# **Specialized Stretch Energy Code**

**Public Educational Forum** 

March 1, 2023



# Why We're Here

- Clean Energy Future Committee (CEFC) & Town Manager have introduced Warrant Article 10 to see if Town Meeting will vote to adopt the Specialized Stretch Energy Code, or Specialized Code
- Meeting Objectives:
  - 1. Review what the Specialized Code is and how it relates to Arlington's climate goals
  - 2. Highlight key components of the Specialized Code and how they would affect Arlington
  - 3. Provide an opportunity to ask questions of experts



# Agenda

- Introduction
- Overview of Specialized Stretch Energy Code
- Key Provisions & Local Impacts
  - Large Homes
  - Pause for questions
  - Passive House & Multifamily Projects
  - Pre-wiring & On-Site Solar
- Open Question & Answer



# Materials and resources will be available following the meeting

- We are recording the meeting
- Slides and recording will be available following the meeting, along with other resources, on the Clean Energy Future Committee website: <u>https://www.arlingtonma.gov/town-governance/boardsand-committees/clean-energy-future-committee</u>



# **Zoom Protocols & Reminders**



## Comments and questions are welcome

in the chat, but we will respond only during the designated Q&A times.

We may not be able to respond to all questions or comments during the meeting.



To ask a question during the designated Q&A times, either:

**1) Raise your hand** using the Zoom Reactions button; OR

**2) Type your question** into the chat.



Stay curious and be mindful.

Be kind to presenters, staff, and participants.

Please remain muted unless you have been called on to ask a question.



# Introduction



### 2010

Town Meeting adopts Stretch Code

Arlington receives Green Communities Designation; ~\$2M in grants since 2010

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Act Creating Next Generation Roadmap for MA Climate Policy



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#### 2022

Town Meeting passes Article 73 Resolution: A True Net Zero Opt-In Code for Cities & Towns

DOER completes Stretch Code updates, develops Specialized Code

Act Driving Clean Energy & Offshore Wind creates Fossil Fuel Free Demo Project

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#### 2023

Stretch Code Update takes effect for residential buildings

CEFC & Town Manager bring Article 10 to adopt Specialized Code to Town Meeting for vote



# Net Zero Action Plan (NZAP) Priority

- Roadmap to net zero greenhouse gas (GHG) emissions by 2050
- Key strategy is electrification of buildings and vehicles to facilitate clean energy transition
- Priority measure: "Advocate...for a state net zero energy stretch code" (what eventually became the Specialized Stretch Code)
- Metric of success is Town adoption of Specialized Stretch Code





# Specialized Code & Fossil Fuel Free Demonstration Project

- MA legislature has not approved clean heat Home Rule Petitions; instead, it created a 10-municipality Fossil Fuel Free Demonstration Project through 2022 Act Driving Clean Energy & Offshore Wind
- DOER draft regulation and model rule suggest that adoption of the Specialized Code may be a key step for participation in Fossil Fuel Free Demonstration Project



https://www.mass.gov/info-details/municipal-fossil-fuel-free-building-demonstration-program

# **Potential Specialized Stretch Code Timeline in Arlington**





# **Overview of Specialized Stretch Energy Code**



### What are building codes?







### MA emissions reduction limits per Global Warming Solutions Act (2008)

**\$50%** Reduction by 2030 (compared to 1990 levels) **75%** Reduction by 2040 (compared to 1990 levels) **Net GHG Emissions** by 2050



### Opt-In Specialized Code Summary

### **1** Pre-Wiring

Buildings using fossil fuels must pre-wire for future electrification.

### 2 Solar PV

Buildings using fossil fuels must install a certain amount of rooftop solar PV.

### **3** Exemplary Performance for Large Homes

<u>If using fossil fuels</u>, single-family homes > 4,000 SF must be certified Zero Energy (HERS 0 or Phius ZERO).

### **4** Exemplary Performance for Large Multi-Family

Multi-Family buildings >12,000 SF must use the Passive House pathway.

### **5** Jump on Lower HERS Ratings

Lower HERS ratings of 42/45 upon effective date of adoption (instead of July 1, 2024).

### RESIDENTIAL Updated Stretch vs Municipal Opt-In Specialized Code

#### Comparison of updated Stretch and Municipal Opt-in Specialized Energy Codes for New Low-rise Residential Buildings<sup>1</sup>

		Minimum Efficiency		Electrification			Renewable Generation	
Building Size	Fuel Type	Stretch Code	Specialized Opt-in Code	Stretch Code	Specialized Opt-in Code	Minimum EV Wiring	Stretch Code	Specialized Opt-in Code
5	<i>·</i>	HERS 45 <sup>2</sup> or	HERS 45 or					
Dwelling units		Passive House	Passive House					
up to 4,000 sf	All-electric	pathways	pathways	Full	Full	1 parking space	Optional	Optional
		HERS 42 <sup>2</sup> or	HERS 42 or					Solar PV: ≥4 kW for single family and ≥0.75 W/sf for multi-family (except
Dwelling units		Passive House	Passive House		Pre-wiring			shaded sites and Passive
up to 4,000 sf	Mixed-fuels	pathways	pathways	Optional	required	1 parking space	Optional	House certified buildings)
Dwelling units	All-electric	HERS 45 <sup>2</sup> or Passive House	HERS 45 or Passive House	Eull	Full	1 parking space	Ontional	Ontional
24,000 31		HERS 42 <sup>2</sup> or						Solar PV or other renewables to meet the
Dwelling units		Passive House	HERS 0 or Phius		Pre-wiring			Zero energy building
>4,000 sf	Mixed-fuels	pathways	ZERO	Optional	required	1 parking space	Optional	definition

Credit: Town of Wellesley Town of Arlington Specialized Stretch Code Webinar

### COMMERCIAL Updated Stretch vs Municipal Opt-In Specialized Code

Comparison of updated Stretch and Municipal Opt-in					pt-in Specialized Energy Codes for New Commercial Buildings <sup>1</sup>				
		Minimum Efficiency Pathway		Electrification			Renewable Generation		
Building Type	Fuel Type	Stretch Code	Specialized Opt-in Code	Stretch Code	Specialized Opt-in Code	Minimum EV Wiring	Stretch Code	Specialized Opt-in Code	
Offices and Schools >20,000 sf	All Electric	Thermal Energy Demand Intensity (TEDI) or Passive House pathways	Thermal Energy Demand Intensity (TEDI) or Passive House pathways	Full	Full	20% of parking spaces for residential and business uses, 10% for other uses	Optional	Optional	
Offices and Schools >20,000 sf	Mixed-fuels	TEDI or Passive House pathways	TEDI or Passive House pathways	Optional <sup>5</sup>	Pre-wiring required	20% of parking spaces for residential and business uses, 10% for other uses	Optional	On-site solar PV: Minimum of 1.5W/sf for each sq foot of the 3 largest floors <u>or</u> 75% of Potential Solar Zone Area	
High Ventilation (Hospitals, Labs, etc.)	All Electric	TEDI, 10% better than 2019 ASHRAE Appendix G, or Passive House pathways	TEDI, 10% better than 2019 ASHRAE Appendix G, or Passive House pathways	Full	Full	20% of parking spaces for residential and business uses, 10% for other uses	Optional	Optional	
High Ventilation (Hospitals, Labs, etc.)	Mixed-fuels	TEDI, 10% better than 2019 ASHRAE Appendix G <sup>4</sup> , or Passive House pathways	TEDI, 10% better than 2019 ASHRAE Appendix G <sup>4</sup> , or Passive House pathways	Optional <sup>4,5</sup>	Pre-wiring required	20% of parking spaces for residential and business uses, 10% for other uses	Optional	On-site solar PV: Minimum of 1.5W/sf for each sq foot of the 3 largest floors <u>or</u> 75% of Potential Solar Zone Area	
Multi-family >12,000 sf	All Electric	TEDI, HERS 45 <sup>2</sup> , Passive House pathways, or (until July 1, 2024) 10% better than ASHRAE Appendix G	Passive House pathways or HERS 0 <sup>3</sup>	Full	Full	20% of parking spaces	Optional	Optional	
Multi-family >12,000 sf	Mixed-fuels	TEDI, HERS 42 <sup>2</sup> , Passive House pathways, or (until July 1, 2024) 10% better than ASHRAE Appendix G	Passive House pathways or HERS 0 <sup>3</sup>	Optional <sup>5</sup>	Pre-wiring required	20% of parking spaces	Optional	Optional with Passive House	
Small Commercial (<20,000 sf, except multi-family)	All Electric	Prescriptive pathway plus Stretch Code amendments	Prescriptive pathway plus Stretch Code amendments	Full	Full	20% of parking spaces for residential and business uses, 10% for other uses	Optional	Optional	
Small Commercial (<20,000 sf, except multi-family)	Mixed-fuels	Prescriptive pathway plus Stretch Code amendments	Prescriptive pathway plus Stretch Code amendments	Optional <sup>5</sup>	Pre-wiring required	20% of parking spaces for residential and business uses, 10% for other uses	Optional	On-site solar PV: Minimum of 1.5W/sf for each sq foot of the 3 largest floors <u>or</u> 75% of Potential Solar Zone Area	

Credit: Town of Wellesley Town of Arlington Specialized Stretch Code Webinar

# Key Provisions & Local Impacts Large Homes





# Houses Large and Small

### Low Rise Residential: 3 Paths to Compliance

- All-Electric: HERS 45 or Passive House. **DOER anticipates this will be the most used compliance pathway**.
- Mixed-Fuel:
  - HERS 42 + Electric Ready + On-Site Solar Where Feasible

OR

- Passive House + Electric Ready
- Zero Energy
  - HERS 0 (HERS 42+ On-Site Renewable to Completely Offset both Electric & Fossil Fuel Usage.)
    OR
  - Passive House (Phius Zero) (Phius Core Standard + Offsetting Renewables (which may be onsite or offsite))
- Homes over 4,000 conditioned square feet (csf) must be all-electric or zero energy! Mixed-Fuel Pathway Not Allowed.

# The provision on large houses will have a significant impact in Arlington.

- The requirement that homes > 4,000 sf must either be all electric or a zero-energy building will apply to many if not most new single-family houses constructed in Arlington.
- The code defines "all-electric" rigorously to include HVAC, service hot water, & appliances (including stoves). It does not include things like emergency generators.
- The standards for showing a Zero Energy building are also strict.
  - Precertification of Compliance with PHIUS ZERO performance standard.
  - Achieve HERS Zero, which requires meeting the HERS score required by the updated Stretch Code and then making up gap to zero by solar or another form of on-site generation.
- BOTTOM LINE: BIG HOUSES IN ARLINGTON WILL BE (MORE) CLIMATE FRIENDLY

### New Houses in Arlington Are Big & Getting Bigger

- By finished square footage, median size of new (singlefamily) construction is now about 4,000 sf.
- Median house size has been steadily increasing for two decades.



# Data from 2022\* Show 50% All-Electric Homes and about 70% of single-family homes exceeding 4,000 csf.

- 24 new dwelling units (single family and duplex) were built in Arlington in 2022.
- 12 of these were new, all-electric homes (2 had HERS < 45)
- 12 were new mixed-fuel homes (2 had HERS < 42)
- 7 of these units were more than 4,000 conditioned sf.
- None of these were Passive House homes.

### The Large House Rule: A First Step



- Under the Specialized Code, Large houses (>4,000 csf) must either electrify or go net zero energy. This is a powerful incentive to electrify.
- The rule will apply to more and more houses as house size increases.
- The next step would be to apply the same rule to smaller houses.
- Over time, this could lead to nearly universal electrification of new low-density housing construction.
- This, however, is for

### **ANOTHER DAY**



# **Pause for Questions**



## Key Provisions & Local Impacts Passive House & Multifamily Projects



## The Specialized Code requires that new, multifamily buildings over 12,000 SF be designed to the Passive House Standard

 In Arlington, 1-2 new buildings over 12,000 SF are constructed per year, on average\*



\*Data from building permits pulled Jan 2018 through March 2023

# PASSIVE HOUSE Building Standard

Aaron Gunderson Exec. Director, PHMass www.PHMass.org Aaron@PassiveHouseMA.org Twitter @PassiveHouseMA







Passive House is a **performance-based** building standard that focuses on the dramatic **reduction of energy use**, while ensuring a comfortable, healthy, and low-carbon building.

A Passive House can be **any building type** – home, office, school, etc. and any size.



### **Benefits of Passive House**

### **Financial Benefits**

- Reduced energy costs
- Reduced maintenance costs
- Climate resilient construction

### **Health & Comfort Benefits**

- Improved indoor air quality
- Consistent temperature
- Quieter acoustics

### **Environmental Benefits**

- Reduced carbon emissions
- Climate resilient building
- Focus on embodied carbon



### **Features of Passive House Buildings**

### **Building Envelope:**

- Exterior Thermal Insulation
- Continuous Air-Barrier
- Thermal Bridge Mitigation
- High-Performance Windows & Doors
- Optimized Solar Heat Gain

### **Mechanical Systems:**

- Balanced Ventilation with Heat Recovery
- Efficient and Minimized Heating/Cooling
- Efficient Water Heater



### **Passive House Multifamily is Scaling**

GAS

Enrolled Projects - Unit Counts



mass save

### **Incremental Costs are Low for Multifamily Projects**





Data from MassCEC Passive House Design Challenge

### Mass Save Passive House Incentives are Available

- Multi-Family buildings with 5+ units
- Certification through PHI or PHIUS



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

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

### **Training Opportunities**

### Mass Save All-Electric Homes & Passive House Training Program

Lunch and Learns		Building Science Workshops		
Target Audience: Architects, builders, contractors, designers engineers, financing agencies, and municipal officials	s, developers,	Target Audience: Architects, builders, developers, engineers, estimators, general contractors, project teams, and sub-contractors		
For developers and general contracting firms that need a high introduction to Passive House standards, development costs	h-level , project delivery,	Covering building science best practices, quality assurance, and more		
and more These 1–2 hour events are presented at no cost to participant Continuing Education Unit (CEU)-eligible for Passive House of	s and is credentials	These half-day training events are presented at no cost to participants and is Continuing Education Unit (CEU)-eligible for Passive House credentials		
	Passive H	Iouse Accreditations		
Target Audio tradespeopl	ence: Passive House bu e, and verifiers	uilders, consultants, designers, raters,		
Offer 50% co certification	ost reimbursement to p 1.	participants upon successful completion of		
Requires sul	bmission of <u>reimburse</u>	ement application.		
Training tim participants	ne varies based on the t s per company per trair	training course selected; limit two ning course.		

https://www.masssave.com/en/saving/residential-rebates/passive-house-training

# **Passive House**

### Principles



### Benefits

#### **Health and Comfort:**

- Superior thermal comfort
- Exceptional indoor air quality
- Better sound isolation
- Resilience during loss of power

#### **Operations and Maintenance:**

- Lower operational costs
- Right-sized MEP systems
- Quality assurance and durability

#### Soft benefits:

- Improved marketability (and competitiveness in affordable QAP process)
- Simplified stretch energy code compliance
- Access to incentives

# **Passive House at Utile**



**152-158 Broadway** Somerville, MA | 45 Units PHIUS Pre-certified, In Construction



Front St. Portland, ME | 100 Units PHIUS Pre-certified, In Construction



**3371 Washington St.** Boston, MA | 39 Units In Design, PHIUS-Registered



**1200 Montello** Brockton, MA | 94 Units In Design, PHIUS-Registered



**25 Sixth St.** Chelsea, MA | 62 Units PHIUS Pre-certified



**1599 Columbus Ave.** Boston, MA | 65 Units PHIUS Pre-certified



Walnut St. Housing Foxborough, MA | 282 Units PHIUS Pre-certified



**1005 Broadway** Chelsea, MA | 38 Units PHIUS Pre-certified, In Construction

### 3371 Washington Street, Boston



### 154 Broadway, Somerville





## Passive House in Arlington: Housing Corporation of Arlington



# Key Provisions & Local Impacts Pre-wiring & On-Site Solar



# **Pre-wiring and solar requirements**

- Required for projects following the mixed-fuel\* pathway,
  i.e., that will use fossil fuels
- **Solar**: Helps offset impacts of fossil fuel use
- **Pre-wiring**: Facilitates / lowers cost of future electrification ("an ounce of prevention...")
- Maximizing solar energy and building electrification are two key strategies for meeting Arlington's 2050 net zero goal



\* "Mixed-fuel" means any use of fossil fuels for space heating, water heating, or other appliances.

# Solar requirements by building type WITH MIXED FUEL

	<b>Building Type</b>	(WITH MIXED FUEL)	Solar Requirement	Notes
L∘ R (≤	low rico	Dwelling units <4,000 sf	<ul><li>≥4kW for single family</li><li>≥0.75W/sf</li><li>for multifamily</li></ul>	Exemptions: Shaded sites (viable areas shaded >70% daylight
	Residential (≤3 stories)	Dwelling units >4,000 sf	Solar PV or other renewables sufficient for zero energy	hours); Passive House certified, buildings where the Potential Solar Zone Area is <300 sf
	Multifamily	Buildings >12,000 sf	N/A – optional*	Must pursue Passive House
	Commercial	Small commercial, offices / schools, high ventilation	≥1.5W/sf for each sq foot of 3 largest floors <u>or</u> 75% of Potential Solar Zone Area	Excludes multifamily buildings*

\*except projects undergoing Environmental Design Review which, per Arlington's Zoning Bylaw, must install solar on at least 50% of the roof area



# "Potential Solar Zone Area"

- Flat and/or low-sloped roofs oriented 90-300° of true north (south/southwest) where annual solar access is ≥70%
- Shading from obstructions on the roof or other parts of the building not included in determining solar access





# Pre-wiring is required for all mixedfuel projects

- What does pre-wiring mean...
  - Sufficient capacity for future electricity use load calculations must assume future electrification
  - Dedicated circuits and plugs installed near fossil fuel equipment for future installation of electric equipment
- 200-amp service likely sufficient (depends on load)











### Frequently Asked Questions

### **1** Does the Opt-In Specialized Code apply to existing structures?

**No**. Improvements to existing structures, depending on size, are regulated by the Updated Stretch Code and Base Code.

# **2** Will the Opt-In-Specialized Code discourage the creation of affordable housing?

**No.** Incentives will continue to encourage affordable housing while the Opt-In Specialized Code delivers benefits for residents.

### **3** Is it possible to install a gas cooktop?

Yes. This is permitted under the Mixed Fuel pathways.

### **4** Why adopt the Opt-In Specialized Code?

**The #1 reason is that it requires pre-wiring**, avoiding costly retrofits down the road and expediting electrification.

### **5** Why does the Opt-In Specialized Code permit fossil fuels?

**It preserves market choice** at a time when utility pricing is highly volatile and utility costs vary 300% among MA communities. "Net zero" definitions vary widely.

# Resources

### NEEP FAQ & Comparative Tables

https://neep.org/ma-updated-stretch-code-municipal-opt-specialized-code-faq https://neep.org/resources

### **BSA Critical Stretch Code Series**

https://www.architects.org/events/558258/2023/01/20/ doer-critical-stretch-code-series

### **DOER Summary Documents**

https://www.mass.gov/doc/summary-document-explaining-stretchenergy-code-and-specialized-opt-in-code-language/download

### **Community Presentations**

https://www.wellesleyma.gov/317/Advisory-Committee Hit PLAY at 1:29

omparison Chart					
	UPDATED STRET	CH CODE	MUNICIPAL OPT-IN ST	RETCH CODE	
	RESIDENTIA	LLOW-RISE			
	Fossil Fuel		<4000 sf - Mixed Fuel*	HERS 42	
R406.5 Maximum Energy Rating	Solar	HERS 42	<4000 sf - All-Electric	HERS 45	
Index (HERS Index) 1	All-Electric		>4000 sf - Mixed Fuel*	HERS O	
	Solar & All-Electric	HERS 45	>4000 sf - All-Electric	HERS 45	
R405 - Passive House Building Certification Pathway <sup>2</sup>	Passive House	PHIUS CORE, PHIUS ZERO, or PHI	All Building Sizes	PHIUS CORE PHIUS ZERC OF PHI	
R403.6.1 Mechanical Ventilation <sup>2</sup>	ERV/HRV for Ventilation		ERV/HRV for Ventilation		
R404.4 - EV Ready Parking Spaces <sup>2</sup>	1 EV Ready Sp	ace	1 EV Ready Sp	ace	
	EXISTING I	BUILDINGS			
	Fossil Fuel	HERS 52	Fossil Fuel	HERS 52	
and a sub-ordered	Solar		Solar	HERS 55	
RSUS.1.5 Alterations	All-Electric	MERS 55	All-Electric		
	Solar & All-Electric	HERS 58	Solar & All-Electric	HERS 58	
	MULTI-	FAMILY			
	Fossil Fuel	HERE 43	Nasa		
R406 Maximum Energy Rating Index	Solar	HERS 42			
(HERS Index) 1	All-Electric		None		
	Solar & All-Electric	HER343			
R405 - Passive House Building Certification Pathway <sup>2</sup>	Passive House	PHIUS CORE, PHIUS ZERO, or PHI	>12,000 sf Mixed Fuel >12,000 sf All Electric	PHIUS COR or PHI	
R403.6.1 Mechanical Ventilation <sup>2</sup>	ERV/HRV for Ven	//HRV for Ventilation ERV/HRV for Vent		ilation	
R404.4 - EV Ready Parking Spaces 2	20% of Spaces EV Ready		20% of Spaces EV Ready		

1. Impacts buildings permitted on or after July 1, 2024 for Updated Stretch Code

2. Impacts buildings permitted on or after January 1, 2023 for Updated Stretch Code

\* Municipal Opt-In Stretch Code requirements only take effect after adoption, with a recommended 6 month waiting period

