



# What States & Cities Ought to Know: Macro Trends Impacting Multifamily





- **Code Process** \_\_\_\_\_ **IECC Development Process**
- **State Adoption** \_\_\_\_\_ **As-is or Stretched or Amended**
- **Local Adoption** \_\_\_\_\_ **Advance GHG Reduction Goals**
- **Implementation** \_\_\_\_\_ **Success through Best Practices**
- **What's Next for Code** \_\_\_\_\_ **2024 IECC - Zero Codes**



# PREVIOUS CODE PROCESS



## IECC Code cycle

- New edition is promulgated every 3 years
- Anyone can submit changes
- Approved changes are determined during two “hearings” and an online vote



# CURRENT CODE PROCESS



## IECC Code cycle

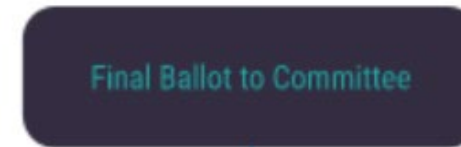
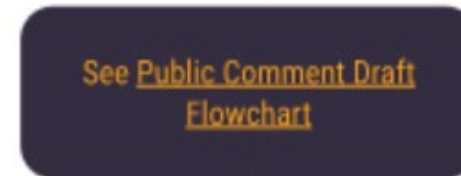
- New edition is promulgated every 3 years
- Anyone can submit changes
- Approved changes are determined ~~during two “hearings” and an online vote~~



# CURRENT CODE PROCESS

## IECC Code cycle

- New edition is promulgated every 3 years
- Anyone can submit changes
- Approved changes are determined ~~during two “hearings” and an online vote~~ by 2 consensus committees comprised of diverse voting members using an ANSI process



2024  
IECC

2024  
IRC

# STATE ADOPTION ~ CT Model Code Adoption Process



## COMMITTEE REVIEW

- Committee reviews model code alongside previous amendments to determine specific CT amendments

## PUBLIC COMMENT

- Anyone can submit changes during public comment
- Approved changes are determined & responses to comments developed

## LEGISLATIVE APPROVAL



**Almost adopted October 1, 2020**  
**2018 IECC, with CT amendments, i.e.,**  
**2020 CT State Building Code**

- **Adopted October 1, 2018**
- **2015 IECC, with CT amendments, i.e.,**
- **2018 CT State Building Code**





~~Almost adopted October 1, 2020~~  
~~2018 IECC, with CT amendments, i.e.,~~  
~~2020 CT State Building Code~~

- **Adopted October 1, 2018**
- **2015 IECC, with CT amendments, i.e.,**
- **2018 CT State Building Code**



- Adopted October 1, 2022
- 2021 IECC, with CT amendments, i.e.,
- [2022 CT State Building Code](#)

~~Almost adopted October 1, 2020~~  
~~2018 IECC, with CT amendments, i.e.,~~  
~~2020 CT State Building Code~~

- Adopted October 1, 2018
- 2015 IECC, with CT amendments, i.e.,
- 2018 CT State Building Code

# STRETCHING OR AMENDING THE CODE



## Want Greener Buildings? Stretch Codes Get You There Faster.

Adopting stretch codes can drastically improve building energy efficiency beyond existing codes, and put buildings on the path to zero energy by 2050.





# COMMUNITIES OPT-IN TO THE STATE'S STRETCH



# IECC 2021 w/ MA amendments + Stretch Code amendments (225 CMR 22.00 and 225)



**TABLE R406.5 MAXIMUM ENERGY RATING INDEX**

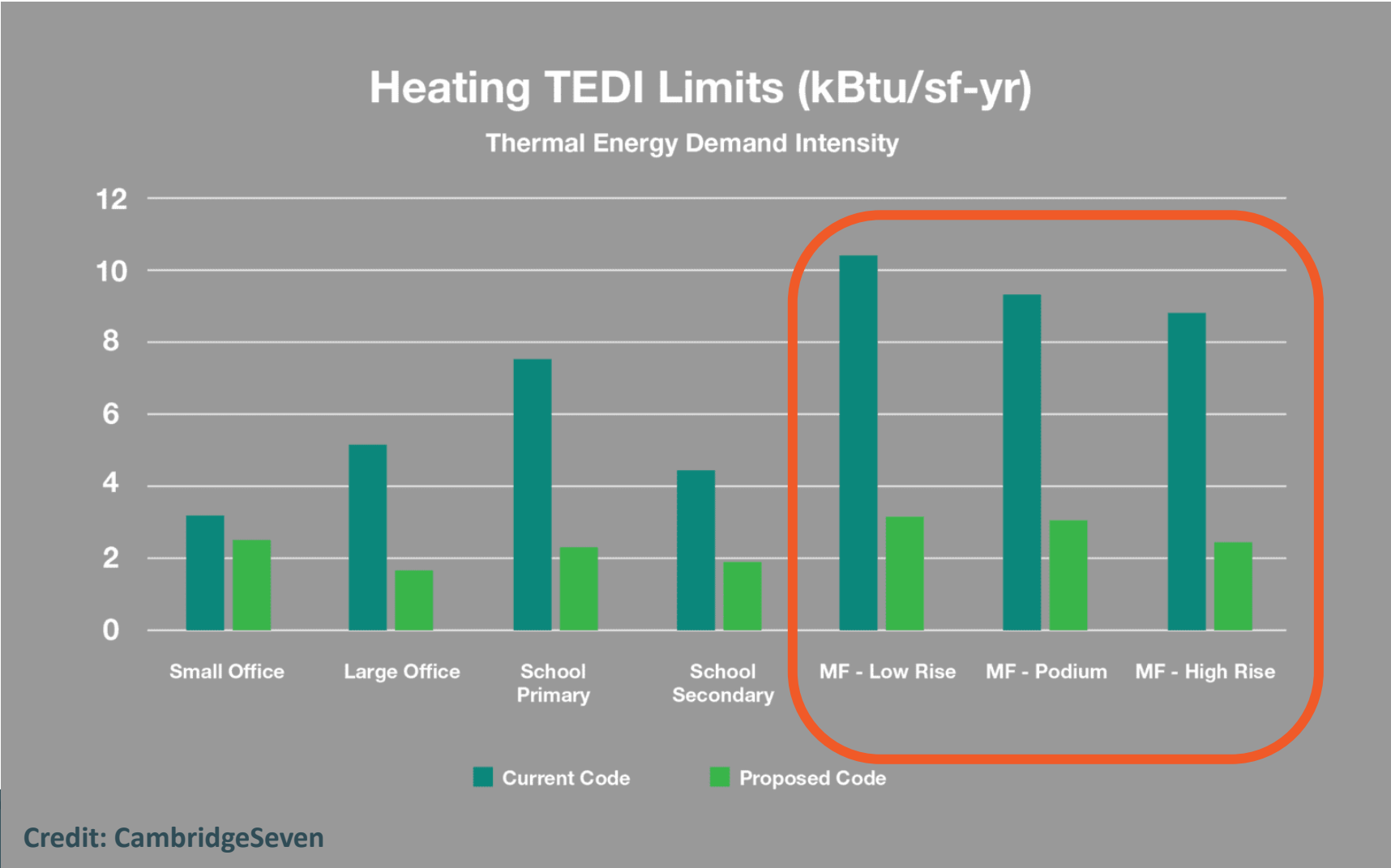
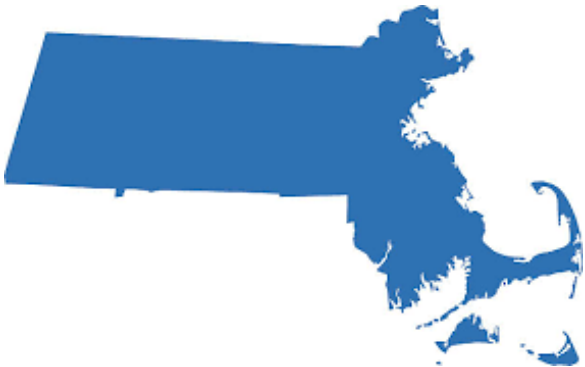
Clean Energy Application	Maximum HERS Index score <sup>a, b</sup>		
	New construction until June 30, 2024	New construction permits after July 1, 2024	Major alterations, additions, or Change of use <sup>c</sup>
<i>Mixed-Fuel Building</i>	52	42	52
Solar Electric Generation	55	42	55
<i>All-Electric Building</i>	55	45	55
Solar Electric & All-Electric Building	58	45	58

<sup>a</sup> Maximum HERS rating prior to onsite renewable electric generation in accordance with Section R406.5

<sup>b</sup> The building shall meet the mandatory requirements of Section R406.2, and the building thermal envelope shall be greater than or equal to the levels of efficiency and SHGC in Table R402.1.2 or Table R402.1.4 of the 2015 International Energy Conservation Code.

<sup>c</sup> Alterations, Additions or Change of use covered by Section R502.1.1 or R503.1.5 are subject to this maximum HERS rating

# IECC 2021 w/ MA amendments + Stretch Code amendments (225 CMR 22.00 and 225)





# IECC 2021 w/ MA amendments + Stretch Code amendments (225 CMR 22.00 and 225)



**TABLE 2: Residential Specialized code requirements summary by building/dwelling unit size**

Building Size	Fuel Type	Minimum Efficiency	Electrification	Min. EV wiring	Renewable Generation
Dwelling units up to 4,000 sf	All Electric	HERS 45 or Phius CORE or PHI	Full	1 parking space	Optional
Dwelling units up to 4,000 sf	Mixed-fuel	HERS 42 or Phius CORE or PHI	Pre-wiring	1 parking space	Solar PV (except shaded sites)
Dwelling units > 4,000 sf	All Electric	HERS 45 or Phius CORE or PHI	Full	1 parking space	Optional
Dwelling units > 4,000 sf	Mixed-fuel	HERS 0 or Phius ZERO	Pre-wiring	1 parking space	Solar PV or other renewables
Multi-family >12,000 sf	All Electric	Phius CORE or PHI	Full	20% of spaces	Optional
Multi-family >12,000 sf	Mixed-fuel	Phius CORE or PHI	Pre-wiring	20% of spaces	Optional

# STATE ADOPTION OF MOST RECENT IECC



## Flexibility to adopt:

- Latest energy codes
- Zero energy codes
- Other standards w/ equivalent savings

## Prioritize Disadvantage Communities:

- Decrease energy burden
- Decrease environmental exposure and burdens
- Increase clean energy technology
- Increase access to low-cost capital
- Increase energy resilience

OFFICE:  State and Community Energy Programs	NEW PROGRAM:  Yes
FUNDING AMOUNT:  \$1,000,000,000	FUNDING MECHANISM:  Grants
RECIPIENTS:  States and local governments with authority to adopt building energy codes. DOE may reserve up to 5% of necessary administrative costs.	PERIOD OF AVAILABILITY:  To remain available through 9/30/2029
ASSISTANCE LISTING:  TBD	FORMULA FUNDING:  No
TRIBAL ELIGIBILITY:  TBD	COST SHARE REQUIREMENT:  No



- **Code Process** ——— **IECC Development Process**
- **State Adoption** ——— **As-is or Stretched or Amended**
- **Local Adoption** ——— **Advance GHG Reduction Goals**
- **Implementation** ——— **Success through Best Practices**
- **What's Next for Code** ——— **2024 IECC - Zero Codes**





- **Code Process** — **IECC Development Process**
- **State Adoption** — **As-is or Stretched or Amended**
- **Local Adoption** — **Advance GHG Reduction Goals**
- **Implementation** — **Success through Best Practices**
- **What's Next for Code** — **2024 IECC - Zero Codes**



- **Code Process** — **IECC Development Process**
- **State Adoption** — **As-is or Stretched or Amended**
- **Local Adoption** — **Advance GHG Reduction Goals**
- **Implementation** — **Success through Best Practices**
- **What's Next for Code** — **2024 IECC - Zero Codes**

# MULTIFAMILY ~RESIDENTIAL OR COMMERCIAL?



## Commercial Building

All buildings that are not included in the definition of “Residential building”



1.

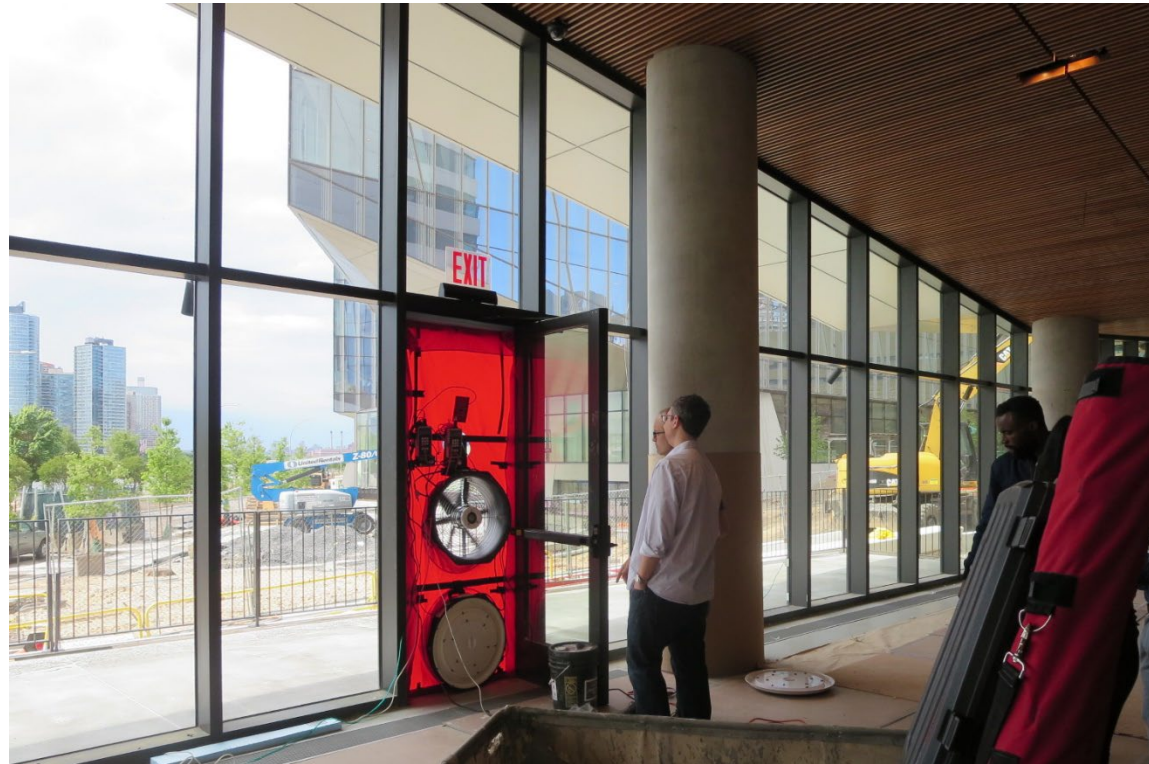
## Residential building

Includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) and Group R-2, R-3, and R-4 buildings three stories or less in height above grade plane





# 2021 IECC AIR INFILTRATION TESTING



1.



2.



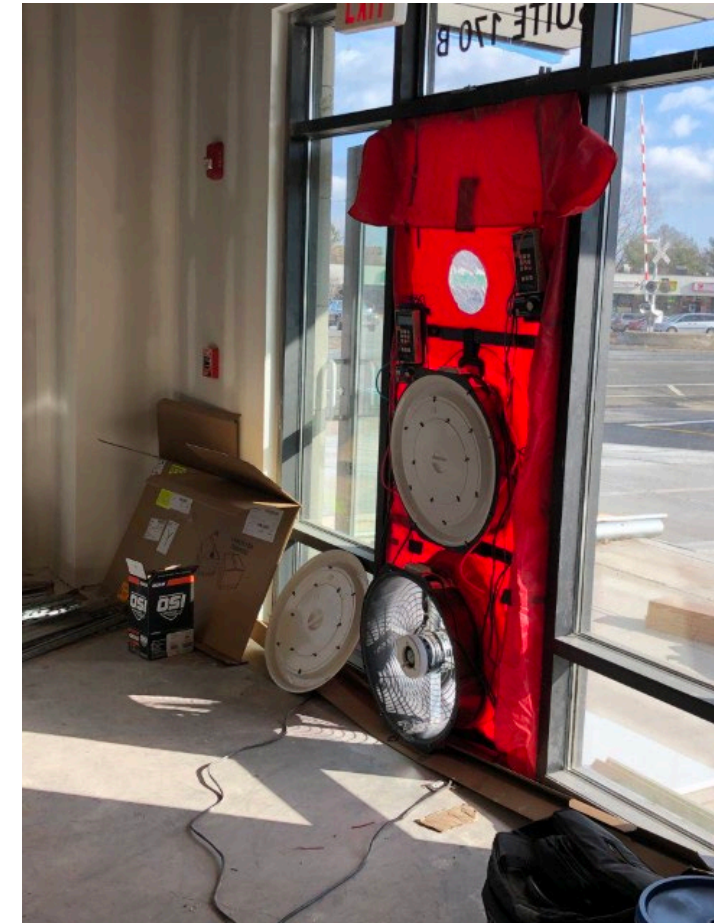
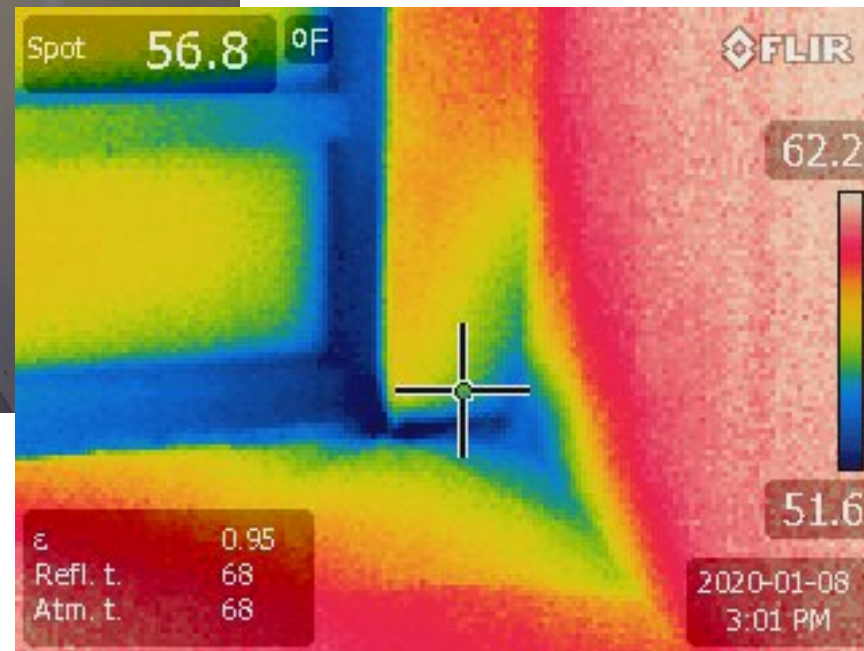
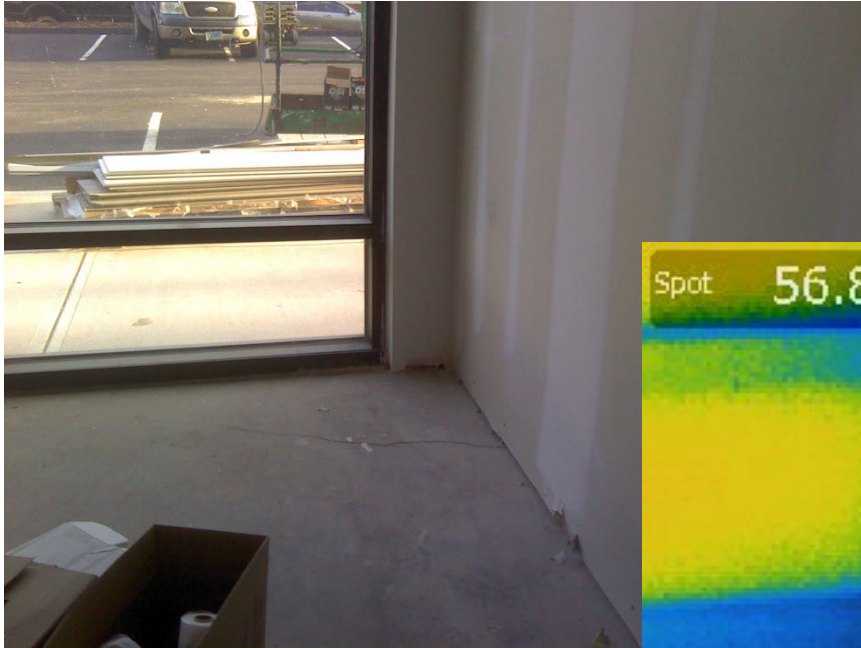
# AIR SEALING STRATEGIES WHOLE BUILDING



2.



# AIR SEALING STRATEGIES WHOLE BUILDING





# AIR SEALING STRATEGIES COMPARTMENTALIZED



[SWA Air Sealing Guides](#)



# AIR SEALING STRATEGIES COMPARTMENTALIZED





# AIR SEALING STRATEGIES COMPARTMENTALIZED

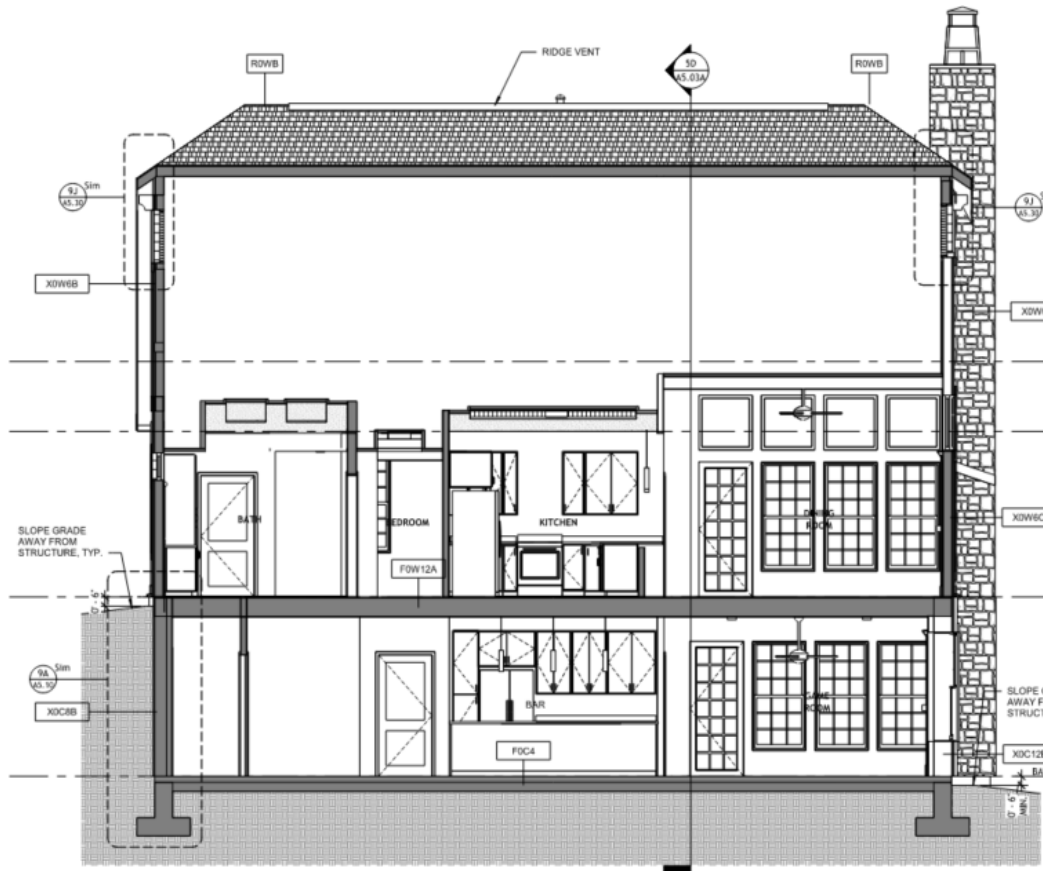




# AIR SEALING STRATEGIES COMPARTMENTALIZED



# DUCTED SYSTEMS





# DUCTED SYSTEMS



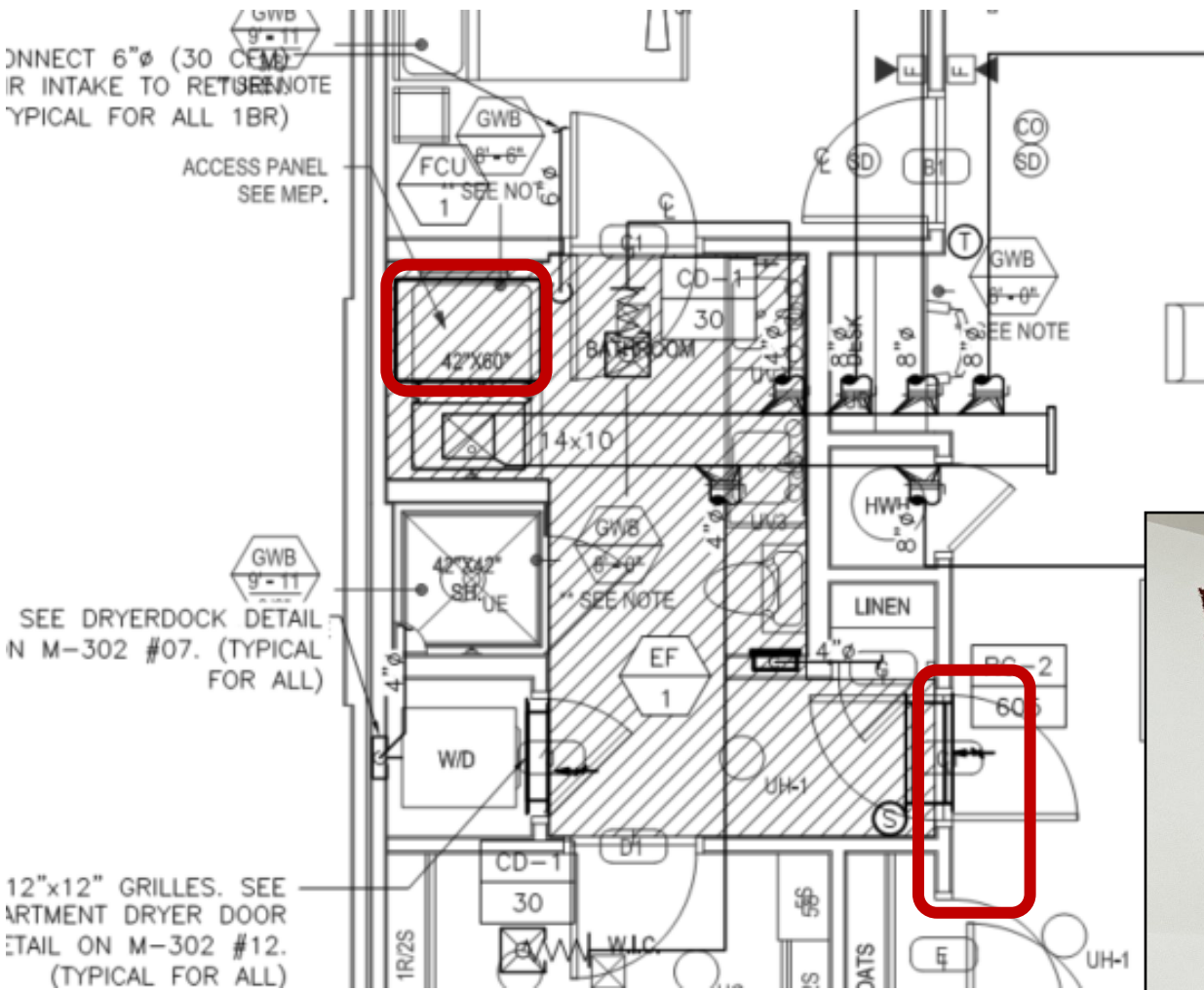


# DUCTED SYSTEMS



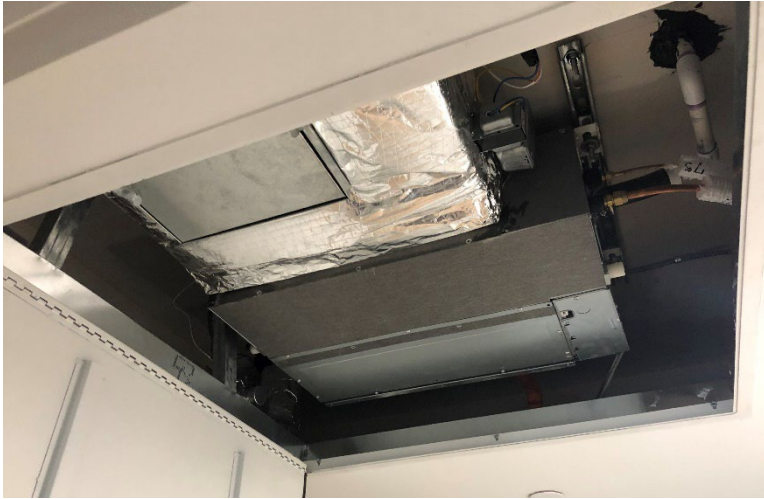


# DUCTED SYSTEMS





# DUCTED SYSTEMS



# DUCTED SYSTEMS





- **Code Process** — **IECC Development Process**
- **State Adoption** — **As-is or Stretched or Amended**
- **Local Adoption** — **Advance GHG Reduction Goals**
- **Implementation** — **Success through Best Practices**
- **What's Next for Code** — **2024 IECC - Zero Codes**



# 2024 IECC DEVELOPMENT



- **Both Residential and Commercial are drafted and have completed at least one public comment period**
- **Sub-Committees and Consensus Committees will repeat process to review and approve proposed changes**
- **2<sup>nd</sup> public comment drafts possible in Spring 2023**

# GETTING CLOSER TO NET ZERO ENERGY/CARBON



- 2021 IECC Appendix RC
- ASHRAE 90.1-2018
- 2024 IECC Appendix RC, All-Electric Appendix, & CO<sub>2</sub>e Index
- Above-Code Programs



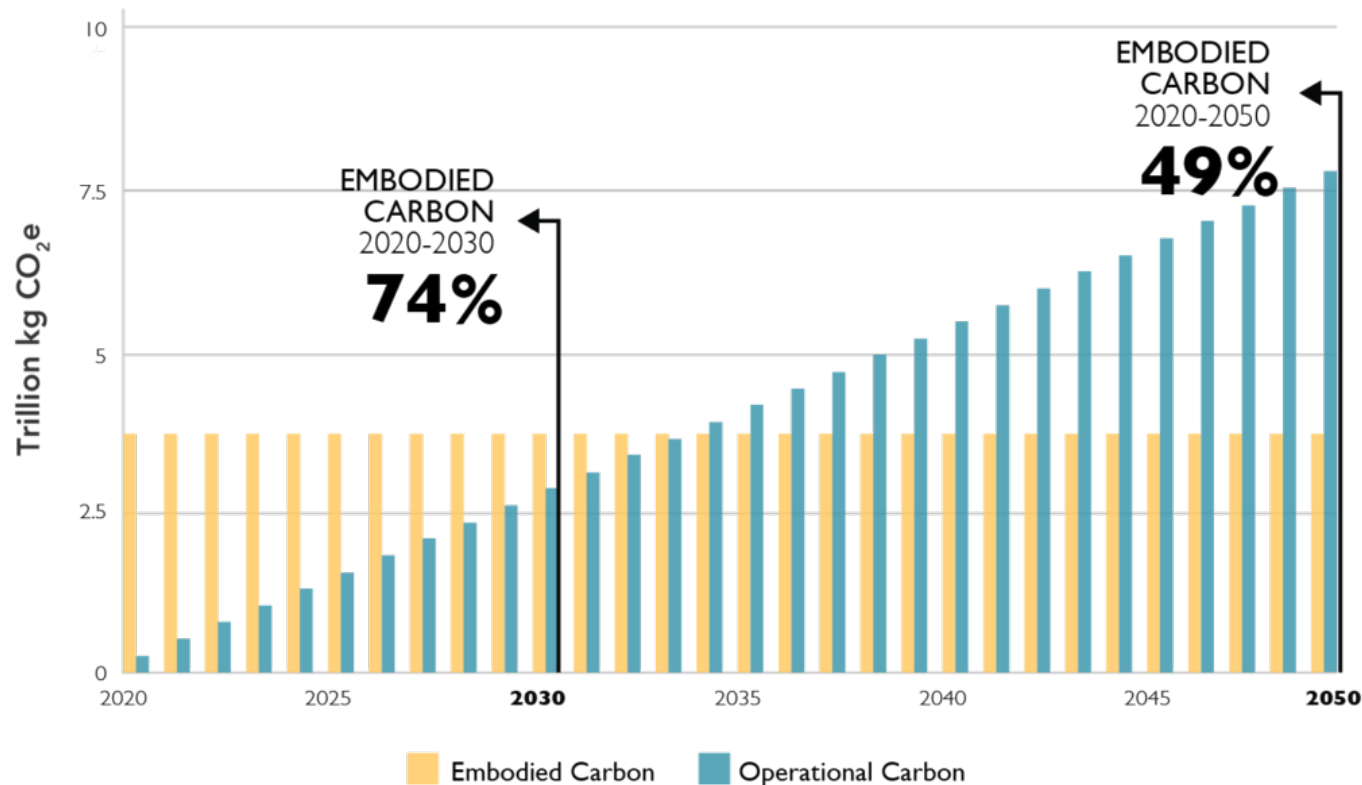
# WHAT'S NOT IN THE 2024 IECC



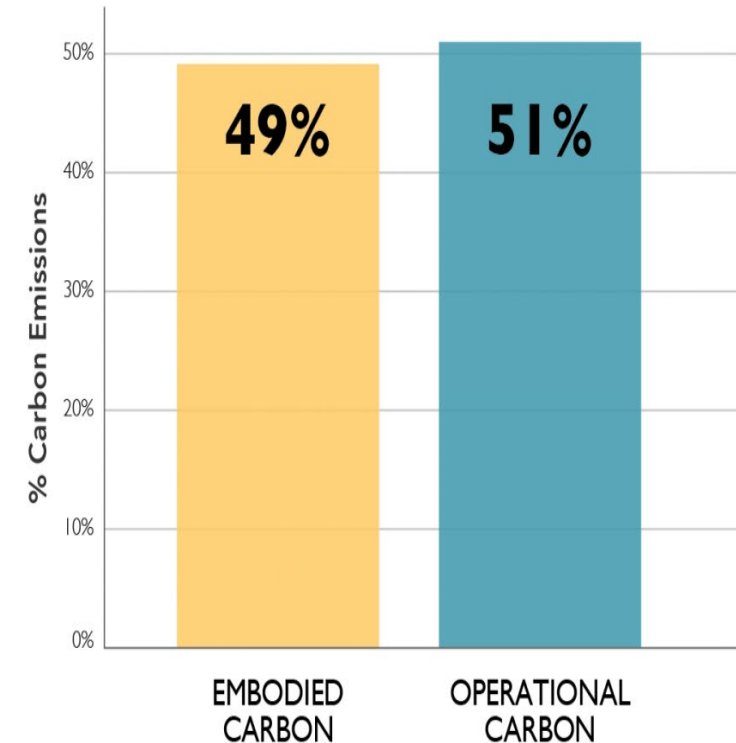
# WHAT'S NOT IN THE 2024 IECC BUT ON ALMOST EVERYONE'S AGENDA



Total Carbon Emissions of Global New Construction  
from 2020-2050  
Business as Usual Projection



Total Carbon Emissions of Global New Construction  
from 2020-2050  
Business as Usual Projection



© 2018 2030, Inc. / Architecture 2030. All Rights Reserved. Data Sources: UN Environment Global Status Report 2017; EIA International Energy Outlook 2017

---

## Contact

Steven Winter Associates, Inc.

Greentown Labs  
444 Somerville Avenue  
Somerville, MA 02143



Karla Butterfield



[kbutterfield@swinter.com](mailto:kbutterfield@swinter.com)



203.246.2880



[www.swinter.com](http://www.swinter.com)



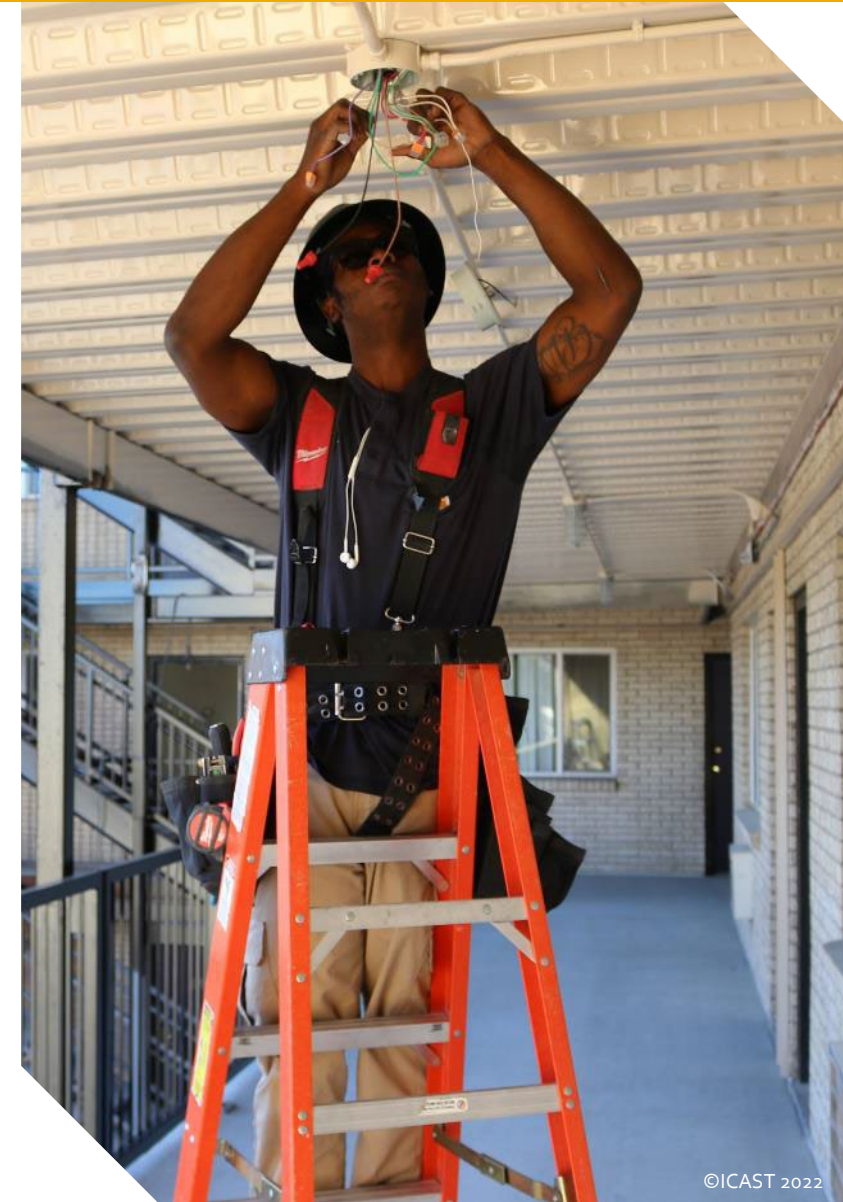
# Heat pumps Retrofits for Multifamily





# Who We Are

- 501C3 national nonprofit
- **Population Served:** Low-to-Moderate Income
- **Market Served:** Multifamily Properties  
*(cluster of 4+ units under single ownership)*
- **Mission:** Provide economic, environmental, and social benefits to LMI communities
- **Motivation:** Affordability of Housing, Climate Change and Economic Development





# What We Do

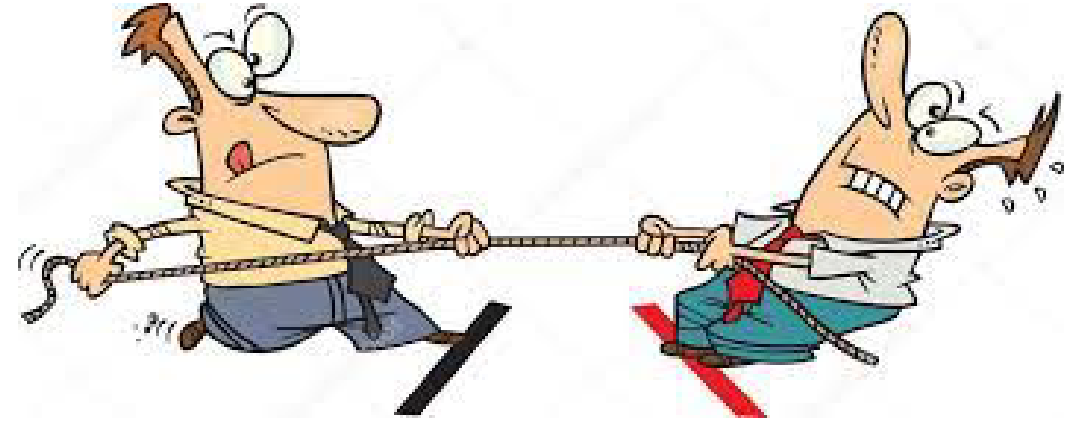
- Green retrofits of existing MF properties
  - ✓ One-Stop-Shop for DER installs
- Design Consulting for New MF Construction
  - ✓ All-electric, high-performance buildings
- Over 40,000 apartments upgraded in 2022
  - ✓ Avg. 23% energy savings across portfolio
- Over 22,000 HP HVAC installs



# What We Have Learned



# What We Have Learned

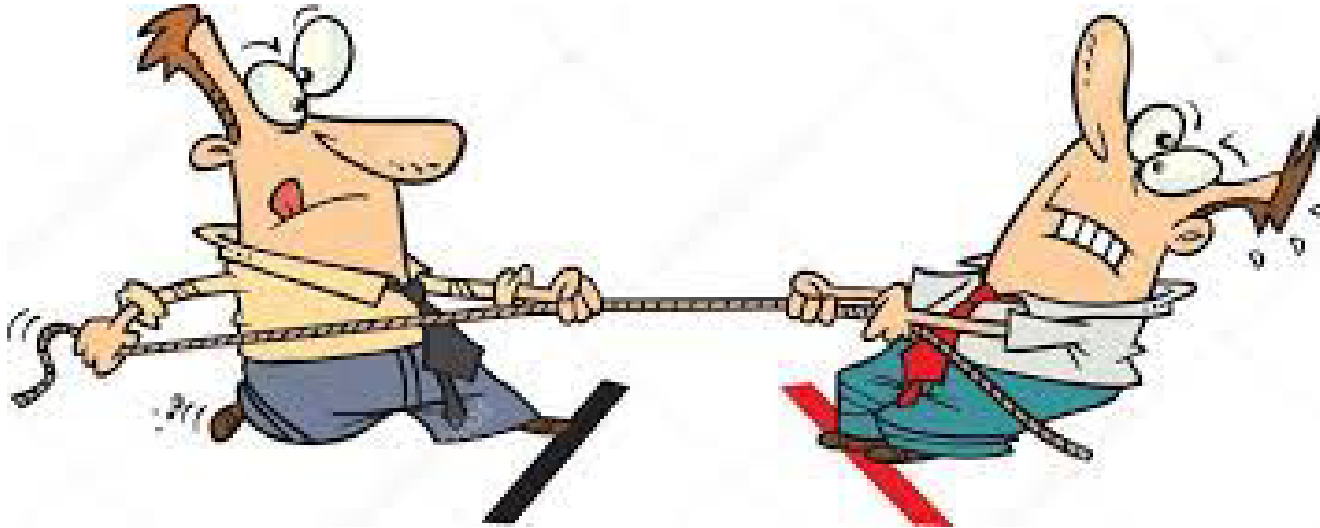


\$500



\$5000

# What We Have Learned

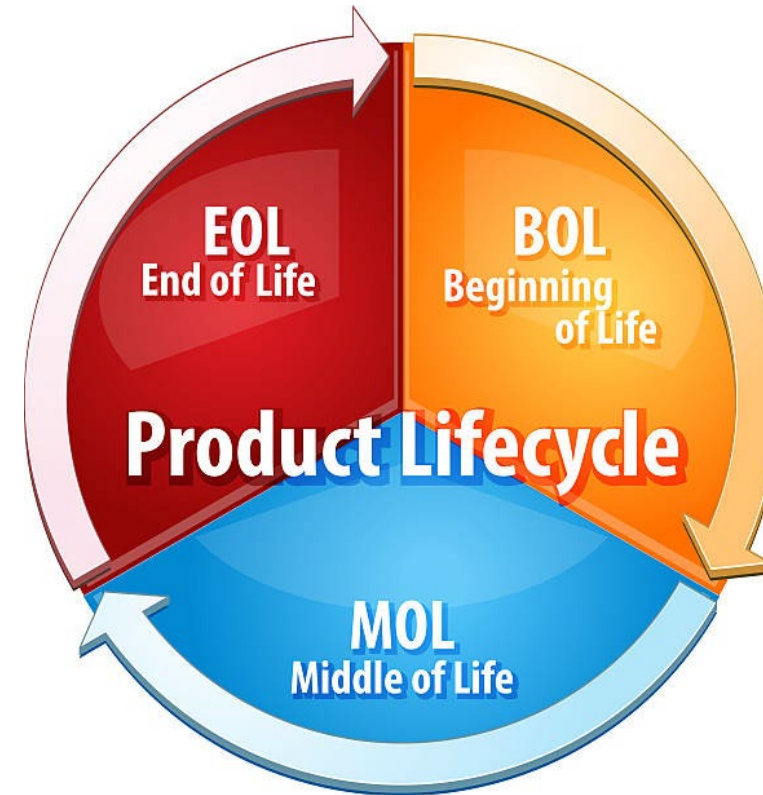
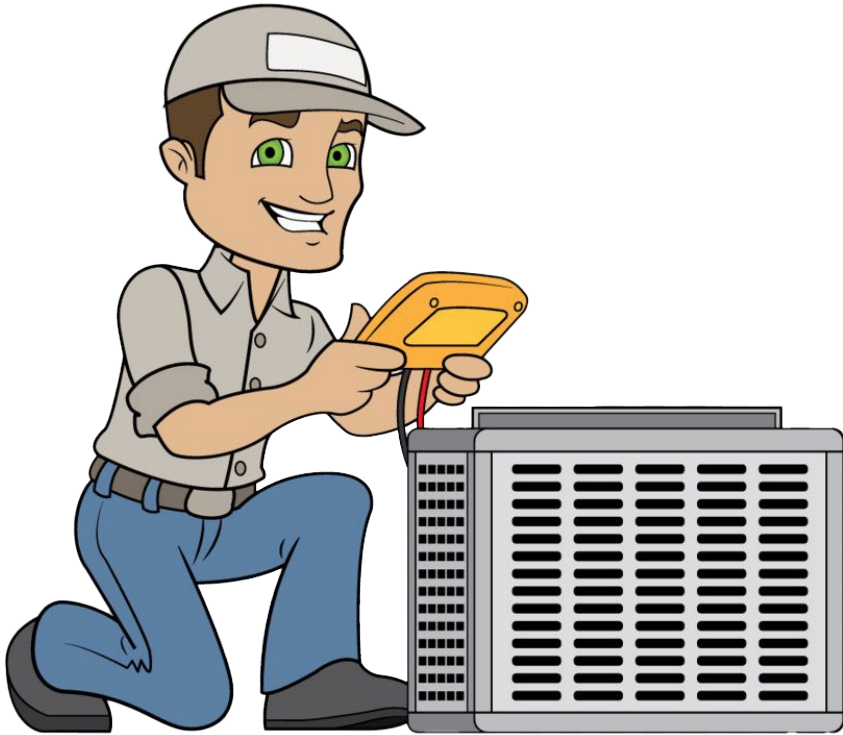




# What We Have Learned



# What We Have Learned





# Utility or State and Federal Incentives



Bridge the gap

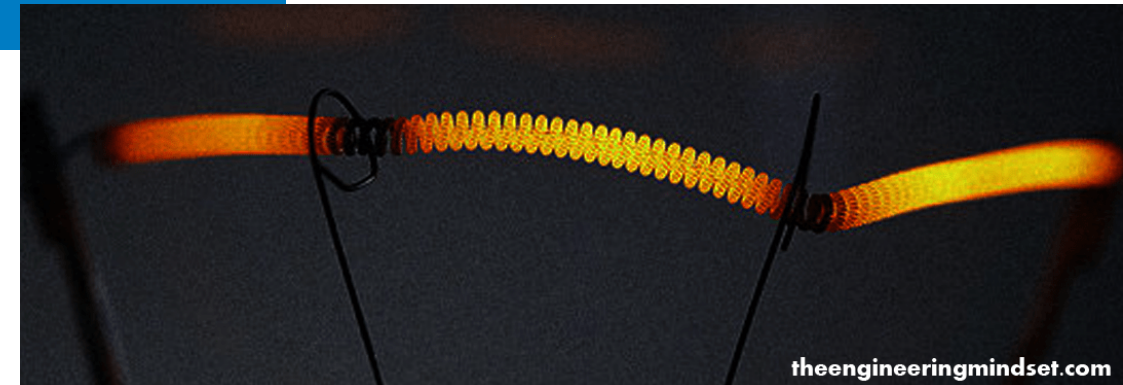


# TRAPS

You do not want resistance Backup!!!

Usually Requires Electric Service Upgrade

Can KILL your Demand Charges



# Cold Climate Heat Pumps



# Cold Climate Heat Pumps



SEER is not a reliable metric of Heat Pump Efficiency  
Neither is HSPF

Cold Climate Performance is the key metric

Can the Heat pump provide 100% (or x percent) of  
the load at the design temperature

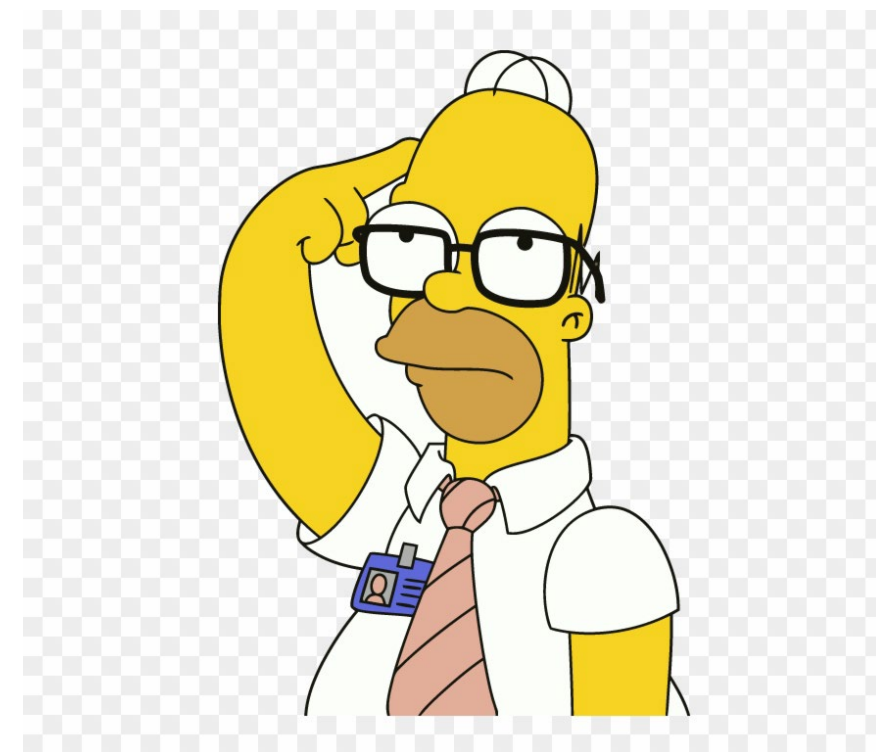


# Bold Statement



*No property owner should  
replace a central air conditioner  
with anything but a heat pump  
for the next 10 years!*

# Central Plants



# Domestic Hot water



\$15,000 /40 Units



\$150,000 / 40 Units



# IRA Incentives



# How can Code Officials Help

- Don't Get ahead of the Technology- Especially in large central systems
- Be a resource for the Contractors and Building owners
- When they apply for CAC replacements ask them if they have considered using heat pumps
- Don't use metrics (like SEER) that don't correctly predict performance -uni

# Installation Mistakes



Do a Test  
Install!

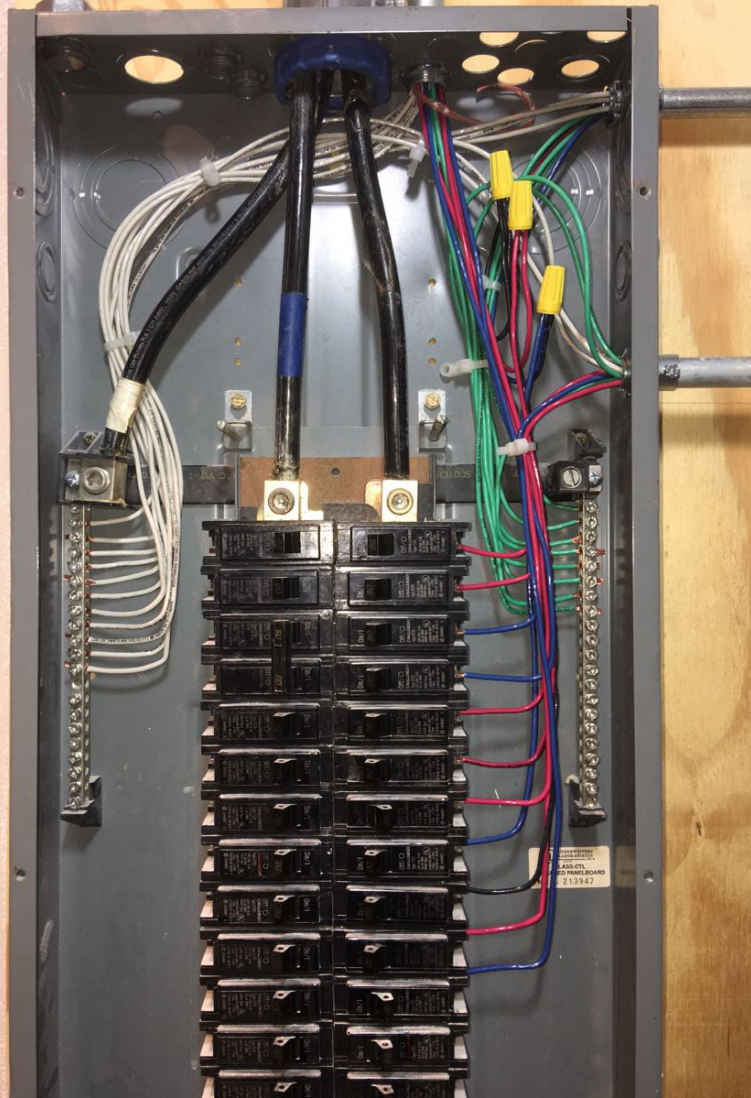


# Installation Mistakes



Protect from  
Wind and  
Snow

# Installation Mistakes



Is wiring adequate  
for new  
equipment



# Lessons Learned

Unitary Lines are years behind  
HSPF at 47 degrees doesn't  
mean much



Cold Climate performance is  
much more important than SEER  
ratings





# Lessons Learned

## 1. Thoughtful Planning will make for successful Project

- ✓ Do any shell improvements first! Right Size the equipment
  - ✓ Insulation
  - ✓ Windows
  - ✓ Air Sealing
- ✓ Pick a major manufacturer with Local Support
  - ✓ Carrier
  - ✓ Mitsubishi
  - ✓ Fujitsu
  - ✓ Daiken





# Lessons Learned

## 1. Dual Fuel (80% approach) makes sense

- ✓ Where there is HP hesitancy, gas as back up allays those fears
- ✓ You can add a Heat Pump without replacing your furnace.
- ✓ Dual Fuel can insure you are always using the least expensive fuel



# Lessons Learned

## 3. Contractors **MUST** be on board

- ✓ Every replacement decision is largely guided by the Mechanical Contractor
- ✓ Many older Mechanical Contractors had negative experiences with Heat Pumps and must be converted
- ✓ Essential to train contractors in best design/install practices for VHE equipment





# Thank You!

## Questions?

Rob Foley  
Senior Project Manager, ICAST  
505-280-4273 / [robertf@icastusa.org](mailto:robertf@icastusa.org)







# What States and Cities Ought to Know About Macro Trends Impacting Multifamily Properties

2023 National Energy Codes Conference | May 3, 2023



# Presentation Overview

---

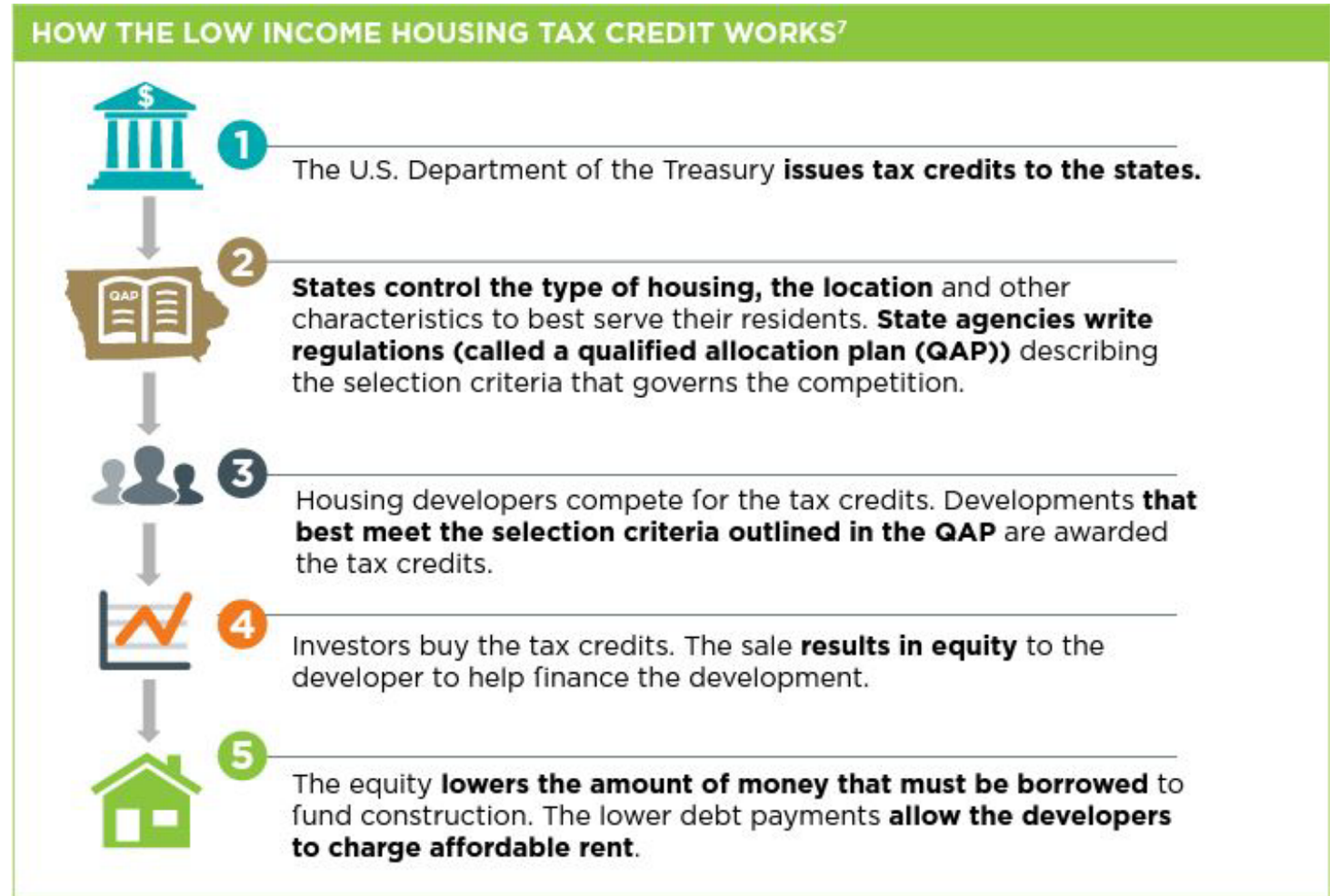
- Advancing sustainability in affordable housing through the Low Income Housing Tax Credit (LIHTC) program
- Opportunities for multifamily housing in the IRA
- Bringing it all together- Leveraging IRA and the LIHTC program to scale up sustainable affordable housing





# About the Low Income Housing Tax Credit (LIHTC)

- Largest source of affordable housing financing
- Administered by state or local Housing Finance Agencies (HFAs)
- Federal statute gives HFAs broad discretion in how to allocate credits through the Qualified Allocation Plan (QAP)



# Sustainability in LIHTC Properties

- Third Party Building Standards
- Water Conservation
- Performance Based Requirements
- Utility Coordination
- Energy Audits or Modeling
- Required energy professional
- Renewable energy
- Energy and water benchmarking
- Project-specific utility allowances
- Electrification\*
- Embodied Carbon\*

*\* New criteria tracked in 2023*

2017



2020



**2023 Updated Report Forthcoming**  
**[nationalhousingtrust.org](https://nationalhousingtrust.org)**

# Energy Performance in New Construction (Examples)

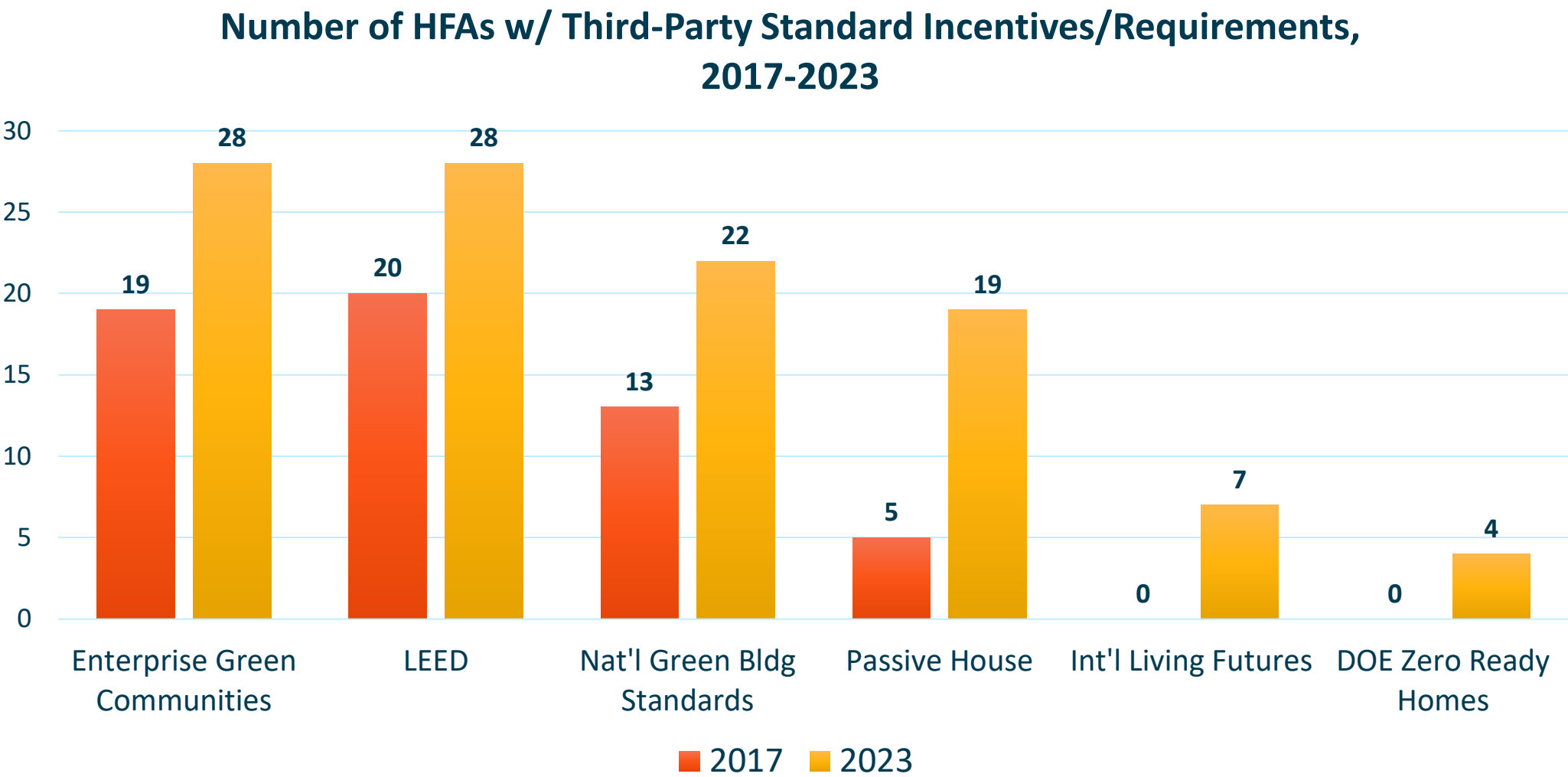
HFA	QAP Requirements/Incentives
Chicago	Properties exceeding the Chicago Energy Transformation Code by 5-40% are more competitive applications
Kansas	Requires 2018 IECC
Montana	Encourages design that exceeds current energy code
New York	Requires building envelope that is 15% more energy efficient than NY State Energy Conservation Construction Code 2020
Pennsylvania	U-value of the exterior building envelope must exceed the requirements of the current IECC by 7-10% depending on the number of stories
Rhode Island	Requires NGRID's Residential New Construction ("RNC") Tier I standards as baseline with preference given to properties that exceed the standards
Utah	Requires 15% improvement over Utah's current residential energy code



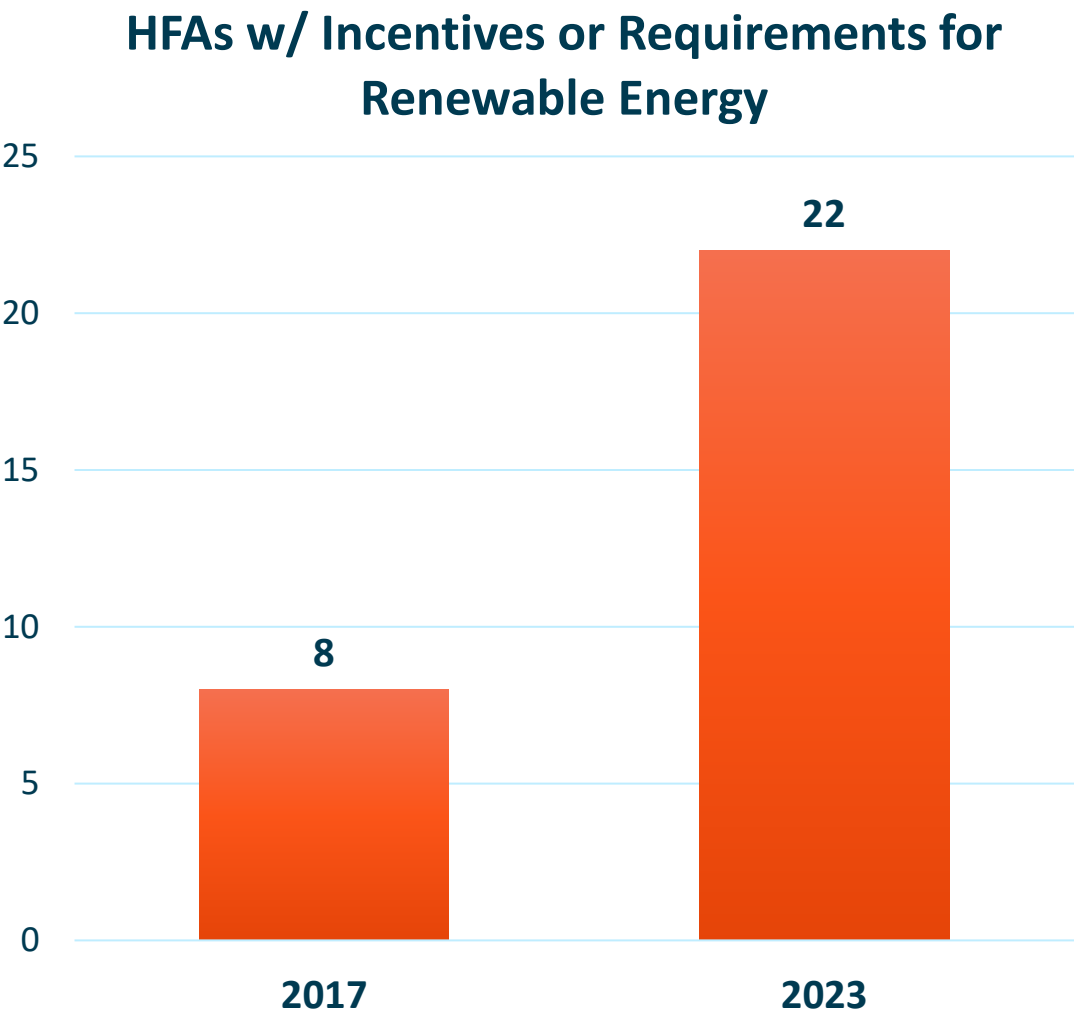
# Energy Performance in Existing Buildings (Examples)

HFA	QAP Requirements/Incentives
Arizona	Requires HERS Index that equates to a fifteen percent (15%) reduction in energy usage over the existing building condition
Connecticut	Requires average HERS Index $\leq 70$ ; OR $\geq 30\%$ reduction in pre-rehab energy use
Georgia	Requires a 20% improvement over existing conditions based upon pre-rehabilitation duct leakage and dwelling unit air filtration rates
Maryland	Requires a 15% energy savings over existing building condition; Projects that demonstrate higher energy savings are more competitive
New Mexico	Requires HERS score of 65 or better
New York	Requires a 20% reduction in energy use across the project
Virginia	Requires 30% performance increase over existing based on HERS Index or evidence of a HERS index of 80 or better

# Third-Party Standards



# Renewable Energy



**Virginia:** Points will be awarded for every 2% of a development's on-site electrical load that can be met through a renewable energy electric system for the benefit of the tenants.

**D.C.:** All projects must either include solar panels or qualify as a Solar Ready Building as defined by the US Department of Energy.

**Maine:** Project Design must include electrical infrastructure to allow for the future installation of photovoltaic solar panels.





# Overview of IRA Opportunities

There's a total of **\$25B of funding** that can be used to increase the energy-efficiency, water-efficiency, and climate resilience of affordable housing and benefit low-income households.



**Green and Resilient Retrofit Program [HUD]**



**Greenhouse Gas Reduction Fund [EPA]**



**HOMES and High-Efficiency Electric Home Rebate Programs [DOE]**

# Overview of IRA Provisions and Funding Amounts

## HUD Green and Resilient Retrofit Program

Grants and loans for holistic energy and resilience retrofits of privately-owned, HUD-assisted housing

## Greenhouse Gas Reduction Fund

Grants to states, municipalities, Tribal governments, and non-profits to provide technical and financial assistance to deploy zero-emission and other technologies that reduce GHG emissions



## HOMES and High-Efficiency Electric Home Rebate Programs (Home Energy Rebates)

Rebates to offset the cost of whole-home energy efficiency upgrades and electrification projects. Up to \$8K/unit for energy efficiency and up to \$14K/unit for electrification projects.

# HUD Green and Resilient Retrofit Program (GRRP)

NOFO Expected  
this Spring

- **Eligible Recipients:** HUD-subsidized Section 202, 811, Project-based Section 8, and Section 236 properties that agree to an extended period of affordability
- **Funding Amounts and Purposes: \$1B through September 30, 2028**, including:
  - \$837.5M for grants and direct loans
  - \$120 M to support administrative activities and for cooperative agreements
  - \$42.5M to benchmark energy and water use for eligible properties
- **Eligible Uses:**
  - Improve energy or water efficiency, indoor air quality or sustainability
  - Low-emission technologies, incl. zero-emission electricity generation, energy storage or building electrification
  - Address climate resilience



# DOE High-Efficiency Electric Home Rebate Program

**\$4.5 B** through September 2031, via State Energy Offices (SEOs)

Rebates for Qualified Electrification Projects per Dwelling Unit			
Heat pump HVAC	<b>\$8,000</b>	Heat pump clothes dryer	<b>\$840</b>
Heat pump water heater	<b>\$1,750</b>	Breaker box/ Electric wiring	<b>\$4,000/\$2,500</b>
Electric stove/cooktop	<b>\$840</b>	Weatherization (e.g., insulation, air sealing)	<b>\$1,600</b>

Income Level*	Maximum Financial Incentive
<b>80-150% AMI</b>	50% project costs, up to \$14,000/unit
<b>Less than 80% AMI</b>	100% of project costs, up to \$14,000/unit

*\*at least 50% of multifamily units must be occupied by HHs at income levels*

# DOE Home Energy Performance-Based, Whole-House Rebate (HOMES)

**\$4.3 B** through September 2031, via State Energy Offices (SEOs)

	Multifamily	Multifamily LMI*
<b>20-35% building wide modeled savings</b>	\$2,000/unit, up to \$200K/building	\$4,000/unit, up to 80% of project cost
<b>35%+ building wide modeled savings</b>	\$4,000/unit, up to \$400K/building	\$8,000/unit, up to 80% of project cost
<b>At least 15% portfolio wide measured savings</b>	Savings rate multiplied by kWh saved, up to 50% of the project cost	Low-income savings rate multiplied by kWh saved, up to 80% of the project cost

*\*LMI is defined as 80% AMI or below. At least 50% of multifamily units must be occupied by LMI households*

*\*\*Savings rate calculation:  $\$2,000 / (\text{average home or multifamily building energy usage in kWh} * 0.2)$ ; Low-income savings rate:  $\$4,000 / (\text{average home or multifamily building energy usage in kWh} * 0.2)$*

# EPA Greenhouse Gas Reduction Fund (GHGRF)

**\$27B** available through September 2024, incl. \$15B for low-income/disadvantaged communities

National Clean Investment Fund Competition	Clean Communities Investment Accelerator Competition	Solar for All Competition
\$14 B, incl. \$2 B to be expended in low-income/ disadvantaged communities	\$6 B, all must be expended in low-income/ disadvantaged communities	\$7 B, all must be expended in low-income/disadvantaged communities
2-3 awards to nonprofits	2-7 awards to nonprofits	Up to 60 awards to state/local/Tribal governments and nonprofits
Provide financial products and supporting predevelopment expenditures to qualified projects	Provide capitalization funding, technical assistance subawards, and technical assistance services to community lenders, incl. HFAs	Expand existing low-income solar programs or design and deploy new Solar for All programs
Project/Activity/Technology that reduces/avoids GHG emissions or assists communities to reduce/avoid GHG emissions	Deployment of qualified projects, incl. distributed power generation and storage; decarbonization retrofits of existing buildings; and transportation pollution reduction	Residential rooftop and community solar photovoltaic (PV) projects, associated storage, and enabling upgrades



## 45L New Energy Efficient Home Credit Extension and Increase

- **Eligibility:** New construction and substantial rehabilitation
- **Changes to the Tax Credit:**
  - Extends the tax credit through December 31, 2032, and increases tax credit amounts
  - No longer reduces LIHTC eligible basis

New Energy Efficient Home Credit Extension		
Energy Performance	Meets Prevailing Wage?	Tax Credit Amount
ENERGY STAR New Construction	No	\$500/dwelling unit
DOE's Zero Energy Ready Homes	No	\$1,000/dwelling unit
ENERGY STAR New Construction	Yes	\$2,500/dwelling unit
DOE's Zero Energy Ready Homes	Yes	\$5,000/dwelling unit

# Low-Income Communities Bonus Credit Program through ITC

- **Eligibility and Amounts:** Solar/wind facilities w/ net output of 5 MW or less connected to low-income communities
  - Maximum annual credit capacity of 1.8 GWs
- **Timeline:** Treasury will begin accepting credit applications for qualifying low-income buildings in Q3 2023 over a 60-day period. Exact timing and add'l selection criteria TBD.

Eligible Project Categories	Amount of Credit Bonus	Maximum Credit Capacity 2023
Installed in a low-income community*	10 percentage point	700 MW
Installed on tribal land	10 percentage point	200 MW
<b>Installed as part of a qualifying low-income building**</b>	<b>20 percentage point</b>	<b>200 MW</b>
Installed as part of a low-income economic benefits project***	20 percentage point	700 MW

**Treasury Guidance:** <https://www.irs.gov/pub/irs-drop/n-23-17.pdf>

\*census tracts with poverty rates of 20% or more, or census tracts with median incomes of 80% or less; \*\*buildings covered by the Violence Against Women Act; \*\*\*provide at least 50% of the financial benefits of the electricity produced by the facility to households with income of less than 200% of the poverty line or at or below 80% of area median income

# Leveraging IRA and the LIHTC program

---

- **Leverage the QAP to create demand for IRA resources**
- **Make funding easily accessible for building owners**
  - Create funding carve outs for multifamily housing
  - Streamline and provide flexible income verification processes
  - Integrate IRA funding into existing HFA financing channels
  - Provide comprehensive technical assistance
- **Partnerships between State Energy Agencies and Housing Finance Agencies**
  - Increase technical capacity of HFA staff
  - Engage and educate building owners





# THANK YOU



NATIONAL  
HOUSING  
TRUST

**Todd Nedwick, Senior Director of Sustainability Policy**  
**[tnedwick@nhtinc.org](mailto:tnedwick@nhtinc.org)**