

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENERGY RESOURCES
Patrick Woodcock, Commissioner

**Massachusetts
Stretch code & Specialized
code Draft regulations:
Informational webinar**

July 7, 2022

Agenda

1. Background

2. Stretch Code

- Summary of Residential and Commercial stretch code proposal
- Key Topics From Public Comment and Changes from Straw Proposal

3. Specialized Opt-in Code

- Summary of Residential and Commercial proposal
- Key Topics From Public Comment and Changes from Straw Proposal

4. **Next Steps** and how to participate in regulatory public comment process

Building Energy Code in MA state law

2008 Green Communities Act

- **Base Energy Code:**

“To adopt and fully integrate the latest International Energy Conservation Code (IECC) and any more stringent amendments thereto as part of the state building code, in consultation with DOER.”

MGL CH143, Section 94(o)

- Created DOER Green Communities Program and **Stretch energy code:**

“minimize, to the extent feasible, the life-cycle cost of the facility by utilizing energy efficiency, water conservation and other renewable or alternative energy technologies.”

MGL CH25a. Section 10(c)

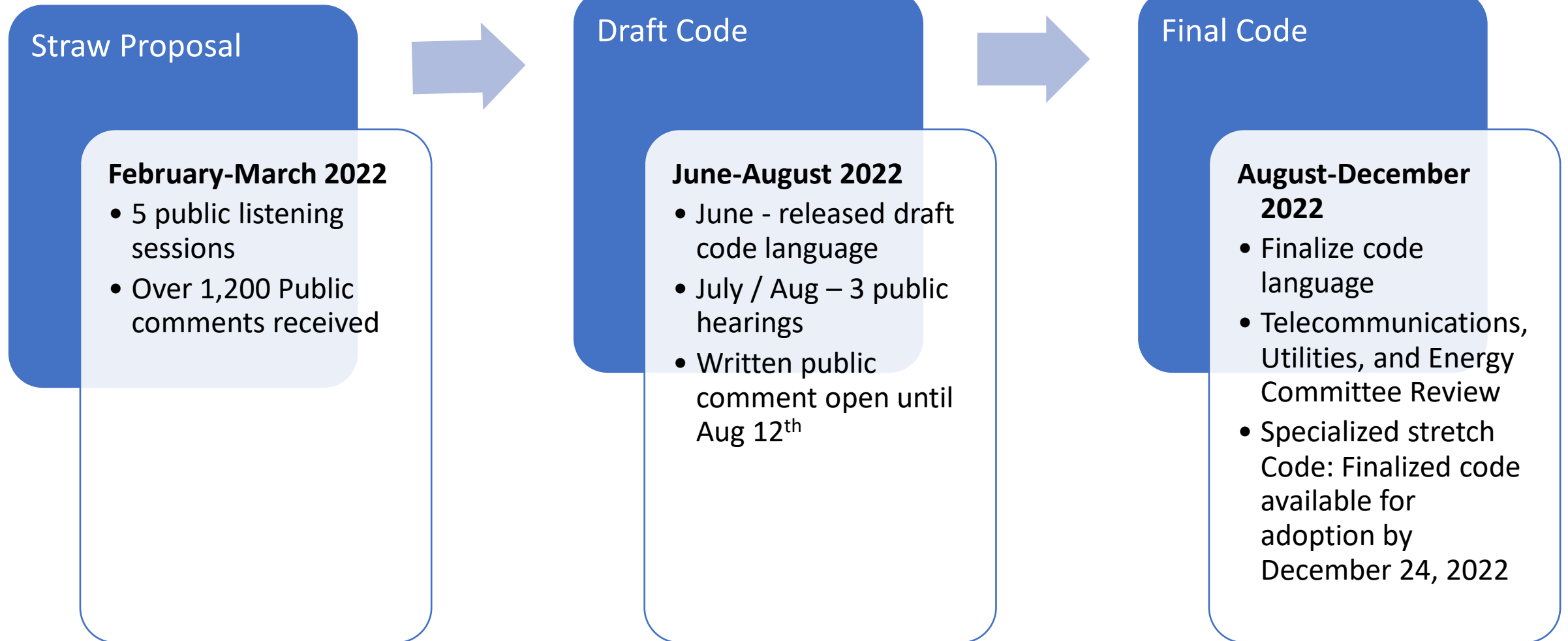
2021 Climate Act

- 50% emission reduction in 2030 (sub-limits to be established for buildings sector)
 - DOER to **update the Stretch Code** from time to time, in consultation with BBRS
 - DOER to develop: a **municipal opt-in specialized stretch energy code** that includes:
 - net-zero building performance standards
 - a definition of net-zero building
 - designed to achieve MA GHG emission limits and sub-limits.
 - may be phased in by building type
- Session Laws of 2021 Chapter 8: Section 31*

Statutory Timeline

- **July 2022:** EEA must establish specific 2025 and 2030 emissions reduction targets for the buildings sector
- **December 2022:** DOER must promulgate new specialized opt-in code
- **January 2023:** New Base Energy Code expected to go into effect
- **2030:** Massachusetts must achieve at least 50% reduction in GHG emissions

Public Process Timeline



Code Language Released for Public Comment

mass.gov/info-details/stretch-energy-code-development-2022

NEW! Release of Draft Code language for Stretch Code update and New Specialized...

NEW! Release of Draft Code language for Stretch Code update and New Specialized Stretch Code

On June 24th, the Massachusetts Department of Energy Resources (DOER) released draft code language for its Stretch Energy Code and Specialized Municipal Opt-in Code:

- [Summary Document Explaining the Stretch Energy Code and Specialized Opt-in Code Language](#)
- [Residential Low-Rise Stretch Energy Code and Specialized Opt-in Code Language](#)
(red-line of applicable code sections)
- [Commercial and Other Stretch Energy Code and Specialized Opt-in Code Language](#)
(red-line of applicable code sections)

DOER's Draft Regulations 225 CMR 22.00 and 225 CMR 23.00 have been filed with the Secretary of State.

Stretch Code

DOER Analysis: Least Cost Decarbonization

- In 2019, DOER commissioned analysis of different building code standards specific to the Massachusetts climate.
- Building Type Variety: 12 building use types and size-specific analysis to align with needs of different building types
- Analyzed up-front costs, operational costs, and total cost of ownership.

Small office
Large office
Office-lab
Elementary
school
High school

High rise multi-family
tower
4 story multi-family
Multi-family mid-rise
podium
6-unit multi-family
Townhouse
Single family Small
Single family Large



Detailed information, results, and case studies:

<https://www.mass.gov/lists/stretch-energy-code-development-support-documentation>

Residential Low Rise – Summary of Major Components of Stretch Code

Energy Efficiency Improvements (code pathways)

HERS 45 if all-electric (current stretch code: HERS 55)

HERS 42 if utilizing fossil fuels (current stretch code: HERS 60)

Passive House (streamlined from current stretch code)

Other Improvements

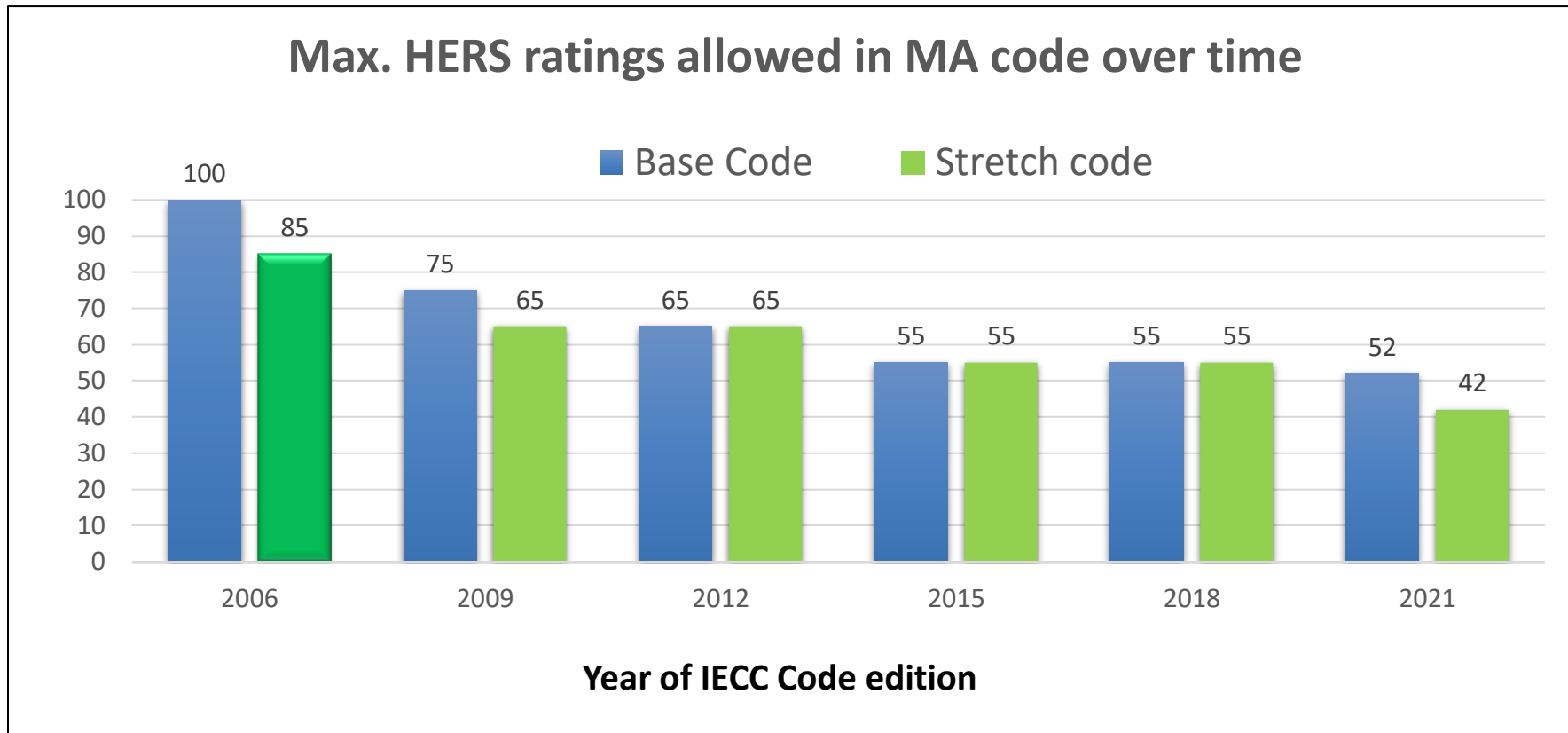
Improved ventilation: either energy recovery or heat recovery

All LED lighting

Electric Vehicle Charging: Pre-wired for 1 Space or 20% of Spaces

HERS Energy Efficiency Improvements

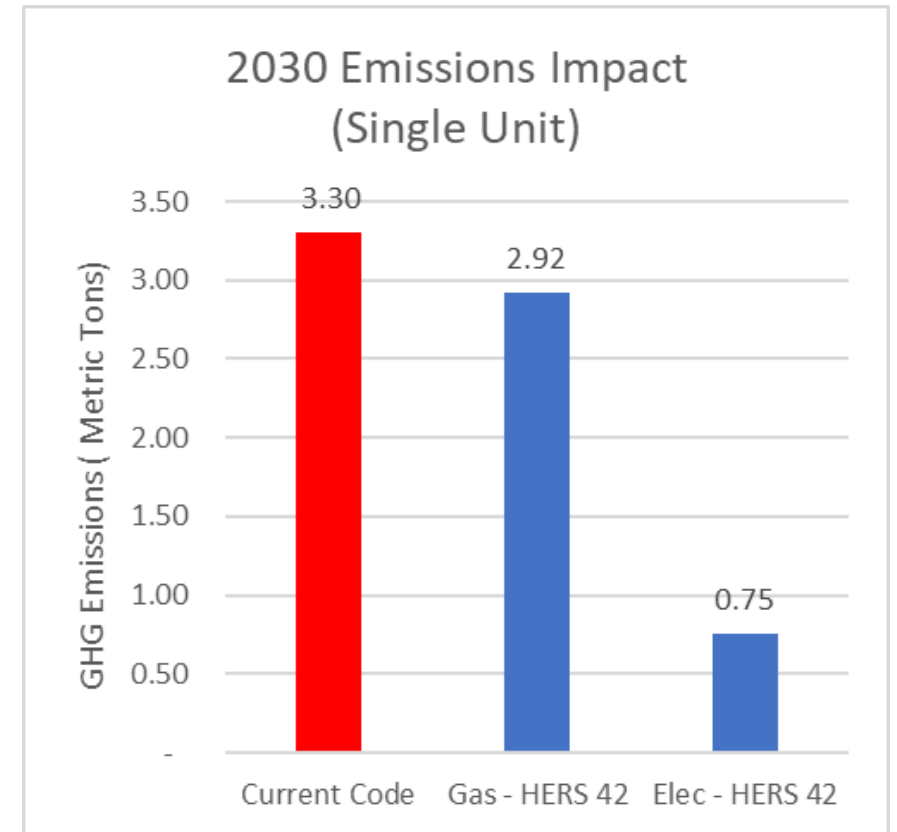
- HERS (Home Energy Rating System) used in MA energy code since IECC 2006 edition
- HERS 51 = Average in MA in 2020
- 87% of new homes used HERS in 2020
- HERS ratings qualify for Mass Save incentives & Federal tax credits



Impact of New HERS Requirements

Why HERS 42?

- At HERS 42, both gas and electric heat are cost-effective to build and cheaper to operate.
- At or below HERS 42, most homes will choose electric heat because heat pumps can lower construction costs for builders and lower ownership costs for buyers.
- Heat pumps are more efficient and save significant GHG emissions compared to gas or propane heating.



Switching from gas heat to electric heat pump saves 75% of the GHG emissions in 2030, more in 2050

Commercial Stretch Code Summary

Energy Efficiency Improvements (code compliance pathways)

Small Commercial (less than 20,000 SF not including multi-family): Prescriptive IECC + COMCHECK with MA amendments

Multi-family: HERS 42/45, TEDI, or Passive House

Schools and offices: TEDI or Passive House

Labs & high ventilation: ASHRAE 90.1 Appendix G with MA amendments, electrification required for primary space heating

Other Improvements

Mandatory thermal bridge derating

Low air infiltration limits and infiltration testing

Dedicated outside air ventilation

Higher ventilation energy recovery

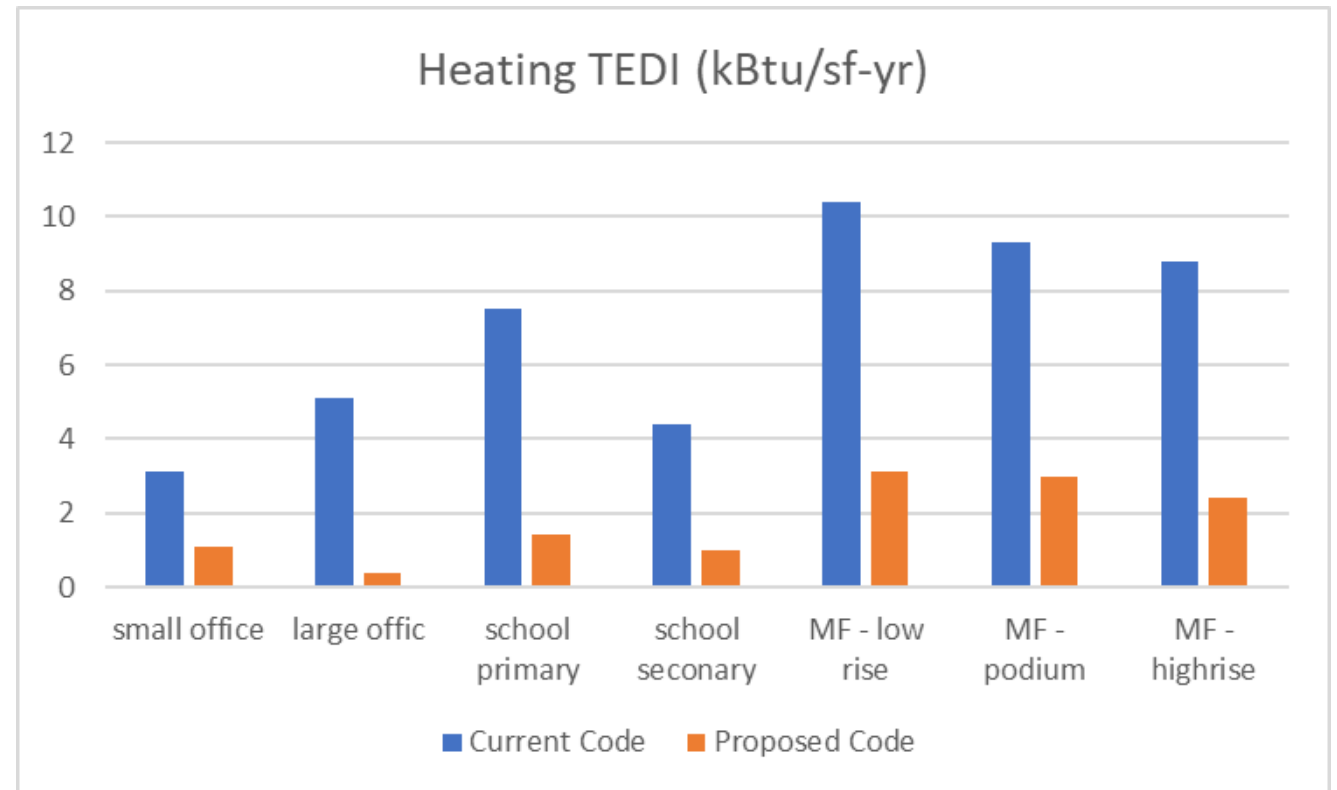
Electrification of space heating required for Curtain wall buildings

Electric Vehicle Charging: Pre-wired 20% of spaces (resi and business use), otherwise 10%

Impact of New Efficiency Requirements

- **What is heating “TEDI”:**
 - Thermal Energy Demand Intensity
 - Amount of heating needed over 1 year

- **Benefit of “TEDI” approach:**
 - Blue – current code heating TEDI
 - Orange – proposed stretch code heating TEDI
 - Easy and less costly to electrify
 - If using fossil fuel, **up to 92% less than current code**



Public Comment: Technical Details of Stretch Code

- Recommend technical advisory committee to help ensure technical details are well addressed
 - DOER established Stretch Energy Technical Advisory Committee (SE-TAC), 20 industry experts, working summer/fall
- Ensure workable and realistic TEDI limits, ensure correct modeling inputs
 - TEDI limits subjected to “stress testing”, modeling inputs to be included in guidelines to be published this fall
- Request for detailed energy recovery language, ensure well addressed for highly ventilated applications
 - Section C403.7 contains detailed energy recovery language, addresses highly ventilated buildings
- Concern that addition of fossil fuel emergency generator would disqualify building as “all electric”
 - An exception for this was included in the proposed code – Section CC101.3 part 3
- Concern about feasibility of reducing embodied carbon, concern about linkage with curtain wall
 - Embodied Carbon requirement replaced with electrification of space heating for curtain wall buildings– Sections C402.1.5.1 & C401.4

Public Comment: Building Retrofits

Residential Retrofit Proposal

- **Additions** (currently not required to follow stretch code)
 - Changed to mandate stretch code for large additions
 - Small additions (<1,000-sf): continue to follow base code
 - Large additions ($\geq 1,000$ -sf or 100% increase in conditioned floor area): require HERS 52 if using fossil fuel and HERS 55 if all-electric
- **Alterations**
 - Changed to require substantial renovations to meet HERS 52 if using fossil fuel and HERS 55 if all-electric
 - Level 3 Alterations (over 50% of the home is renovated and reconfigured)
 - Substantial Improvements (improvements that cost more than 50% of the value of the existing home)

Public Comment: Building Retrofits

Commercial Stretch Code Proposal

- **Additions** (currently not required to follow stretch code)
 - Changed to mandate stretch code
 - Small additions (<20,000-sf): prescriptive stretch code
 - Large additions (≥20,000-sf): performance stretch code
- **Alterations** (currently not required to follow stretch code)
 - Changed to require altered portions to meet stretch code
 - Accommodation for envelope UA compliance
- **Change of use or occupancy**
 - Clarify that stretch code applies
 - Allow prescriptive pathway for any size
 - Accommodation for envelope UA compliance

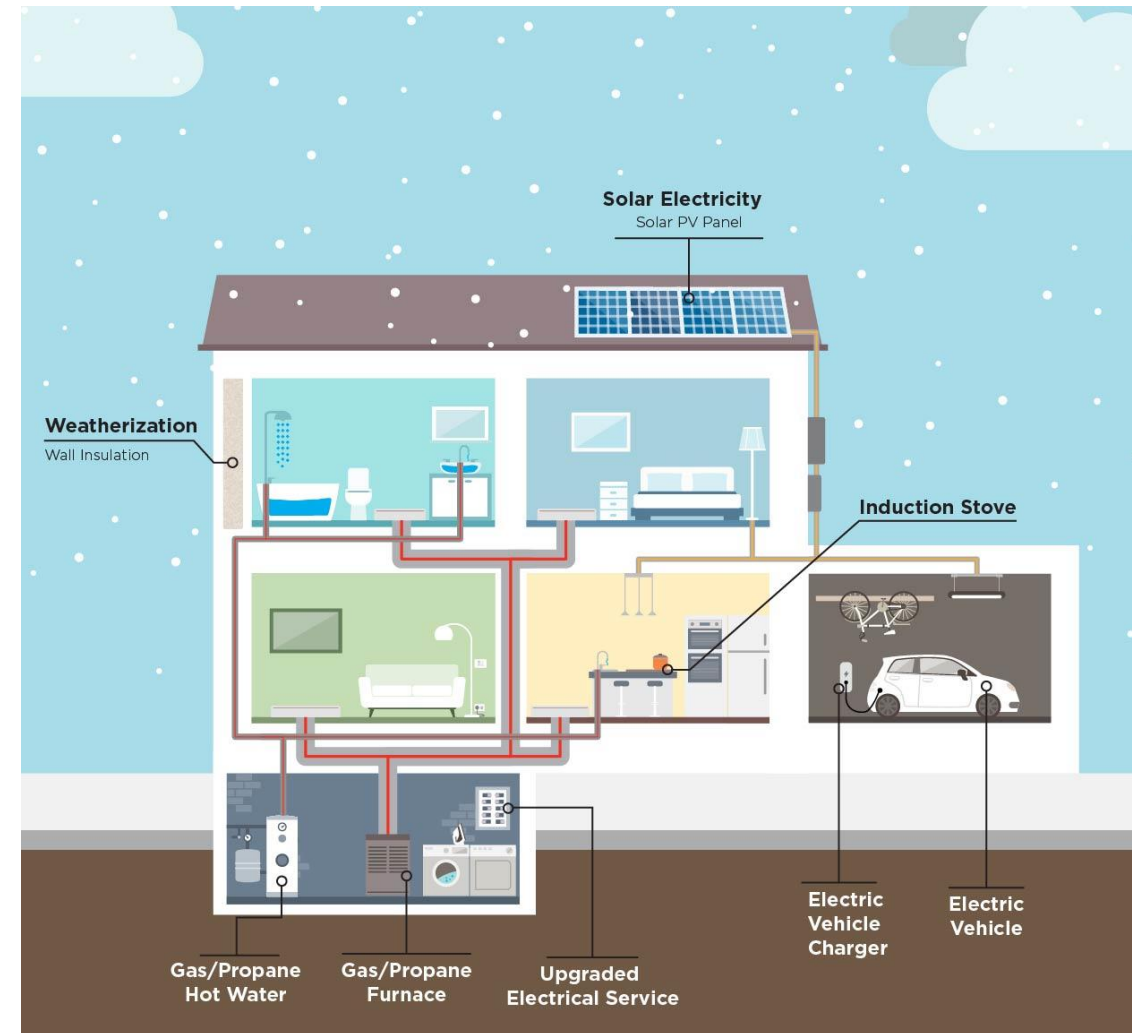
Specialized Opt-In Code

Summary of Specialized Opt-in Code – Residential and multi-family less than 12,000 square feet

Options for Code Compliance, including all efficiency and EV-ready requirements from Stretch Code:

- **All-electric HERS 45 or Passive House**
- **Mixed Fuel:**
 - HERS 42 or Passive House plus pre-wiring for electrification plus rooftop solar where feasible
- **Zero Energy:**
 - HERS 0 (HERS 42 + on-site solar), pre-wiring if using fossil fuel
 - HERS 0 (HERS 45 + on-site solar) if all-electric
 - Plus ZERO with on-site solar

New: Homes and units greater than or equal to 4,000 square feet not allowed to follow mixed fuel pathway, must follow all electric or Zero Energy.



Summary of Specialized Opt-in Code: Large Multi-family

Passive House Required for Multi-family equal to or greater than 12,000 square feet:

- Effective Jan 1, 2023: Passive House required for buildings up to 5 stories
- Effective Jan 1, 2024: Passive House required for buildings 6 stories and above



*Winthrop Center
Boston, MA*



*The Distillery
Boston, MA*



*North Commons
North Hampton, MA*



*Harbor Village
Gloucester, MA*



*Bunker Hill
Boston, MA*



*Depot Village
Hanson, MA*

- Over 6,500 Passive House Units in Development in MA
- Passive house Growth: 6+ unit multi-family currently over 6,500 units in the Mass Save® incentive program pipeline versus less than 20 in 2017.
- 133 MA firms have Certified Passivehouse consultants, \$1.7m for Mass Save training of 3,600 people in 2022-2024.
- Significant Mass Save incentives available for design/feasibility and construction up to \$3,000 per unit.

Summary of Specialized Opt-in Code: Commercial (non-residential)

Options for Code Compliance, including all efficiency and EV-ready requirements from Stretch Code:

- **All-electric with efficiency requirements or Passive House**
- **Mixed Fuel:**
 - Efficiency requirements or Passive House plus pre-wiring for electrification plus rooftop solar where feasible
 - Curtain wall buildings: efficient electric-only space heating required
 - High ventilation: efficient electric space heating as primary heating system required (hybrid)
- **Zero Energy Building:**
 - Efficiency Requirements + on-site solar to offset annual energy use, plus pre-wiring if using fossil fuel

Public Comment: Net Zero Definition

Net Zero Building: *A building which is consistent with achievement of MA 2050 net zero emissions, through a combination of highly energy efficient design together with being either a Zero Energy Building, or an All-Electric Building, or where fossil fuels are utilized, a building fully pre-wired for future electrification and that generates solar power on-site from the available Potential Solar Zone Area.*

The Specialized Code is a set of net-zero building performance standards that adopts a broad Net-zero Building definition intended to cover all new buildings in the Specialized Code that is consistent with Executive Office of Energy and Environmental Affairs 2050 Roadmap Study and Buildings Technical Report:

- Consistent with the electrification and deep efficiency
- Compatible, as-built, with the Commonwealth's netzero emissions economy in 2050
- Focus is on-site emissions; it does require onsite or offsite renewables

Public Comment: Option for zero energy buildings

- Optional pathway in residential and commercial stretch code and specialized opt-in code
- **Zero Energy Building:** A building which through a combination of highly energy efficient design and onsite renewable energy generation is designed to result in net zero energy consumption over the course of a year as measured in MMBtus or KWheq, on a site energy basis, excluding energy use for charging vehicles.
- **Compliance Options for Residential and Multi-family:**
 - HERS 0 (HERS 42 plus on-site solar if using fossil fuel)
 - HERS 0 (HERS 45 plus on-site solar if all-electric)
 - Phius ZERO with on-site solar
- **Compliance Options for Commercial (non-residential):**
 - Stretch Code efficiency plus on-site solar to offset annual energy use

Public Comment: Fossil Fuel in Specialized Code

- Stretch Code efficiency requirements are designed to transition market to efficient electric heating, specialized opt-in code includes all requirements from stretch code including:
 - More stringent HERS ratings with differential between fossil fuel and electric
 - New TEDI limits
 - Thermal bridge, air infiltration, ventilation energy recovery
 - EV-ready provisions
- If all-electric, no additional requirements in Specialized Code:
 - Less costly to build
 - Access to significant Mass Save incentives: residential low-rise: \$15k For All-Electric homes below HERS 45 and \$25k below HERS 35 / Passive House
- If using any fossil fuels (“Mixed Fuel” pathway), additional requirements in Specialized Code:
 - Solar
 - Electrification-ready (pre-wiring for future electric loads)
- Additional Specialized Opt-in Requirements
 - Passive House requirement for large multi-family
 - Added requirement that homes and dwelling units over 4,000 sf must be all electric or achieve Zero Energy/HERS 0 if using fossil fuel

Public Comment: Solar where feasible for Mixed Fuel Pathway

Solar development of the available on-site solar potential, specifically through one of 2 options:

1. Not less than 75% of the Potential Solar Zone Area, or
2. Not less than:
 - *Residential low-rise*: 1.5W/ft² for each sq foot of the 3 largest floors (the threshold proposed in solar requirements in the forthcoming IECC2024)
 - *Commercial*: 1.5W/ft² for each sq foot of the 3 largest floors (the threshold proposed in solar requirements in the forthcoming IECC2024),

Potential Solar Zone Area: The combined area of any low-sloped roofs and any steep-sloped roofs oriented between 90 degrees and 300 degrees of true north where the annual solar access is 70 percent or greater. Annual solar access is the ratio of “annual solar insolation with shade” to the “annual solar insolation without shade”. Shading from obstructions located on the roof or any other part of the building shall not be included in the determination of annual solar access. (language proposed in the forthcoming IECC 2024)

Public Comment: Effective Dates for Stretch Code

- Align stretch code effective dates with base code change – currently Jan 1, 2023
- Phase in new commercial (non-residential use) TEDI requirements on July 1, 2023 to allow time for training
- Phase in new residential efficiency requirements:
 - Current stretch code – HERS 55 fossil fuel, HERS 60 all-electric
 - Effective Jan 1, 2023 – HERS 52 fossil fuel, HERS 55 all-electric
 - Effective July 1, 2024 – HERS 42 fossil fuel, HERS 45 all-electric

Any building applying for permit on or after effective dates above are subject to updated stretch code provisions

Public Comment: Effective Dates for Specialized Opt-in Code

- Available for municipal adoption in Dec 2022
- When a municipality votes to adopt the Specialized Code, the requirements will take effect for new building permit applications beginning on the next **January 1st or July 1st**, whichever is a **minimum of 6 months** after the municipal vote.
 - This phase-in period, also utilized by new Stretch Code municipalities, allows an orderly transition for developers, designers and builders as well as additional training time for municipal code officials.
- All requirements in effect without phase-in, except for Passive House mandate for multi-family buildings 12,000 square feet or more (see slide 19).

Public Hearings

| Date | Time | Location |
|----------------------------------|---------------------------|---|
| July 22 nd , 2022 | 9:30 a.m. – 11:30 a.m. | Division of Fisheries and Wildlife, 1 Rabbit Hill Road, Westborough, MA 01581 |
| August 2 nd , 2022 | 5:30 p.m. – 8:30 p.m. | Thomas Crane Public Library, 40 Washington Street, Quincy, MA 02169 |
| August 8 th , 2022 | 1:00 p.m. – 4:00 p.m. | ZOOM online meeting: https://zoom.us/webinar/register/WN_-2zUi2ZuRk6G4k-uPS9cBA Interpretation services will be provided in American Sign Language, Spanish, Portuguese, and Chinese. For interpretation services in other languages, please email a request to stretchcode@mass.gov by August 1, 2022. |

Please email STRETCHCODE@MASS.GOV in advance to sign up for public comment or request interpretation.

Stretch Code Technical Advisory Committee

- More information: <https://www.mass.gov/service-details/stretch-energy-code-technical-advisory-committee>
- Key topics being addressed:

| Subcommittee | Key Topics |
|---------------------------|---|
| Envelope | Backstop, curtainwall, thermal bridge, air infiltration |
| Mechanical | Economizers, ventilation and exhaust systems |
| Modeling | Targeted and relative performance (TEDI and ASHRAE) |
| Residential/Certification | Passivehouse, HERS documentation and process |
| Electric | Solar, EV, pre-wiring |

- Upcoming meetings (available for public to listen in):

| | |
|-----------------|-----------------|
| July 25, 2022 | 10 a.m. - noon |
| August 25, 2022 | 1 p.m. – 3 p.m. |

Written Comments

DOER is seeking public comments on the Stretch Energy Code and Specialized Stretch Code Draft Regulation, released on June 24, 2022, to inform the final code language.

Written comments will be accepted **until 5 PM on August 12th 2022.**

Please submit written comments on the regulations electronically to stretchcode@mass.gov with the words BUILDING CODE COMMENTS in the subject line. Alternatively, comments can be submitted via mail to Ian Finlayson, Department of Energy Resources, 100 Cambridge Street, Suite 1020, Boston, MA 02114.