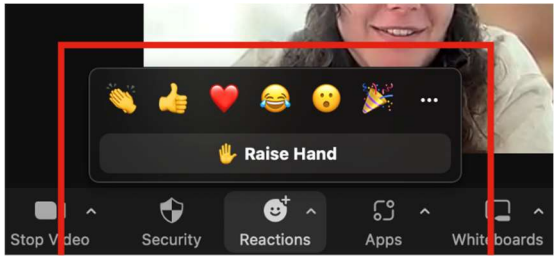
MUNICIPAL OPT-IN SPECIALIZED ENERGY CODE

INFORMATIONAL MEETING FOR BUILDING PROFESSIONALS

NOVEMBER 4, 2024 | 7:00 PM

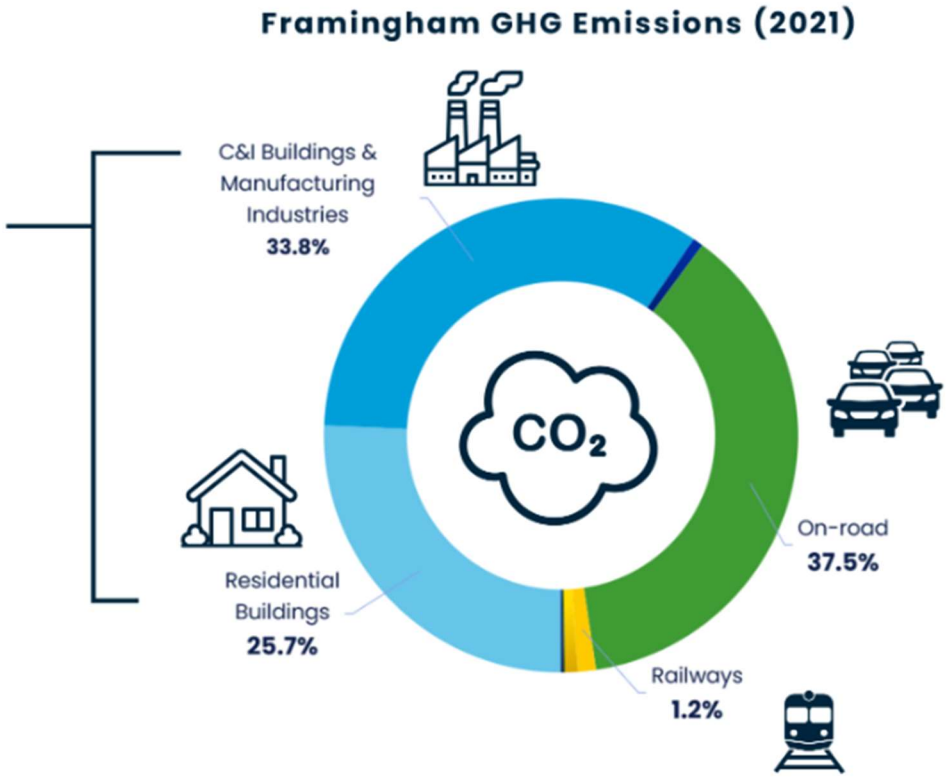
MEETING PROTOCOL

- **This meeting is being recorded:**
  - Slides and recording will be shared following the meeting.
- **Questions/comments in the Zoom chat are welcome:**
  - All questions/comments in chat are directed to the host and co-hosts.
  - We will try to answer relevant questions as we go, but will leave most questions until Q&A.
- **To ask a question during the designated Q&A segment, please:**
  - If on Zoom, Use the “Q&A” feature to ask questions during the meeting or raise your hand to be called on.

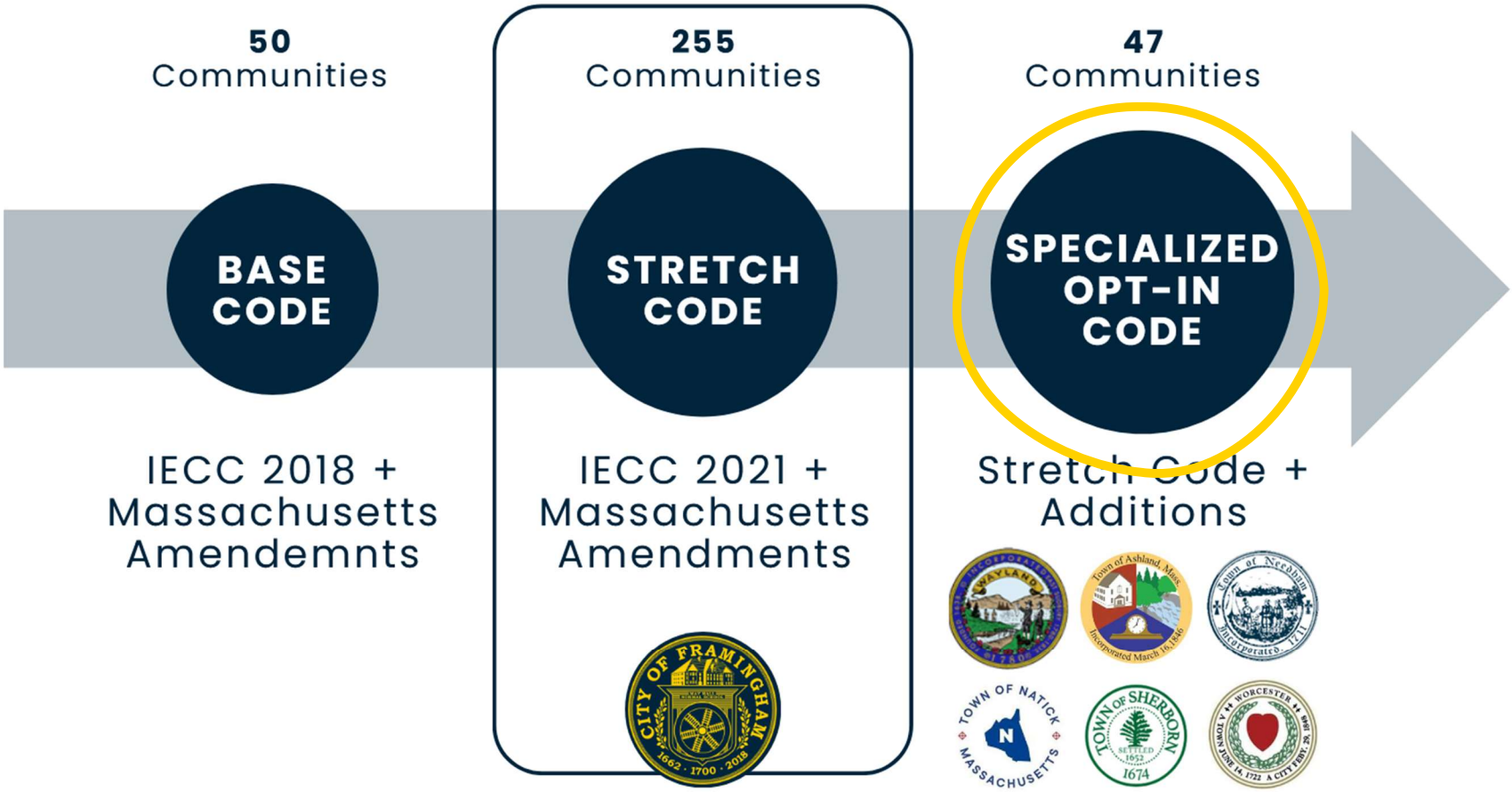


BUILDING EMISSIONS IN FRAMINGHAM

- Framingham adopted a target to achieve **net zero emissions by 2050 (City Council Order 2022-083).**
- **Approximately 60% of emissions come from building energy consumption.**
- Approximately **74%** of Framingham's building emissions come from fuel oil and natural gas.
- Tackling building emissions is critical to meeting our emissions reduction target.



ENERGY CODE OPTIONS



PANELISTS

Fred Bray

Framingham Director of Inspectional Services / Building Commissioner

Shawn Luz

Framingham Sustainability Coordinator

Dillan Patel

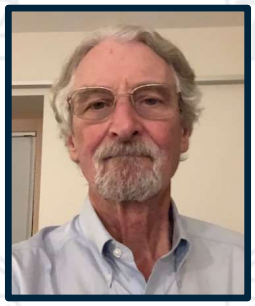
Green Communities Coordinator, Department of Energy Resources

Becca Edson

Architect, Department of Energy Resources

Michael Rossi

Energy Code Specialist, PSD Consulting



Hank Keating

President of Passive House Massachusetts

Former Project Architect at Trinity Financial

Nick Falkoff

Owner, Auburndale Builders

Founder, Studio for High-Performance Design and Construction

Tonight's Agenda

- An Overview of the Specialized Opt-In Code and Differences from the Stretch Code
  - Dillan Patel, Michael Rossi, and Becca Edson
- Understanding Passive House Building Standards and Multifamily Development
  - Hank Keating
- Building Resilient, High Performance Homes in Massachusetts
  - Nick Falkoff
- Q&A Session

Massachusetts Municipal Opt-In Specialized Code

DOER
Massachusetts Department of Energy Resources

Creating A Clean, Affordable, Equitable and Resilient Energy Future For the Commonwealth

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MA Municipal Opt-In Specialized Code

November 2024

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Climate Act 2021

The legislation signed into law updates the greenhouse gas emissions limits related to the 2008 Global Warming Solutions Act, commits Massachusetts to achieve **Net Zero emissions in 2050**, and authorizes the Secretary of Energy and Environmental Affairs (EEA) to establish an emissions limit of no less than **50% for 2030**, and no less than **75% for 2040**.

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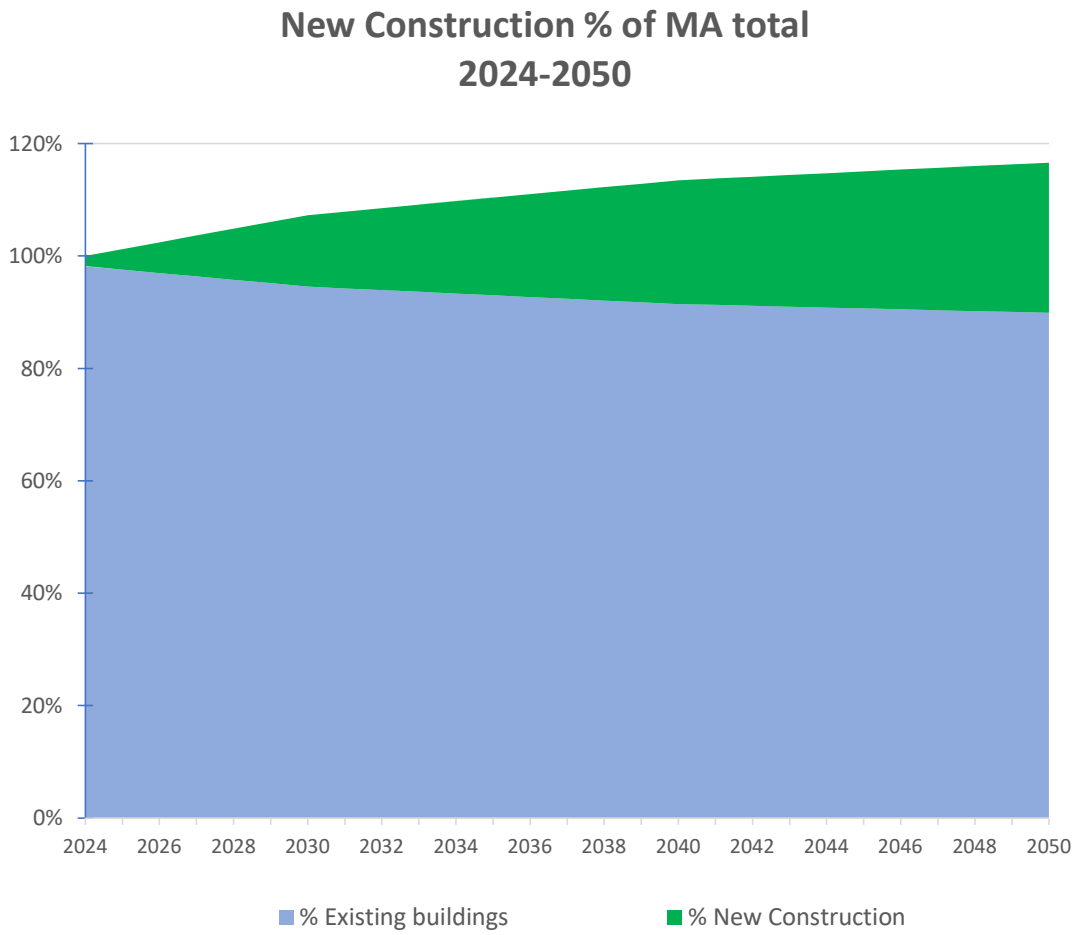
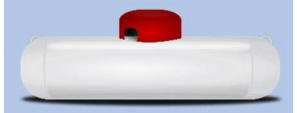
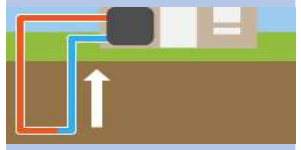
Building Energy Code's role in reducing emissions

- Building code is the primary policy impacting new buildings.
- New buildings (built after 2023) **~27% of all building space by 2050**
- New buildings are easiest and cheapest to make 2050-compliant
- New construction market helps drive cost reductions in building retrofits



2020

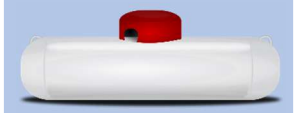
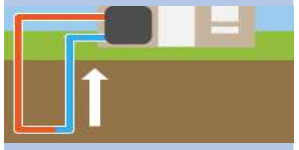
Current grid emissions:
~680 lbs./MWh

OIL	PROPANE	GAS	ELECTRIC RESISTANCE	ELECTRIC COLD CLIMATE AIR SOURCE HEAT PUMP	ELECTRIC GROUND SOURCE HEAT PUMP
					
Pounds of emissions to deliver 1 MMBtu of heat					
170	145	120	205	65	45

45% Less

2050

Future grid emissions:
~200 lbs./MWh

OIL	PROPANE	GAS	ELECTRIC RESISTANCE	ELECTRIC COLD CLIMATE AIR SOURCE HEAT PUMP	ELECTRIC GROUND SOURCE HEAT PUMP
					
Pounds of emissions to deliver 1 MMBtu of heat					
170	145	120	~~205~~ 59	~~65~~ 18	~~45~~ 13

85% Less

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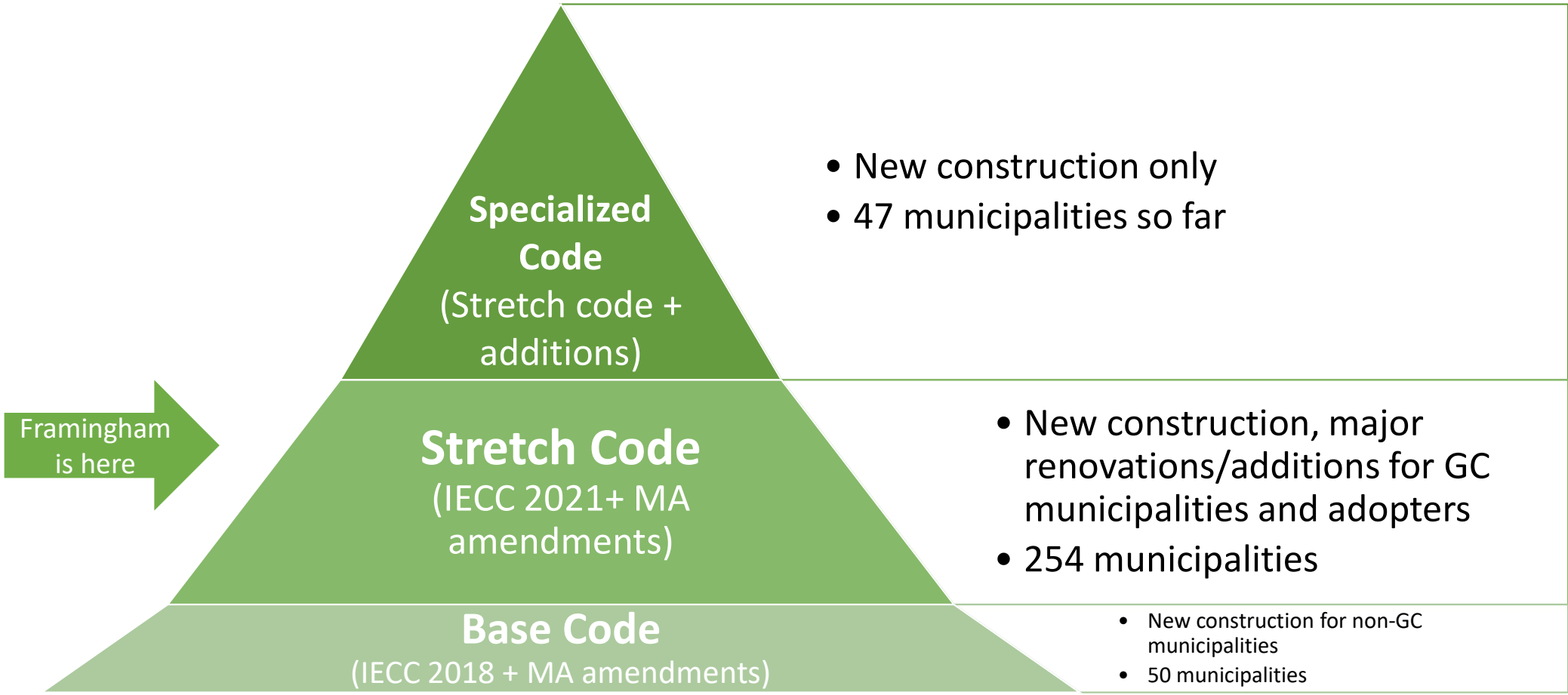
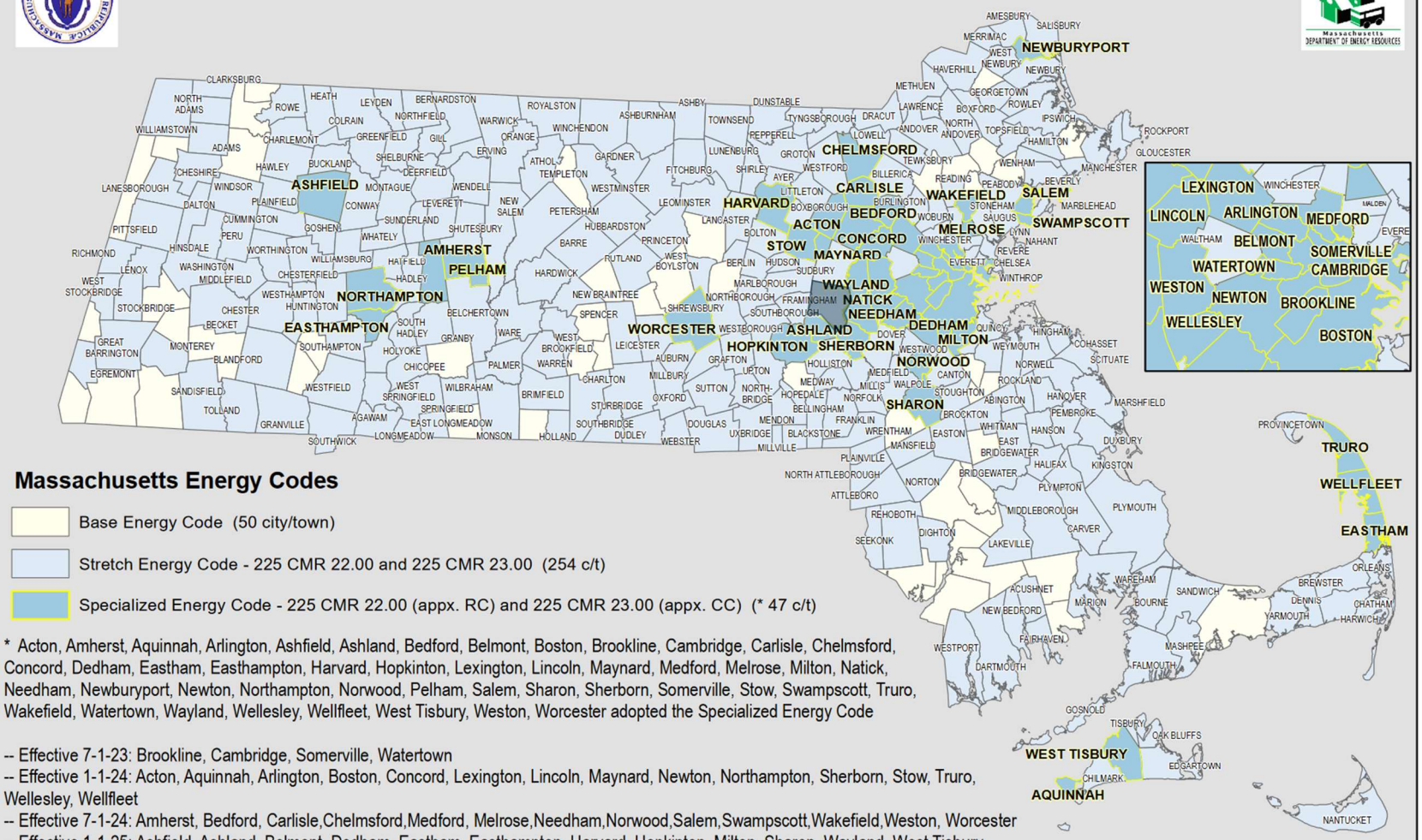
Base, Stretch, and Specialized – 3 Options



From Green Community to Climate Leader

Green Communities Criteria	Climate Leaders Criteria
Adopt as-of-right siting for RE/AE generation, R&D, or manufacturing	Establish/maintain local committee to advise, coordinate, and/or lead clean energy and climate activities
Adopt expedited permitting process	Municipal decarbonization commitment
Create an Energy Reduction Plan to reduce energy use by 20% in 5 years	Create Municipal Decarbonization Roadmap with 2030 & 2050 goals
Purchase only fuel-efficient vehicles	ZEV-First vehicle policy
Adopt the Stretch Code	**Specialized Stretch Code Adoption**

Massachusetts Building Energy Code Adoption by Municipality



Massachusetts Energy Codes

Base Energy Code (50 city/town)

Stretch Energy Code - 225 CMR 22.00 and 225 CMR 23.00 (254 c/t)

Specialized Energy Code - 225 CMR 22.00 (appx. RC) and 225 CMR 23.00 (appx. CC) (* 47 c/t)

* Acton, Amherst, Aquinnah, Arlington, Ashfield, Ashland, Bedford, Belmont, Boston, Brookline, Cambridge, Carlisle, Chelmsford, Concord, Dedham, Eastham, Easthampton, Harvard, Hopkinton, Lexington, Lincoln, Maynard, Medford, Melrose, Milton, Natick, Needham, Newburyport, Newton, Northampton, Norwood, Pelham, Salem, Sharon, Sherborn, Somerville, Stow, Swampscott, Truro, Wakefield, Watertown, Wayland, Wellesley, Wellfleet, West Tisbury, Weston, Worcester adopted the Specialized Energy Code

-- Effective 7-1-23: Brookline, Cambridge, Somerville, Watertown
-- Effective 1-1-24: Acton, Aquinnah, Arlington, Boston, Concord, Lexington, Lincoln, Maynard, Newton, Northampton, Sherborn, Stow, Truro, Wellesley, Wellfleet
-- Effective 7-1-24: Amherst, Bedford, Carlisle,Chelmsford,Medford, Melrose,Needham,Norwood,Salem,Swampscott,Wakefield,Weston, Worcester
-- Effective 1-1-25: Ashfield, Ashland, Belmont, Dedham, Eastham, Easthampton, Harvard, Hopkinton, Milton, Sharon, Wayland, West Tisbury
-- Effective 7-1-25: Natick, Newburyport, Pelham (9-1-25)

MA DOER, 10-16-2024, jpfister

Opt-in Specialized Energy Code

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Specialized code – Fast Facts

- Makes new buildings as efficient as possible while saving future homeowners money if they want to convert their home to all-electric in the future.
- **Applies only to new buildings** - there is **no impact on existing or historic homes and no impacts on additions, alterations, or renovations**.
- **No additional requirements for new all-electric homes.**
- **Retains choice to building with natural gas**.
- **No changes in electric vehicle (EV) wiring requirements.**
- **Facilitates large incentives for energy efficient homes and affordable multifamily housing.**

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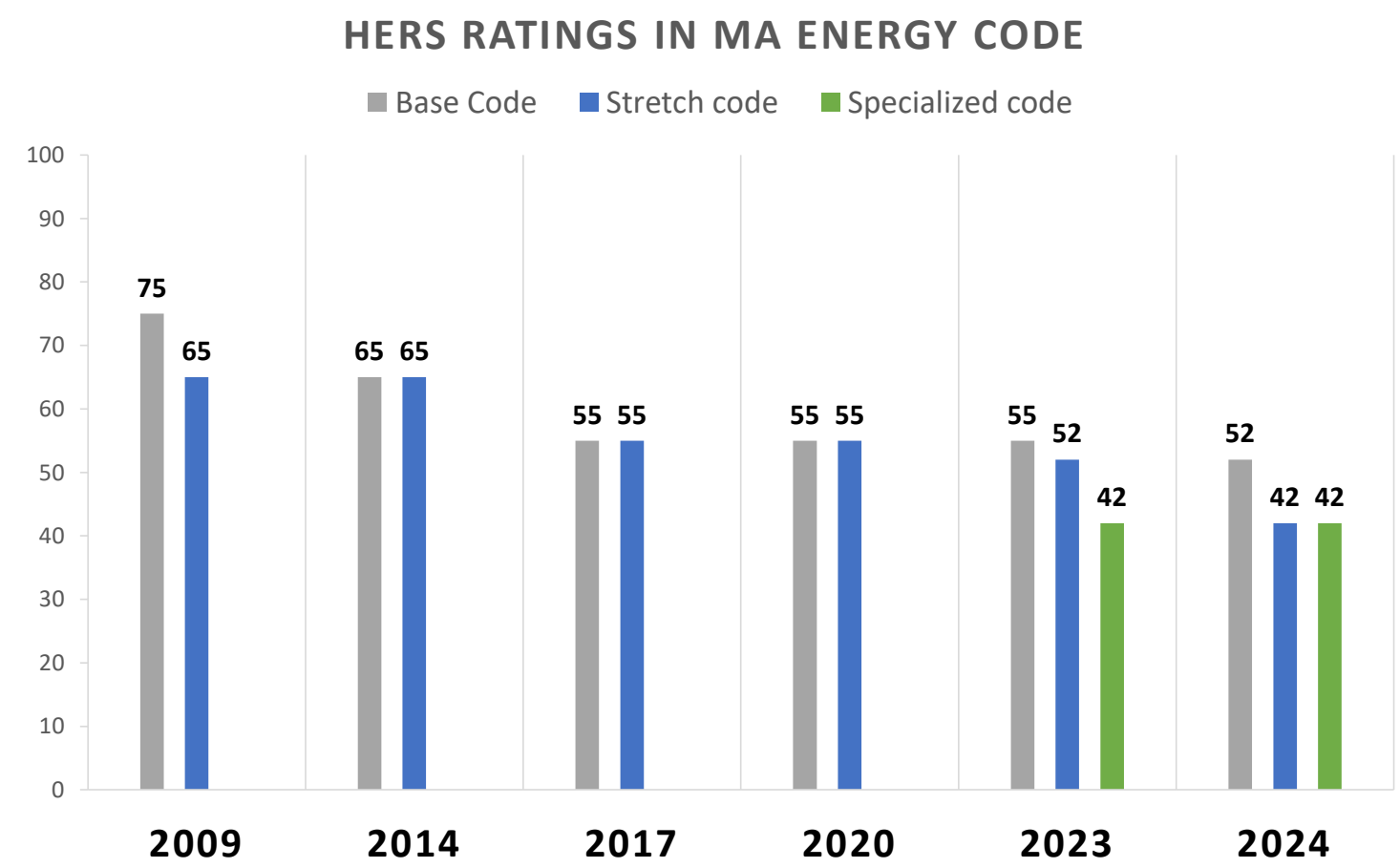
Intro to HERS ratings in MA energy code



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Specialized vs Stretch code - Residential Low-Rise

Energy Source(s)	Home Size	Stretch code (July 2024)	Specialized Code
All Electric New Homes	Any Size home	HERS 45 or Passive house	
Mixed-Fuel New Homes	Under 4,000 sq. ft.	HERS 42	**+Solar PV (min 4kw) + wiring for electrification**
	4,000 sq. ft. and over	HERS 42	**+ Solar PV (to net-zero) + wiring for electrification**
	Any	Passive house option	**+ wiring for electrification**

Energy Source(s)	Home Size	Stretch code (July 2024)	Specialized Code
Home additions & alterations	Any	Same as Stretch code	
Historic or Existing homes	Any	Energy Code exemption if it would damage the historic fabric of the building	

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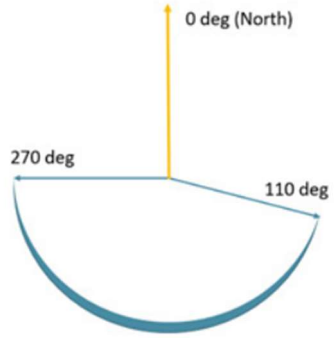
Specialized Residential Code: Solar PV sizing

- Mixed-fuel: Solar required for mixed fuel buildings when there is a suitable solar-roof zone ≥ 300 sq. ft. AND at right orientation
  - Can be ground mounted as long as it's on-site
  - Direct ownership or third-party (lease, PPA) allowed
  - No trees need to be cut down
- All-electric: No PV required, just solar-ready roofs (regular stretch code)



Eligible Orientation for Solar Zone

A 4-kW system would take up about 230 ft^2 while an 8-kW system would take up 460 ft^2

Home Type	Solar required
All-electric	No
Passivehouse	No
Mixed-fuel < 4,000 sq ft	**4 kW**
Mixed-fuel 4,000 sq ft +	**Enough for net-zero (8+ kw)**
Other residential	0.75 W/sq ft

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Small Residential Incentives

	Single Family	Small multifamily (2-4 units)
State (Mass Save)	$15,000 for HERS < 46	$17,500 - $22,500 for HERS < 46
	$25,000 for Passive House	$25,000 - $40,000 for Passive House
	Adders for certain technology (induction stoves, HPHW)	
Federal (45L)	$2,500 for Energy Star	$500 for Energy Star $2,500 for Energy Star + prevailing wage
	$5,000 for Zero Energy Ready	$1,000 for Zero Energy Ready $5,000 for Zero Energy Ready + prevailing wage

Solar incentives:

- 30% federal tax credit through 2032
- 15% state tax credit ($1,000 cap)
- Net metering
- SMART
- No sales tax, no extra property tax on added value to home
- Forthcoming: Solar4All and 0% interest loans

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Specialized vs Stretch Code – Multi-family

Building Type	Fuel Type	Stretch code (July 2024)	Specialized Code
New Multi-family (4+ stories & over 12,000 sf)	All Electric	HERS 45 or TEDI or Passive house	**Passive house**
	Mixed Fuel	HERS 42 or TEDI or Passive house	**Passive house + wiring for electrification**

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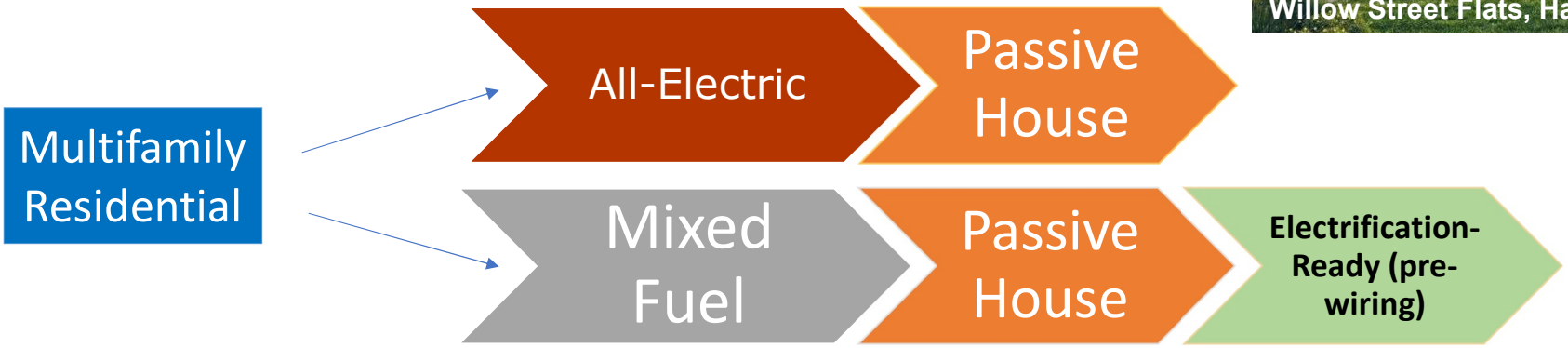
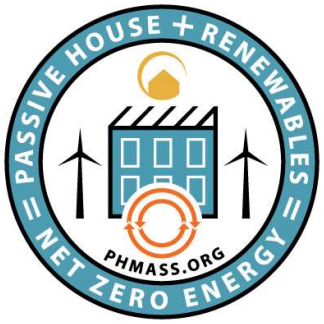
Specialized Code – Residential Building Pathways Summary



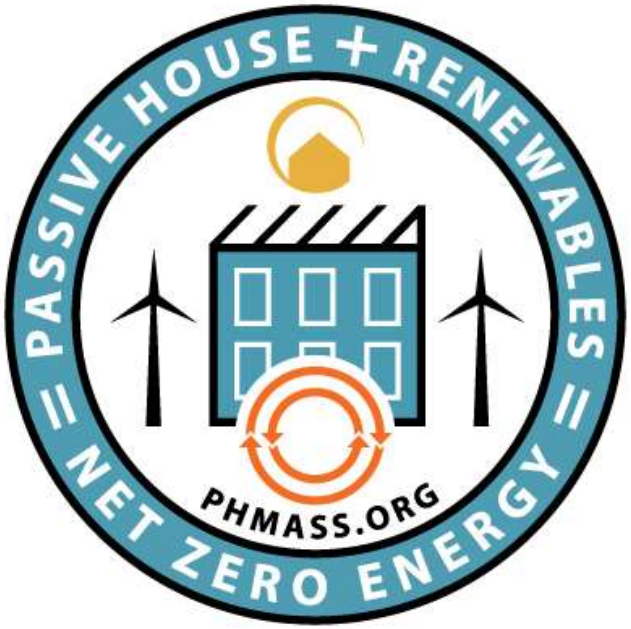
Passive House Building Standards and the MA Building Codes



PASSIVE HOUSE Building Standards and the MA Building Codes

www.PHMass.org

PASSIVEhouse MASSACHUSETTS



Passive House is an Approved Pathway in the New Code

Stretch Code

- Passive House Certification is an optional pathway for both residential and commercial buildings to meet code and is an an alternative to HERS and TEDI pathways

Specialized Opt-In Code

- Passive House Certification is a requirement for multifamily residential buildings over 12,000 sf and remains an optional pathway for all others

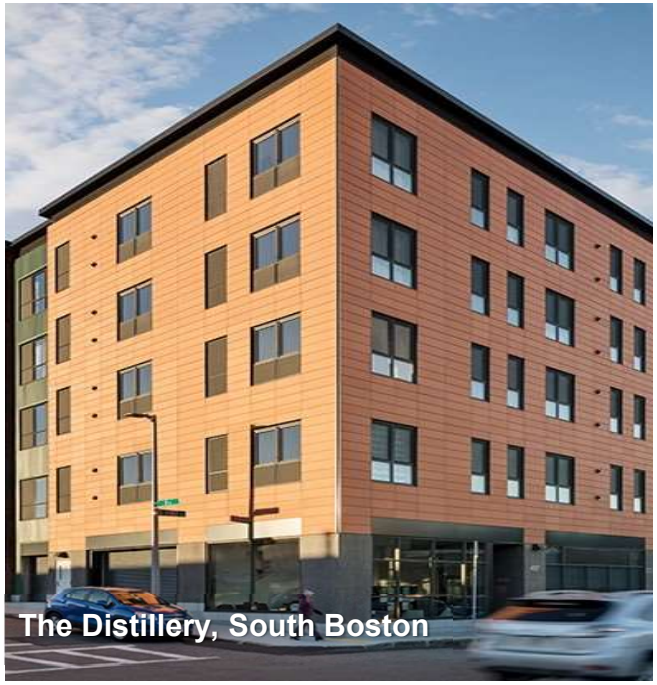
Passive House Building Standards

What is Passive House?

- Passive House is third party building verification program with two options for certification (PHIUS and PHI)
- These certification standards set energy performance and building envelope air-tightness requirements

How do Passive House Buildings Perform?

- Heating loads can be reduced by 90% or more compared to a typical building
- Overall energy demand can be reduced by 60% or more


The Distillery, South Boston

Passive House Building Standards

Passive House's can be any building and any size

- Residential home, townhouse, multifamily building, commercial office, school, municipal building

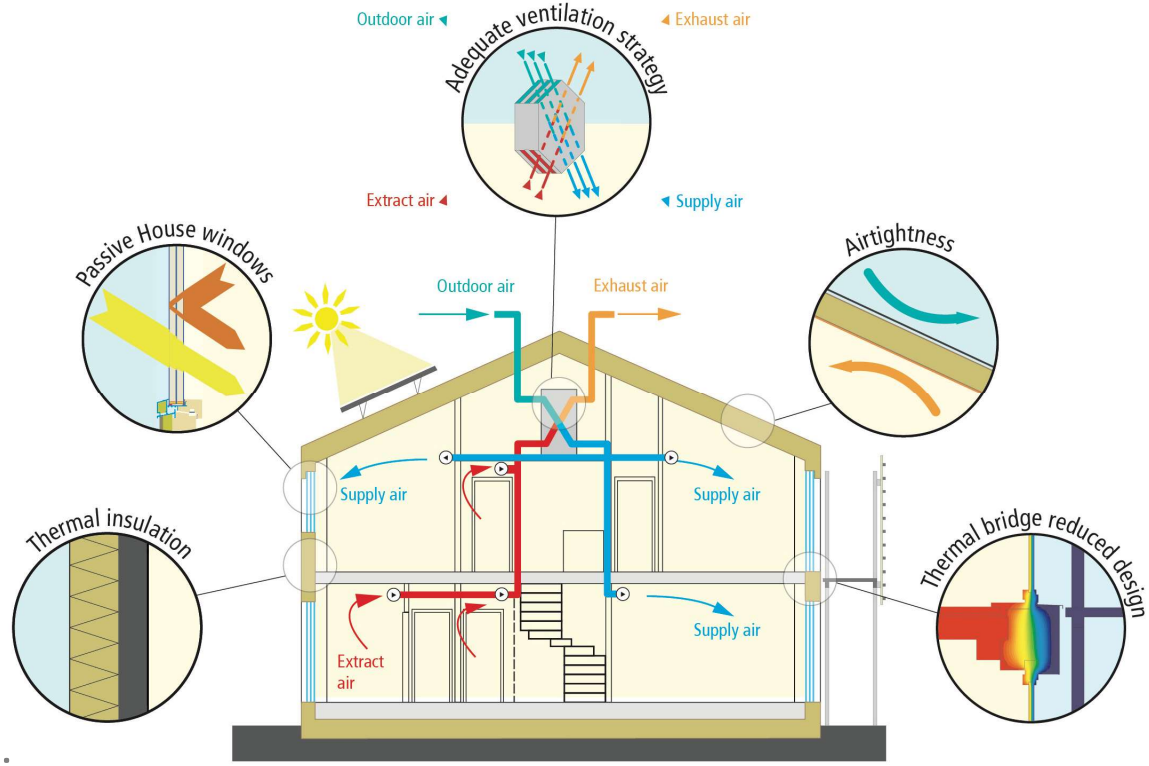
Features of Passive House Buildings

Building Envelope:

- Continuous Thermal Insulation
- Air-Tight Building Envelope
- Thermal Bridge Mitigation
- High-Performance Windows & Doors
- Reduced Radiant Cooling
- Optimized Solar Heat Gain

Mechanical Systems:

- Balanced & Continuous Ventilation with Heat Recovery
- Efficient & Minimized Heating & Cooling
- Efficient Water Heating & Distribution



Passive House Institute, *principles of passive house*

Benefits of Passive House

Financial Benefits

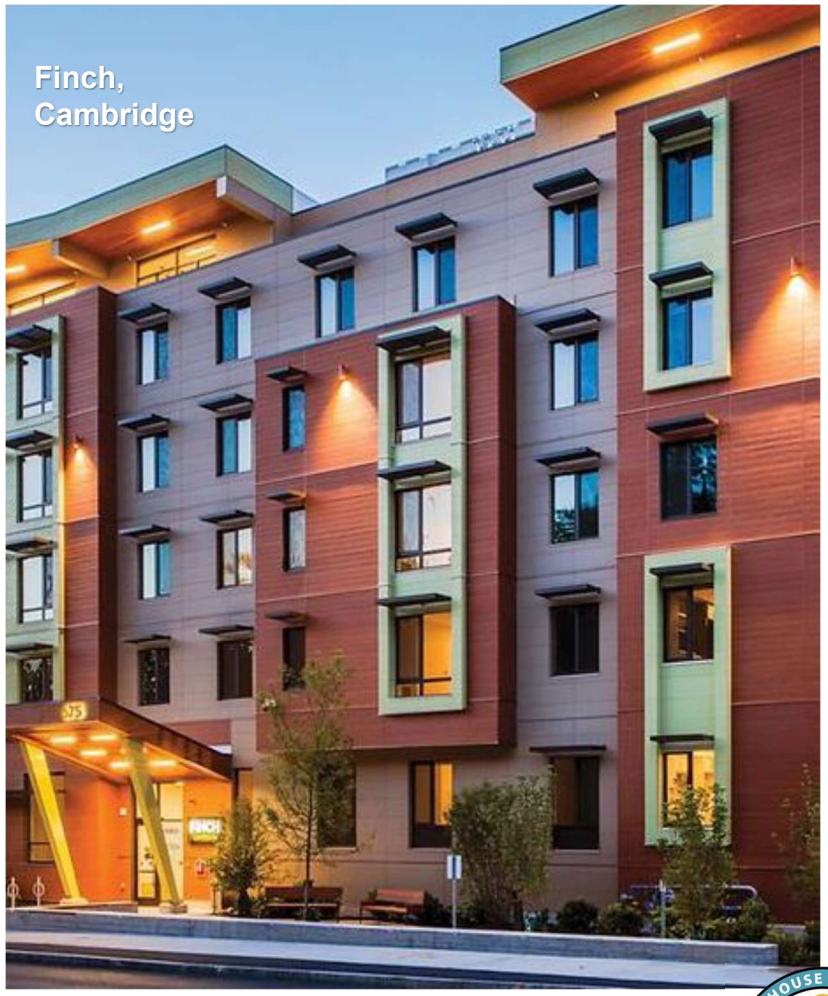
- Predictable, stable, and reduced energy costs
- Smaller and more efficient equipment
- Higher-quality and more valuable asset

Health & Comfort Benefits

- Improved indoor air quality
- Reduced air drafts and consistent temperatures
- Quieter acoustics

Environmental Benefits

- Reduced carbon emissions
- Climate resilient building
- Platform for electrification and net-zero



How Do You Design & Build a Passive House?

Architects and engineers work with certified Passive House consultants to design low energy projects

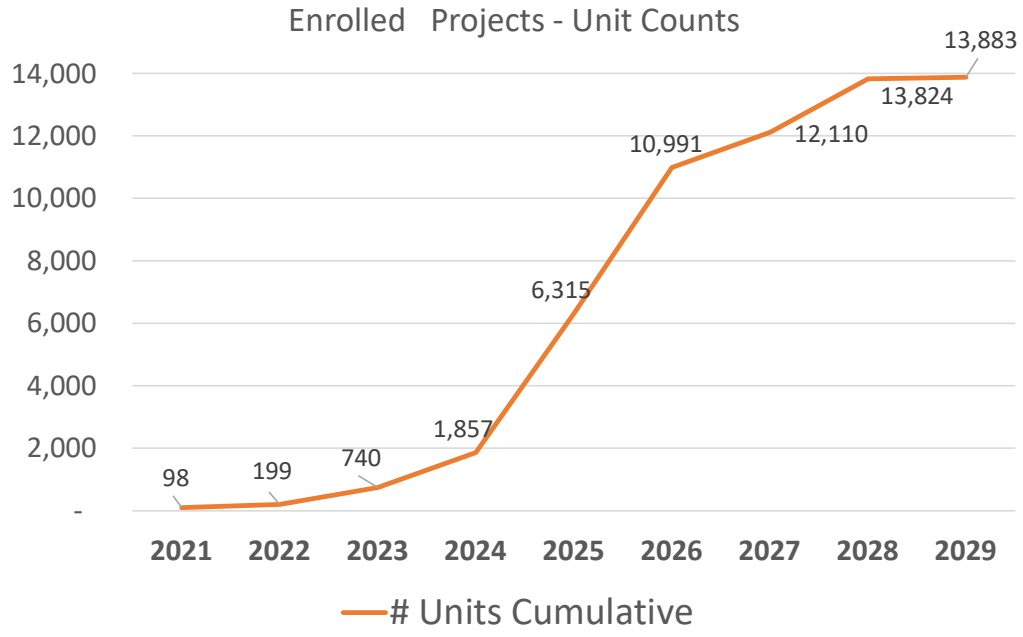
Contractors are supported by Passive House verifiers who inspect, test, and verify performance in the field during construction

Building owners follow a two-step certification process before and after construction requiring energy modeling, design submissions, and post construction inspection reports

Passive House is Scaling Fast for Multifamily Buildings

There are over 15,000 units of multifamily housing pursuing Passive House certification in the state

Over 1/3 of these are categorized as Low-Income projects with the rest as market-rate housing



Mass Save Passive House Incentive Program, 2023 data

Incremental Costs are Low for Multifamily Projects

MASSACHUSETTS CLEAN ENERGY CENTER

Data from MassCEC Passive House Design Challenge

The cost to build to the Passive House standard compared to stretch code construction is 1-4% for actual multifamily projects in Massachusetts

The projects to the left were part of the MassCEC's Passive House Design Challenge issued in 2018, and more recent projects are expected to have an even lower cost premium

Affordable Housing Is Leading the Way

DHCD now gives extra consideration to Passive House projects in their Low Income Housing Tax Credit Funding Program, awarding them bonus points in the Qualified Allocation Plan

Nearly 1/3 of all LIHTC funded projects in 2022 committed to achieving Passive House certification and in the first funding round of 2023, this increased to over *half* of all projects.

The Loop at Mattapan Station, Boston

Mass Save Project Incentives are Available

- Multi-Family buildings with 5+ units
- Certification through PHI or PHIUS
- Provides funding for conducting Feasibility Studies and Energy Modeling services in addition to per-unit incentives

Passive House Incentive Structure for Multi-Family *(5 units or more)*

Incentive Timing	Activity	Incentive Amount	Max. Incentive
Pre-Construction	Feasibility Study	Up to 100% of Feasibility costs	$5,000
	Energy Modeling	75% of Energy Model cost	$500/unit, max. $20,000
	Pre-Certification	$500/unit	N/A
Post-Construction	Certification	$2,500/unit	
	Net Performance Bonus	$0.75/kWh	
		$7.50/therm	

The Net Performance Bonus is calculated by determining the final pay for savings incentives and subtracting the pre- and final certification incentives. The result is the Net Performance Bonus.

Projects that pre-certify but do not achieve certification are eligible for the pre-certification incentive and Net Performance Bonus.

Projects over 100 units must be pre-approved by the applicable Sponsors of M

Mass Save Project Incentives are Available

- Single Family and 2-4 unit buildings
- Homes must be fossil fuel free

Home Type	Level 1	Level 2
Single family	$15,000	$25,000
2-unit dwelling	$17,500	$30,000
3-unit dwelling	$20,000	$35,000
4-unit dwelling	$22,500	$40,000

Component	Level 1	Level 2
Energy savings percentage or HERS Index Score	Savings ≥ 30% or HERS Index Score ≤ 45*	Savings ≥ 50% or HERS Index Score ≤ 35*
Heat pump for space heating†	Required	Required
Heat pump for water heating	Optional	Required
All-electric cookware	Required	Required
Infiltration rate (ACH)	ACH50 ≤ 1.5	ACH50 ≤ 1.0
Balanced ventilation systems (HRVs & ERVs)	Required	Required
Continuous envelope insulation‡	Optional	Required
Electric vehicle-ready checklist	Required	Required

*The HERS Index Score is calculated without factoring in on-site generation.
†Installed air-source heat pumps must be on the Mass Save Heat Pu
Qualified Product List.
‡Level 2 requirement applies to whole home (i.e., slab, slab edg
foundation, exterior walls, and roof assemblies).

Training Opportunities

Mass Save Passive House Training Program

- Offers no-cost Lunch & Learns and Workshops directly to industry firms
- Provides a 50% reimbursement for professional certification courses

Studio for High-Performance Design & Construction

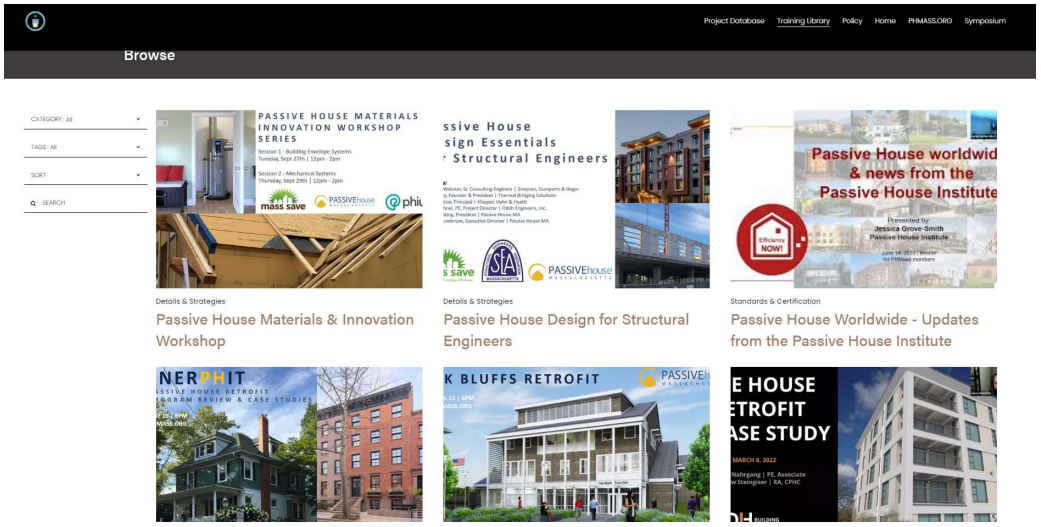
- Provides hands-on workshops for carpenters and trades

Other organization focused on providing industry training on Passive House and high-performance construction include the Northeast Sustainable Energy Association (NESEA), Built Environment Plus (BE+), Boston Society of Architects, Northeast HERS Alliance, and the Builders & Remodelers Association of Greater Boston

Training Opportunities

Passive House Massachusetts

- On-Demand training library of recorded content
- Monthly presentations
- Annual conference
- Professional directory
- Resources and fact-sheets



https://passivehousema.org/video-library

Developing High Performance Homes

AUBURNDALE BUILDERS

SHPDC
STUDIO FOR HIGH - PERFORMANCE DESIGN & CONSTRUCTION

Intro to Auburndale Builders

- We remodeled for 14 years before our first new house build.
- Completed first Passive House in 2016.
- Completed first Net-Positive House in 2017.
- Completed first Net-Zero Remodel in 2018.
- Our team has Completed over 30 All-Electric Projects in the past 8 years. These are a mix of new construction and remodels.
- We are currently teaching High Performance Building for Carpenters through our non-profit Studio HPDC.

AUBURNDALE BUILDERS

Stephanie Horowitz & Mathew Genaze
Architects at Zero Energy Design
Reviewing details with
Zen Saito from AB

Net- Zero with Transportation - meaning the building generates enough electricity to power both the house and the electric vehicles

How We Discovered High Performance Building

BUILDERS AND REMODELERS ASSOCIATION OF GREATER BOSTON

Member NAHB

A former president of BRAGB recommended I join a Builder 20 Club and said it was the best thing he ever did for his company

Builders 20 Club

We learned how to build this way by joining these organizations:

PHIUS.org

NESEA.org

AUBURNDALE BUILDERS

Building to Meet the New MA State Stretch Code Changes (HERS 42/45): What Builders Need to Know

Speakers:

Nick Falkoff
Principal
Auburndale Builders
nick@auburndalebuilders.com

Andrew Popielarski
Senior Home Energy Rater
Home Energy Raters
andrew@energycodehelp.com

Bob Ryley
Director of Construction
Habitat for Humanity
of Cape Cod
bobryley@habitatcapecod.org

nehers.org/ma-stretch-hers-4245-series

(or Google HERS 42/45)

Session 1: Overview Home Performance Summary

Session 2: Orientation, Windows and Doors, and PV

Session 3: Mechanicals, Ventilation, Envelope and Appliances

Session 4: Review/Summary and Questions

Dialing In on Targets

ORIENTATION

WINDOWS/DOORS

PV

MECHANICALS

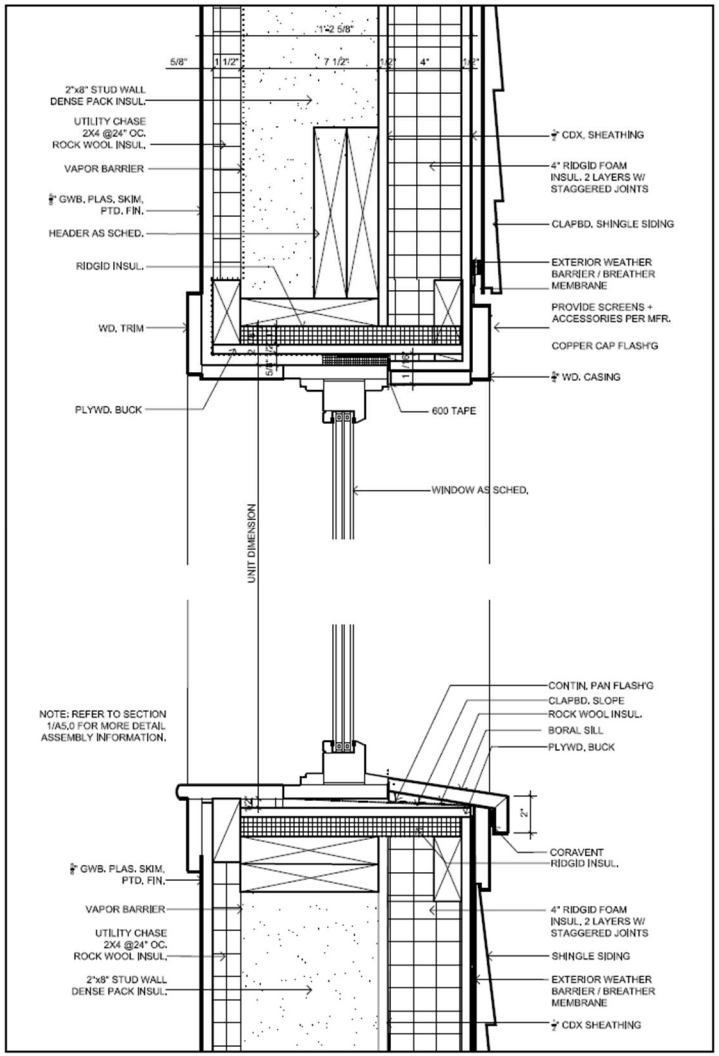
INSULATION

APPLIANCES

Dialing in Wall Assemblies

Here is one wall assembly

- Walls - R - 44 - 2x8 w/ DPC (2) 2” layers reclaimed polyi-iso exterior insulation (R 19) over 2x8 Dense pack cellulose wall (R25)
- Total Above Grade Wall R44
- Roof - R-60 - 2x16” W/DPC Slab - R-17 - Concrete slab + 6” salvaged EPS
- Air barrier to minimize air leakage (Aiming for less than 1 ACH)
- High-performance windows




ZIP System


ZIP System
USG DUROCK

Recommended Workflow to Reduce Risks

Recommended Workflow for HERS 42/45:

1. More check-ins, earlier in **SD/DD/CD *design phases*** before you get to construction.

2. Keep value engineering options open. Do not design your team into a corner that could require expensive corrections to reach your HERS score.

3. Focus on: high efficiency heating/cooling, DHW, ERV/HRV, and windows- making the right decisions with these four items makes the biggest impact on overall HERS rating.

4. Allows builder/architects to play with insulation type and level, which home-owner may not have preferences about.

5. Go through it step by step for non-production builds with your design team. Once you have a formula you can repeat your successes on the next build.

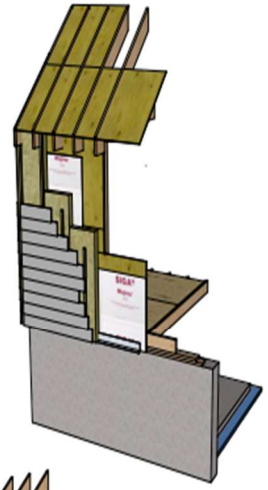
STUDIO FOR HIGH PERFORMANCE DESIGN AND CONSTRUCTION

STUDIO HPDC

This course **helps carpenters prevent and solve problems** on the job and to contribute to successful high-performance construction businesses and projects.

Through hands-on experience constructing mock-up assemblies, working with plans, talking with experts, and collaborating with other building professionals, we will learn the basics of **using high-performance construction to help our companies, clients, and communities thrive**.

#4



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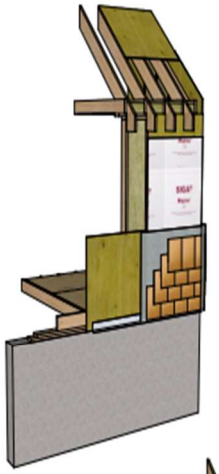

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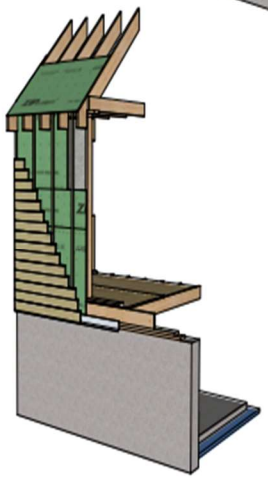

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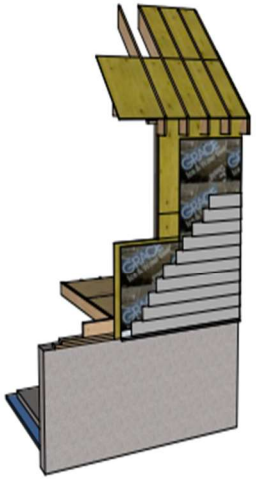
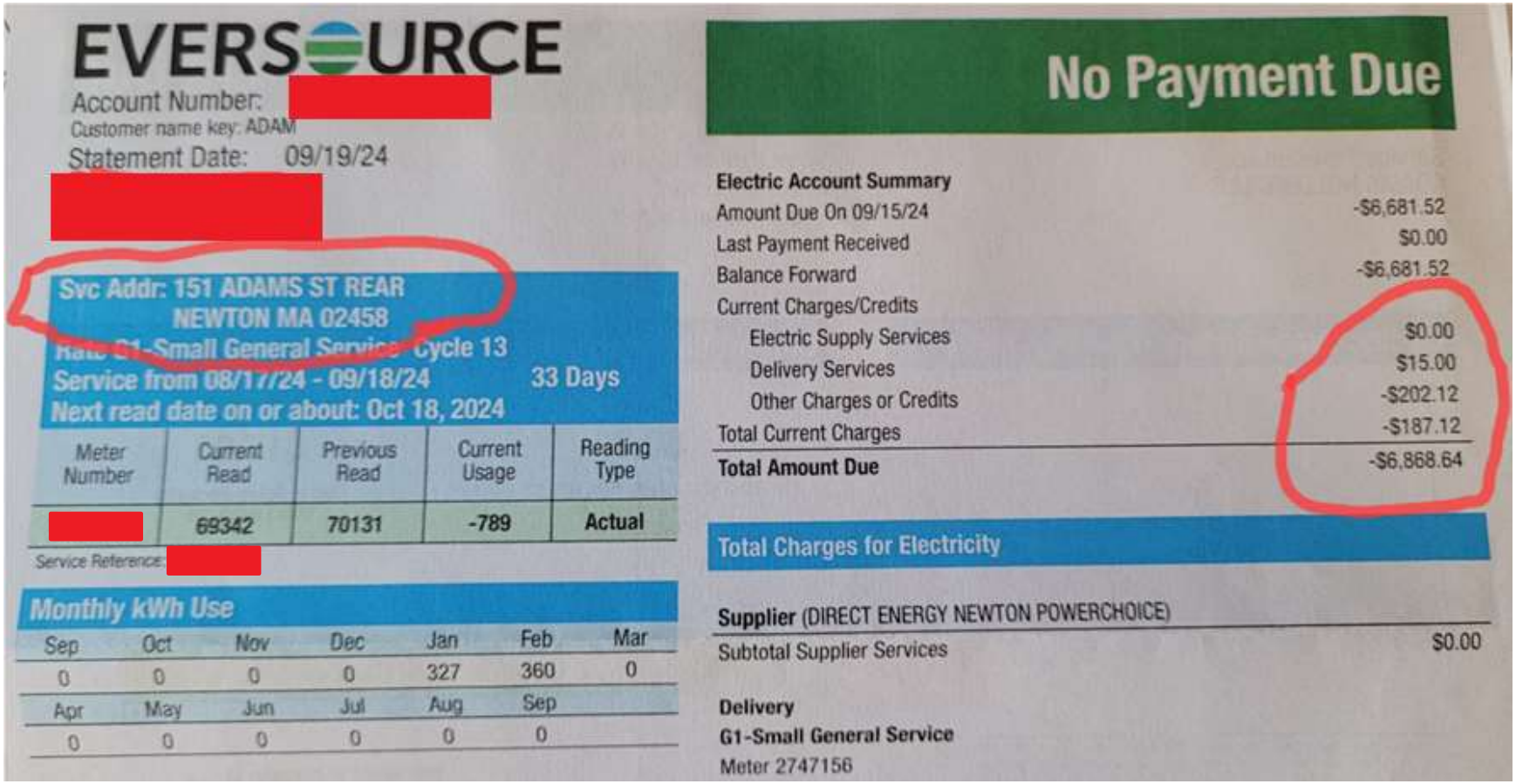


#2	Perspective Illustrations	SHPDC

Higher Performance Building Benefits

1. **Lower operating costs for homeowners and renters**
   - A net-zero all electric house means the occupants have no gas or electric bill for the life of the building.
   - A net-positive building makes more electricity than it uses. This can power electric vehicles.
2. **Better indoor air quality.**
3. **Better thermal comfort** - no drafts through reduced air sealing - and the heating and cooling runs less often
4. **Better resale value in the marketplace - https://www.eeba.org/selling-high-performance-homes.**



EVERSOURCE

Account Number: [redacted]
Customer name key: ADAM
Statement Date: 09/19/24

[redacted]

Svc Addr: 151 ADAMS ST REAR
NEWTON MA 02458
Rate G1-Small General Service Cycle 13
Service from 08/17/24 - 09/18/24 **33 Days**
Next read date on or about: Oct 18, 2024

Meter Number	Current Read	Previous Read	Current Usage	Reading Type
[redacted]	69342	70131	-789	Actual

Service Reference: [redacted]

Monthly kWh Use

Sep	Oct	Nov	Dec	Jan	Feb	Mar
0	0	0	0	327	360	0
Apr	May	Jun	Jul	Aug	Sep	
0	0	0	0	0	0	

No Payment Due

Electric Account Summary

Amount Due On 09/15/24	-$6,681.52
Last Payment Received	$0.00
Balance Forward	-$6,681.52
Current Charges/Credits	
Electric Supply Services	$0.00
Delivery Services	$15.00
Other Charges or Credits	-$202.12
Total Current Charges	-$187.12
Total Amount Due	-$6,868.64

Total Charges for Electricity

Supplier (DIRECT ENERGY NEWTON POWERCHOICE)

Subtotal Supplier Services	$0.00

Delivery
G1-Small General Service
Meter 2747156

Q&A

SPECIALIZED CODE RESOURCES

FraminghamMA.gov /SpecializedCode

- **Background on the Specialized Code**
- **Specialized Code & Stretch Code Comparison Chart**
- **Specialized Code Adoptions**
- **Frequently Asked Questions (FAQ)**

Home › Doing Business › Sustainability › Specialized Opt-In Energy Code

Municipal Specialized Opt-In Energy Code

SPECIALIZED CODE MEETING FOR BUILDING PROFESSIONALS

JOIN US FOR A PRESENTATION AND Q&A SESSION ON THE SPECIALIZED CODE

NOVEMBER 4, 2024 | 7:00 PM

HYBRID MEETING: MAIN LIBRARY ZOOM

IN-PERSON: COSTIN ROOM, MAIN LIBRARY, 49 LEXINGTON STREET
VIRTUAL: REGISTER TO ATTEND OVER ZOOM FRAMINGHAMMA.GOV/SOCMEETING

ABOUT THE MUNICIPAL OPT-IN SPECIALIZED BUILDING ENERGY CODE ("SPECIALIZED CODE")

The Specialized Code is a new energy code option developed in 2022 as a result of the Massachusetts Decarbonization Roadmap Act signed into law in 2021. The Specialized Code is a set of high-performance building energy standards that builds upon the Stretch Code and prioritizes deep energy efficiency, reduced heating loads, and efficient electrification for new construction **with no additional requirements above the Stretch Code for additions, alterations, or renovations.**

Communities can adopt the code to enhance the sustainability of new construction, primarily by requiring buildings that will be utilizing fossil fuels to be pre-wired for future full-building electrification and to install solar PV systems in most cases. If adopted in Framingham, the Specialized Code would advance net-zero building energy performance and incentivize—but not require—all-electric new construction consistent with state and local emissions targets. If adopted in Framingham, the Specialized Code would advance net-zero building energy performance and incentivize—**but not require**—all-electric new construction consistent with state and local emissions targets.

Watch the video here for an overview of the Specialized Code presented by Green Communities Coordinator, Dillan Patel on April 10, 2024.

Supplemental information

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Accessory Dwelling Units

ADUs (Accessory Dwelling units) Because these are dwelling units it means that a HERS rating can be conducted on an ADU. This is helpful because then if an addition or an alteration to an existing home is big enough to trigger the HERS rating requirement (ie. Over 1,000sf addition or change of use, or over 1,000 sf and over 50% of existing conditioned floor area for an alteration to an existing home.) then the HERS rating can be done on just the ADU, and it can be clearly separated from the original residential dwelling unit.

ADUs can be either additions – if they are physically connected to the existing building, or new construction – if they are standalone buildings. That new construction vs addition question is down to the physical design and that is based on IRC language that has been in place for decades, not the IECC deciding the difference between new construction and additions.

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Specialized Code – Commercial Building Pathways

Commercial Building Types

- All-Electric → Stretch code
- Passive House → Stretch code → Electrification-ready (pre-wiring)
- Mixed fuel → Stretch code → Electrification-ready (pre-wiring) → On-site solar (where feasible)

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Massachusetts Department of Energy Resources

Specialized vs Stretch code – what's different?
Commercial Buildings

Building Type	Fuel Type	Stretch code (July 2024)	Specialized Code
Schools, Offices, Municipal buildings	All Electric	TEDI or Passive house	
	Mixed Fuel	TEDI or Passive house	TEDI **+ Solar PV** or Passive house **+ wiring for electrification**
Other Commercial (over 20,000 sf)	All Electric	ASHRAE or TEDI or Passive house	
	Mixed Fuel	ASHRAE or TEDI or Passive house	ASHRAE **+ Solar** or TEDI **+ Solar** or Passive house **+ wiring for electrification**

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Massachusetts Department of Energy Resources

Thermal Energy Demand Intensity (TEDI)

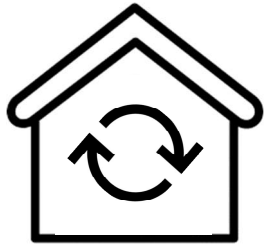
Stretch code now directly regulates heating and cooling demand for office, municipal buildings, schools, and residential buildings:

Heating TEDI

*Total annual energy **delivered to** the building for space conditioning and conditioning of ventilation air, normalized by area (kBtu/sf-yr)*

Cooling TEDI

*Total annual energy **removed from** the building for space conditioning and conditioning of ventilation air, normalized by area (kBtu/sf-yr)*



Important: even though they have the same units, TEDI is not the same as energy use intensity (EUI)
TEDI is demand while EUI is consumption

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Specialized Commercial Code: Solar PV Sizing

CC105.2 On-site renewable energy. New mixed-fuel buildings shall have equipment installed for on-site renewable energy with a rated capacity of not less than 1.5 W/ft² (16.1 W/m²) multiplied by the sum of the gross conditioned floor area of the three largest floors.

Exception: Where the building site cannot meet the requirement in full with an on-site renewable energy system, the building site shall install a partial system designed to utilize not less than 75% of the *Potential Solar Zone Area*.

Examples of Solar PV size:

- 4 story 200,000 sf High school: 160,000 sf on 3 largest floors

  Min. Solar = 1.5 x 160,000 = 240 kW system

- 3 story 80,000 sf Office

  Min. Solar = 1.5 x 80,000 = 120 kW system

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What about the grid?

Our 2021 study team (below) found the following:

- The same or lower peak electric use for most building types
- Modest peak electric increases in residential
- Across Massachusetts: about 5% increase in peak electric
- Key is demand reduction, which is key priority in new code

What happens to the grid when we "electrify everything"

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

CONSIGLI Est. 1905 BRA+ BURO HAPPOLD Steven Winter Associates Inc nbi

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Comparing the Stretch Code to the Base Code

HERS Index

52 Base | **42** Stretch

Electric Heat Pump

2030 Annual Greenhouse Gas

1.19 Stretch Tons | 4.43 Tons Saved

CO_2

Home Details

- 4000 sq.ft.
- Large Single Family
- 5 Bedrooms
- Worcester, MA

DOER Massachusetts Department of Energy Resources

PERFORMANCE SYSTEMS DEVELOPMENT

MA 10th Edition Building Code | 2023

Large Single Family - Electric

Costs and Benefits to Meet Stretch Code

	COSTS		BENEFITS	NET
BUILDER	-$3,062 Total Adjustments		$17,000 Rebates & Tax Rebates[1]	-$20,062 Cost Compared to Base Code
HOME BUYER	-$4,013 Change to Downpayment[3]	-$873 Change to Annual Mortgage Payment[3]	-$325 Estimated Energy Cost Savings per Year[2]	-$548 Buyer Annual Net

1. Rebates are calculated on a per unit basis, using Mass Save® residential new home construction incentives & Tax credit allows for up to $2,000 for new homes independently rated below HERS 50.
2. Energy costs are based on 22 cents/kWh, $1.53/therm, and $3.09/gal propane
3. 30-year mortgage assumes 10% down payment at 4% APR
4. In addition to the Mass Save® rebates, HERS Rated homes are eligible for the $2,000/unit residential builder energy efficiency tax credit under section 1332, Credit for Construction of New Energy Efficient Homes, of the Energy Policy Act of 2005

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Resources

Stay in touch

Sign up for DOER energy code email updates:
https://app.e2ma.net/app2/audience/signup/1965182/1356542/
Code language, case studies, detailed technical information here:
https://www.mass.gov/info-details/stretch-energy-code-development-2022
Local vote coming up? Contact your local Green Communities Coordinator
https://www.mass.gov/service-details/contact-gc-coordinator

Energy Code Training (free via Mass Save®)
https://www.masssave.com/en/learn/partners/energy-code-training-and-events
Contractor Training
https://www.masssave.com/en/saving/residential-rebates/passive-house-training