning and heat pumps (New) excluding self-contained room air conditioners†	R-32	Acceptable Subject to Use Conditions*

† EPA listed R-32 as Acceptable Subject to Use Conditions for self-contained room air conditioners (April 10, 2015; 80 FR 19454)

Use Conditions*

1. Follow UL 60335-2-40, 3rd edition
2. New equipment ONLY
3. Warning Labels



U.S. EPA SNAP Approved A2L Refrigerants



Air Conditioning	R-410A	R-32	R-452B	R-454B	R-454A	R-457A	R-454C
GWP AR4 (AR5)	2088 (1924)	675 (677)	698 (676)	466 (467)	239 (238)	137 (139)	148 (146)
Capacity vs. R-410A	-	+7%	-3%	-4%	-23%	-37%	-33%
COP vs. R-410A	-	+1%	+1%	+1%	+3%	+6%	+5%
Evap Glide [K]	0.1	0	1	1	5	5.5	6
T Discharge [°C]	82	98	86	87	77.4	73	73.2
P Discharge [kPa]	2802	2802	2663	2631	2131	1680	1842



Refrigerant Phasedown

AIM Act Phase Down Estimate

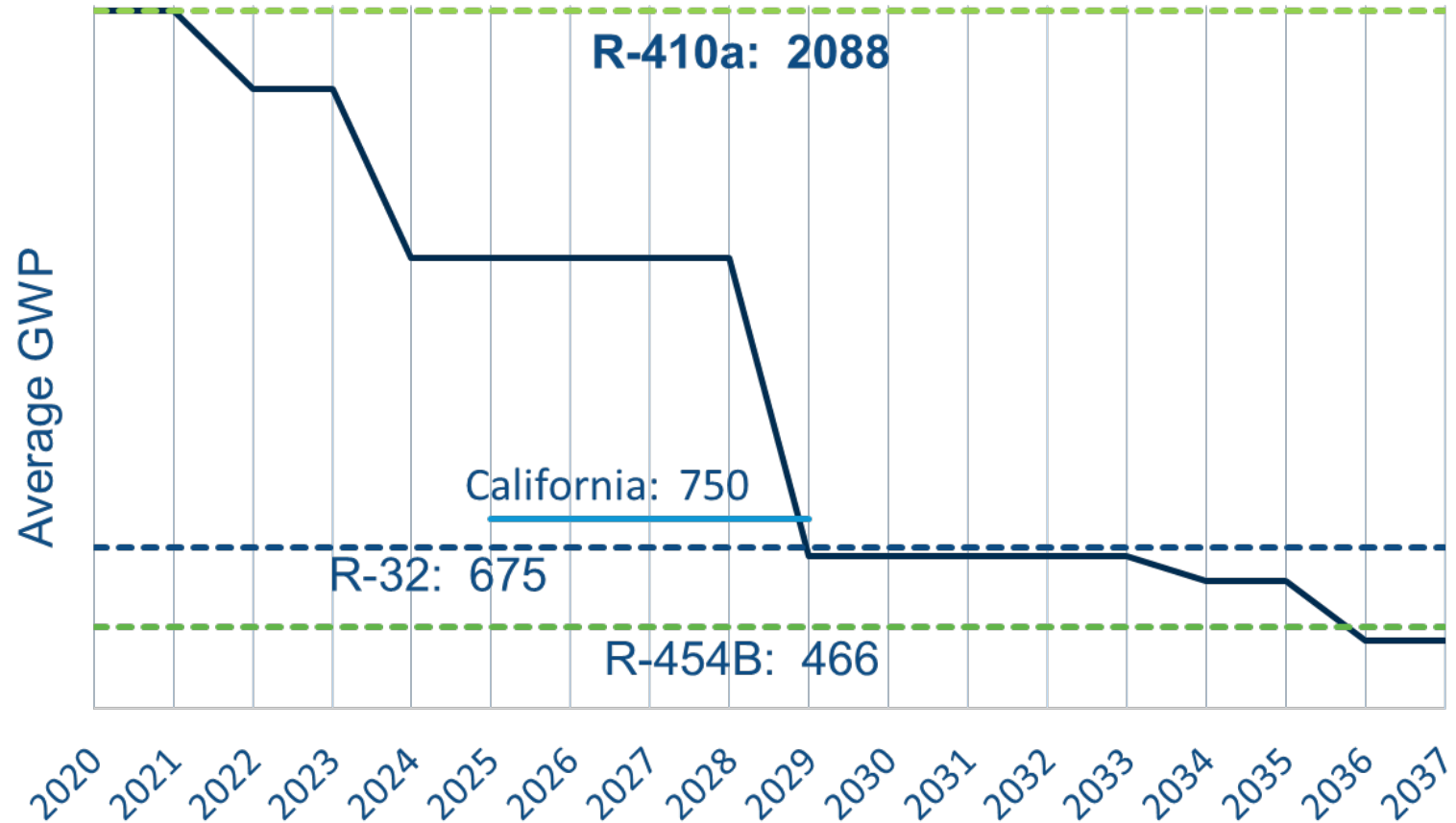
Residential and Light Commercial HVAC

January 2025

GWP (global warming potential) < 750

2025 CA & WA adopt

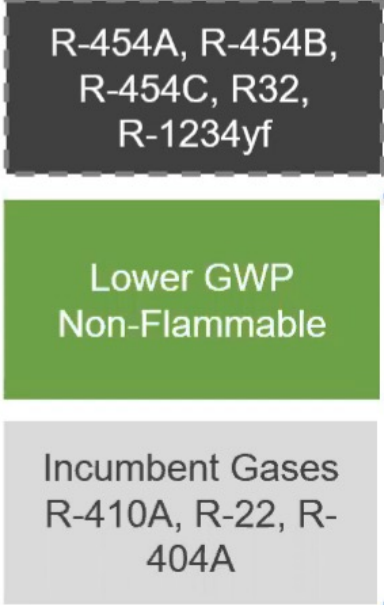
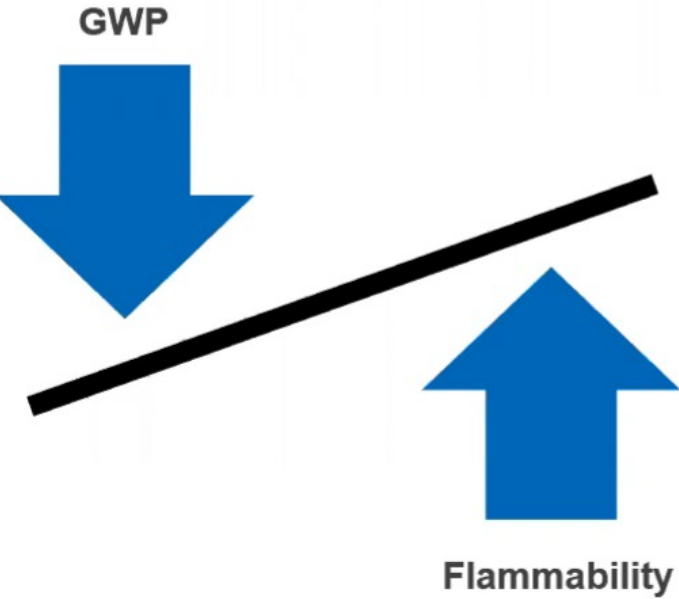
TBD National adoption



ASHRAE Standard 34 - Flammability and GWP

To lower GWP, results in increasing the flammability properties

- R-410A = 1924 GWP (50% R-32 / 50% R-125)
- R-454B = 466 GWP (69% R-32 / 31% R-1234yf)



Higher Flammability	A3	B3
Flammable	A2	B2
Lower Flammability	A2L	B2L
No Flame Propagation	A1	B1
	Lower Toxicity	Higher Toxicity

Increasing Flammability

Increasing Toxicity

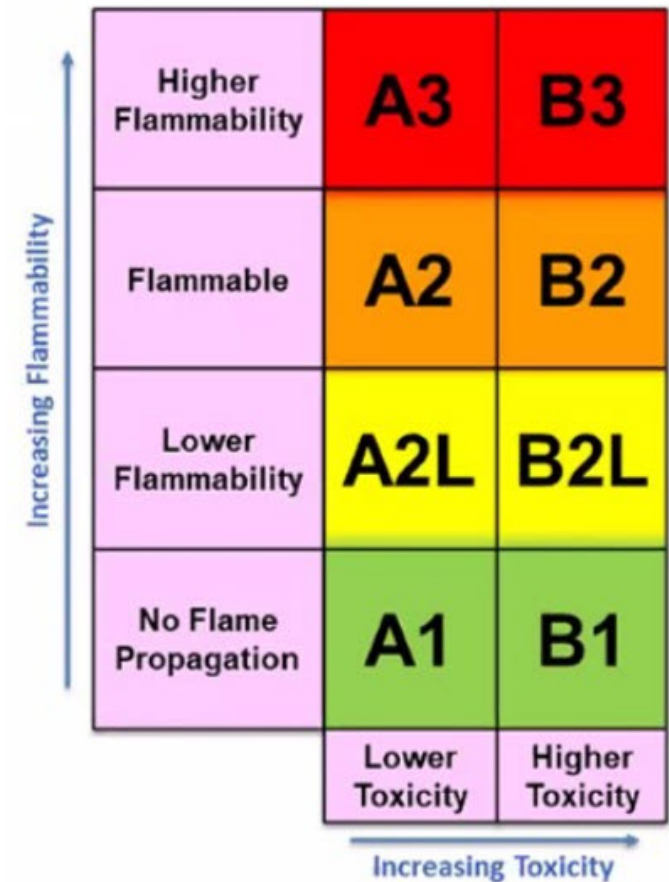









HFO: Next Generation of Refrigerants

- Move to lower GWP requires use of mild flammable refrigerants for many applications.
- A2L's help reduce the HFC use in the short-term and long-term future, while also helping satisfy energy efficiency, safety, and environmental standards.
- Systems will be converting to HFO/New A2L Refrigerants.

Some HFCs Affected	
Refrigerant	GWP
R-134a	1,430
R-407C	1,774
R-410A	2,088
R-404A	3,900
R-236FA	9,810
R-23	14,800

New HFO Refrigerants	
Refrigerant	GWP
R-1234yf	< 1
R-1234ze	< 1
R-455A	146
R-454C	146
R-454B	466
R-32	675

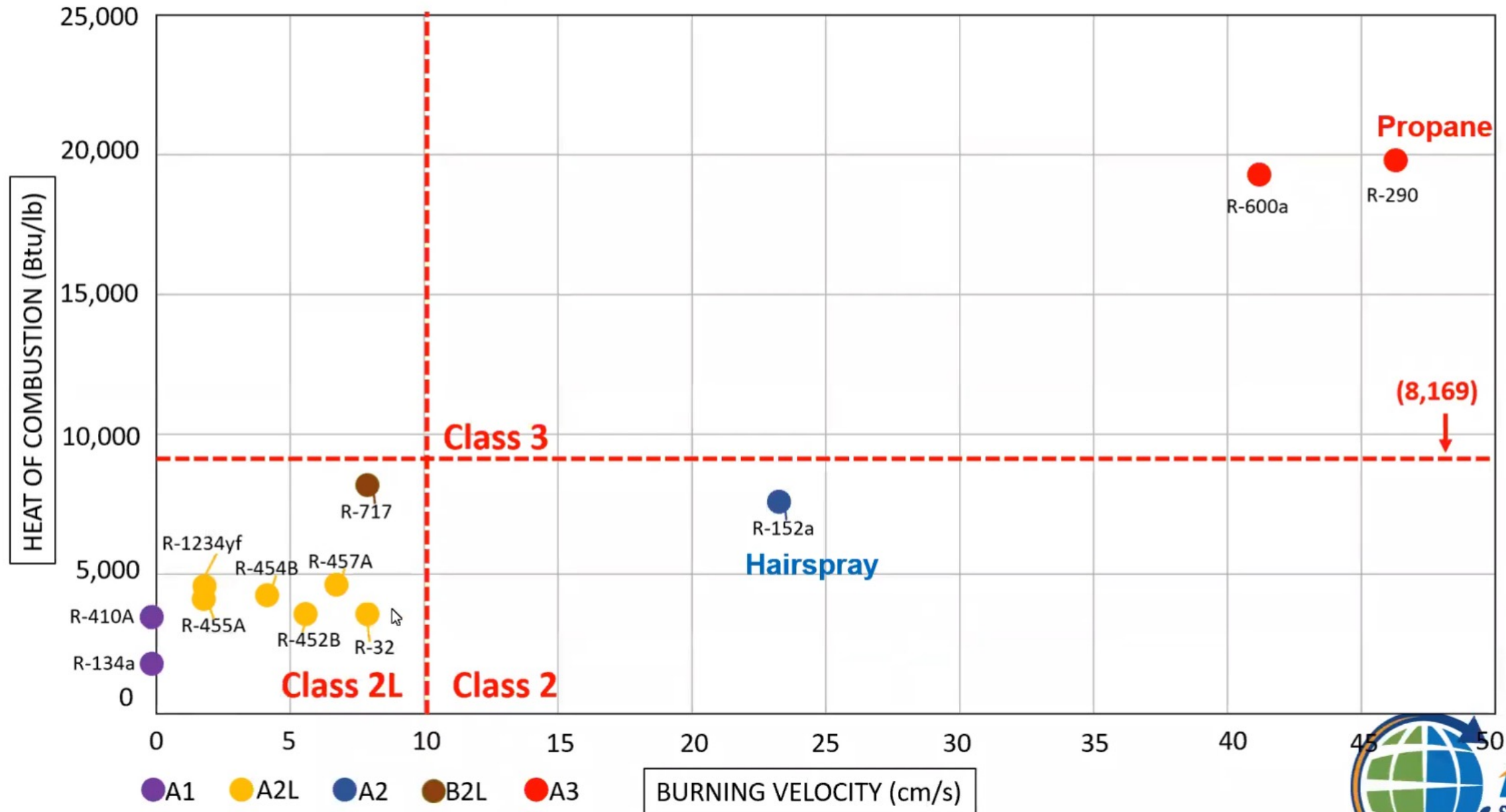


		ASHRAE 34 and ISO 817		Fuel Equivalents (HOC)
Higher Flammability 	Ignites very easily. Potentially explosive.	Higher Flammability A3 R-290 (Propane), R-600 (Butane), R-600a (Isobutane), R-429A, R-430A, R-431A	B3	
Flammable 	Ignites easily. Relatively High Energy Release.	Flammable A2 R-152a, R-413A, R-439A, R-440A	B2 R-40 (Methyl Chloride)	
Lower Flammability 	"Mildly Flammable" Difficult to Ignite Relatively Low Energy Release Low Flame Speed	Lower Flammability A2L R-1234yf, R-1234ze(E), R-32, R-452B, R-454A, R-454B	B2L R-717 (Ammonia)	
No Flame Propagation 	No flame propagation at ≤63 C but still may be flammable at higher temperature and in building fires	No Flame Propagation A1 R-22, R-134a, R-404A, R-407C, R-410A, R-448A, R-449A, R-450A, R-452A, R-466A, R-1233zd(E)	B1 R-123, R-514A	
		Lower Toxicity [OEL ≥ 400 ppm]	Higher Toxicity [OEL < 400 ppm]	

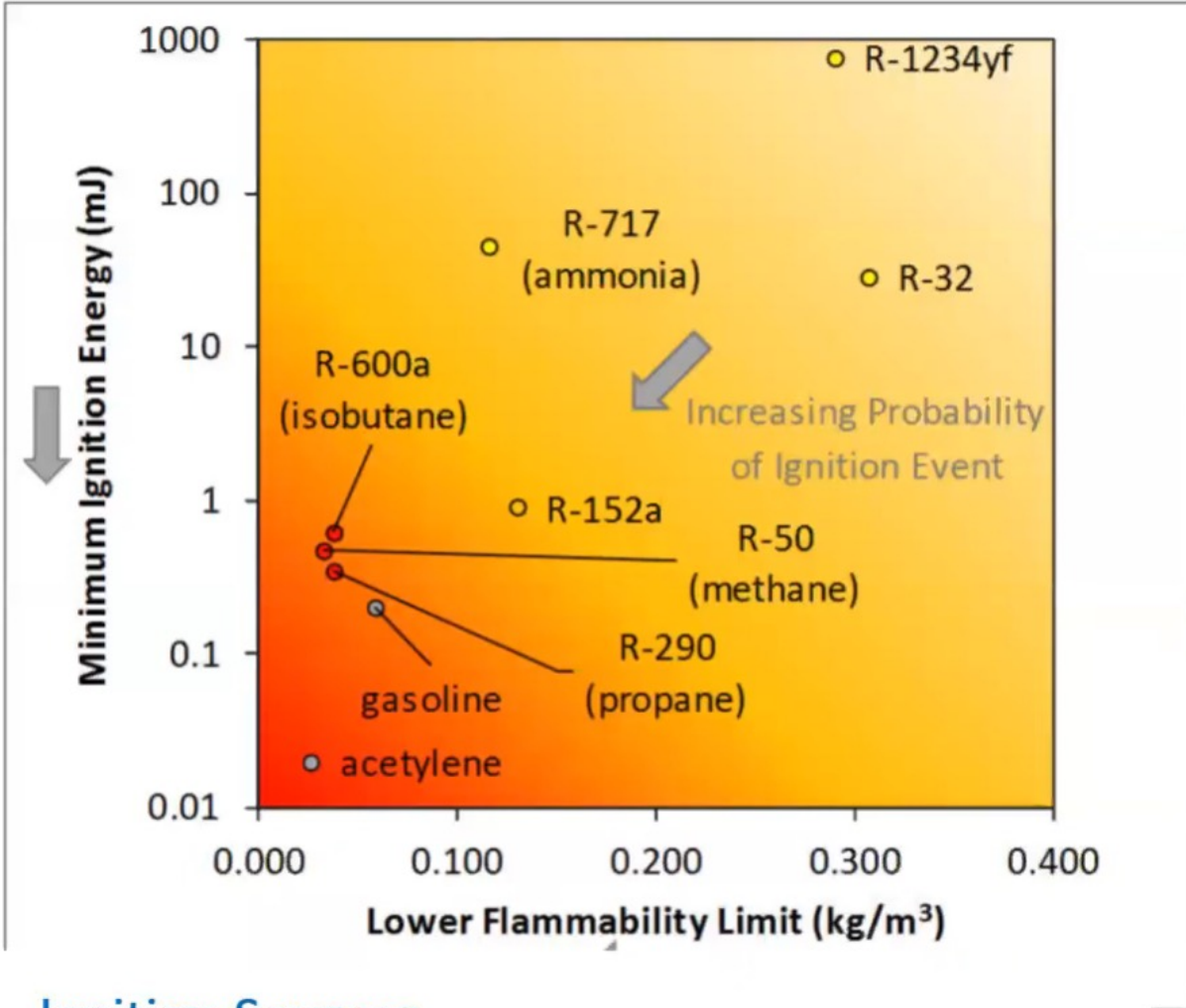
Burning Velocity and Heat of Combustion Increase ↑

Toxicity Increase →

Refrigerant Flammability Properties



A2L Potential Residential Ignition Sources



Ignition Sources

hot wire, safety match, lighter flame insertion, leak impinging on candle

No Ignition when tested with

- cigarette insertion
- barbeque lighter
- plug & receptacle
- light switch
- hand mixer
- cordless drill
- friction spark
- hair dryer
- toaster
- hot plate insertion
- space heater insertion.

Bottom Line: Open flames can be ignition sources for A2L refrigerants.

50% of Cars in 2018 Used A2L Refrigerants

OEM	Total # of Models	Percentage of R-134a	Percentage of R-1234yf	OEM	Total # of Models	Percentage of R-134a	Percentage of R-1234yf
Acura	5	100%	0%	JLR	7	0%	100%
Audi	9	78%	22%	Kia	10	30%	70%
BMW	11	0%	100%	Lexus	9	89%	11%
Buick	8	50%	50%	Lincoln	5	60%	40%
Chevrolet	17	35%	65%	Mazda	6	100%	0%
FCA	8	13%	87%	Mini	2	0%	100%
Ford	14	57%	43%	Mitsubishi	4	50%	50%
Genesis	3	33%	67%	Nissan	12	100%	0%
GMC	6	17%	83%	Ram	2	50%	50%
Honda	9	22%	78%	Subaru	7	71%	29%
Hyundai	8	75%	25%	Toyota	14	71%	29%
Infiniti	6	100%	0%	Volvo	6	100%	0%



Starting with Fiat Chrysler and General Motors in 2014, the automotive industry switch to HFO-1234yf refrigerant is well underway.

A2L & Building Codes

- **Legislation**

- “Codes cannot prohibit the use of SNAP approved refrigerants in listed equipment”

- **State Code updates**

- ASHRAE® 34, 15, UL 60335-2-40

Refrigerant
Classification



ASHRAE 34

Application
Safety



ASHRAE 15

Product
Safety

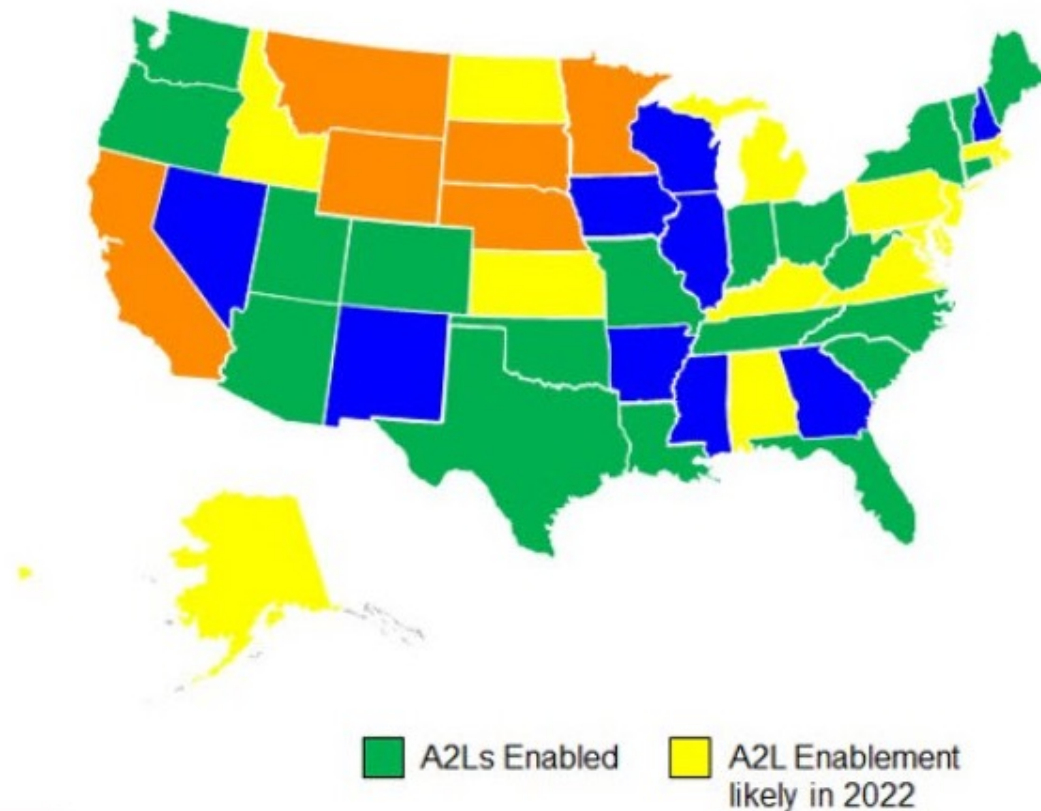


UL 60335-2-40



- **A2Ls already enabled for Chillers**

- 2018 model codes updated and adopted by most states
- Jurisdictions can also approve by project (AMM)



Blue = A2L Enablement likely in 2023

Orange = A2L Enablement likely in 2024

Refrigerant Phasedown

- 2019 (Dec.31) - R-22 refrigerant production ended for service work
- 2019 (Dec.31) - R-123 ended in all new equipment
- 2022 – HFC (R-410a, R-134a, R-407C, etc) production cap dropped by 10%
- 2023 (Dec.31) - R-134a & R-410a ends in new chillers (in 12 states and possibly all states)
- 2024 – HFC (R-410a, R-134a, R-407C etc) production cap dropped by 40%
- 2024 (Dec.31) - R-410a (and all HFCs) ends for new unitary equipment
- 2025 (Dec.31) - R-410a (and all HFCs) end in VRF
- 2029 – HFC (R-410a, R-134a, R-407C etc) production cap dropped by 70%
- 2029 (Dec.31) - R-123 refrigerant production ends for service work
- 2036 – HFC (R-410a, R-134a, R-407C, etc) production cap dropped by 85%

2022 Tax Credits & Utility Rebates

Inflation Reduction Act – Existing Tax Credits

Tax Section	Name	Individual Amount	Length	Performance Requirement
25C	Nonbusiness Energy Property Credit	30% Installation cost -Up to \$600 AC -Up to \$600 Furnace -Up to \$2000 HP		Highest efficiency CEE Tier
25D	Residential Energy Efficient Property	Geothermal HP 30% cost 2022 - 2032 26% cost 2033-2034 22% cost 2034-2035		Geothermal HP Energy Star
45L	New Energy Efficient Home Credit	\$2500 SF or \$5000 zero-energy SF \$500 MF or \$1000 zero-energy MF		New Home Requirement 3.1
179D	Efficient Commercial Building Deduction	\$2.50-\$5.00/sq ft total -increases based eff and wage req		Minimum of 25% efficiency increase to ASHRAE 90.1

Inflation Reduction Act – New Rebates

Name	Total Amount	Individual Amount	Length	Performance Requirement	Recipient Requirement	Disbursement
High-Efficiency Electric Home Rebate Program	\$4.3B	<ul style="list-style-type: none"> -Up to \$8000 for all-electric HP -Up to \$4000 for electrical load service center -Up to \$2500 for wiring -Max for all \$14,000 	~2023 - 9/30/2031 or funding used	Energy Star	LMI households -100% of cost up to max for income <80% median -50% for income 80%-150% of median	State Energy Offices
Home Energy Performance-Based, Whole-House Rebates	\$4.3B	<p><u>Contractors</u></p> <ul style="list-style-type: none"> -\$200 for DA homes identified <p><u>Individuals</u></p> <ul style="list-style-type: none"> -\$2000 or up to 50% cost 20% to 35% EE savings -\$4000 or up to 50% cost >35% EE savings -\$2000 or up to 50% cost 15-20% EE savings (measured) <p><u>Multi-family</u></p> <ul style="list-style-type: none"> -\$2000/dwelling up to \$200K for 20-35% EE savings -\$4000/dwelling up to \$400K for >35% EE savings 	~2023 - 9/30/2031 or funding is used	Modeled or measured energy savings	Single family amounts increase 2X and up to 80% of cost when homes are occupied by LMI family	State Energy Offices

Multiple Programs:

Standard Rebates at www.comed.com

- a) Includes chillers, VFDs, RTUs, split systems, economizers, DCV, RAC, PTAC, GSHP, ECM, ERV, pumps, etc.
- b) RTUs are \$12 per ton per IEER over code
- c) Separate applications for:
 - i. Energy Management System
 - ii. Tune-ups plus upsells
 - iii. Custom

Midstream Rebates thru Distributors

- a) RTU Tier II - \$48 to 67 per ton for 2 to 100 tons
- b) RTU Tier III - \$116 to 157 per ton for 2 to 100 tons
- c) Also Heat Pumps & PTACs

ComEd Midstream Distributor Rebates

Rooftop Unit, non-Heat Pump

	UNIT SIZE	EFFICIENCY REQUIREMENT (SEER/IEER)	INCENTIVE
TIER 2 (HIGH EFFICIENCY)	<5.4 tons / <65 MBH	16 SEER	\$48.75 / ton
	5.4 to <11.25 tons / 65 to < 135 MBH	14 IEER	\$56.25 / ton
	11.25 to < 20 tons / 135 to < 240 MBH	13.5 IEER	\$56.25 / ton
	20 to < 50 tons / 240 to < 600 MBH	13.5 IEER	\$67.50 / ton
	50 to < 100 tons / 600 to < 1200 MB	13 IEER	\$67.50 / ton
TIER 3 (ULTRA HIGH EFFICIENCY)	<5.4 tons / <65 MBH	19.5 SEER	\$116.25 / ton
	5.4 to <11.25 tons / 65 to < 135 MBH	19 IEER	\$135.00 / ton
	11.25 to < 20 tons / 135 to < 240 MBH	18 IEER	\$135.00 / ton
	20 to < 50 tons / 240 to < 600 MBH	17 IEER	\$157.50 / ton
	50 to < 100 tons / 600 to < 1200 MBH	16.5 IEER	\$157.50 / ton

ComEd Midstream Distributor Rebates

Air Source Heat Pumps

	UNIT SIZE	EFFICIENCY REQUIREMENT (SEER/IEER)	INCENTIVE
High Efficiency	Unitary ASHP, <5.4 tons / <65 MBH	15.5 SEER	\$67.50 / ton
	Unitary ASHP, 5.4 to <11.25 tons / 65 to < 135 MBH	13.6 IEER	\$75.00 / ton
	Unitary ASHP, 11.25 to < 20 tons / 135 to < 240 MBH	12.8 IEER	\$75.00 / ton
	Unitary ASHP, 20 to < 50 tons / 240 to < 600 MBH	11.8 IEER	\$90.00 / ton

Packaged Terminal Air Conditioner (PTAC) / Packaged Terminal Heat Pump (PTHP)

Instant incentives are available for PTAC and PTHP units of all sizes. A 6% efficiency increase over IECC 2018 is required; see calculations for common sizes in the chart below.

	UNIT SIZE	EFFICIENCY REQUIREMENT ** (EER)	INCENTIVE
High Efficiency	PTAC, 7,000 BTU Cap	12.6 EER	\$37.50 / ton
	PTAC, 9,000 BTU Cap	12.0 EER	\$37.50 / ton
	PTAC, 12,000 BTU Cap	11.0 EER	\$37.50 / ton
	PTHP, 7,000 BTU Cap	12.6 EER	\$60.00 / ton
	PTHP, 9,000 BTU Cap	12.0 EER	\$60.00 / ton
	PTHP, 12,000 BTU Cap	11.0 EER	\$60.00 / ton

**Based on a 6% increase over IECC 2018 requirements found using their formula of $14.0 - (0.300 \times \text{Cap} / 1000)$ EER

ComEd Residential

2022 COMED RESIDENTIAL MIDSTREAM PROGRAM

All qualifying equipment (shown below) can be claimed if installed September 13 through December 31st, 2022

Equipment Type	Product Efficiency	Customer Rebate Amount
Central Air Conditioner	≥ 15 SEER	\$ 100.00
Central Air Conditioner	≥ 16 SEER	\$ 150.00
Central Air Conditioner	≥ 18 SEER	\$ 225.00
Ductless Mini Split Heat Pump	≥ 17 SEER and ≥9.5 HSPF	\$ 450.00 \$1,350
Air Source Heat Pump	≥ 16 SEER	\$ 400.00 \$1,400
Air Source Heat Pump	≥ 18 SEER	\$ 500.00 \$2,000

MAKE SURE YOU WORK WITH YOUR TM TO TAKE ADVANTAGE OF THESE GREAT REBATES!

Residential HVAC Downstream Rebates

Measures	Incentives
ECM - Retrofit	\$100 per existing furnace
Smart Thermostat	\$100 per thermostat
CAC Tune-up	\$25 per unit
ASHP Tune-up	\$50 per unit
Duct Sealing	\$200 per home
Ground Source Heat Pump	Up to \$6,000
Ground Source Heat Pump \geq 15 EER	\$850 per system
Ground Source Heat Pump \geq 17 EER	\$1,000 per system
Ground Source Heat Pump \geq 20 EER	\$1,200 per system

- Review Eligibility Catalog for measure specific requirements
- Ground Source Heat Pumps require the EESP to have both geothermal and ICC certifications

Special Thanks to those who allowed us to use their slides or graphics today...



Turn to the Experts.™



Illinois
Department of Commerce
& Economic Opportunity
Pat Quinn, Governor