

THE PROPOSED HIGH EFFICIENCY BUILDING ENERGY CODE IN WORCESTER, MA

Municipal Opt-in Specialized Energy Code

Wednesday, August 2, 2023

Public Presenting by John Odell, Chief of Department of Sustainability & Resilience



Agenda

- Climate Change and Worcester
- Building Energy Code Overview
- Proposed Adoption of the Specialized Stretch Code



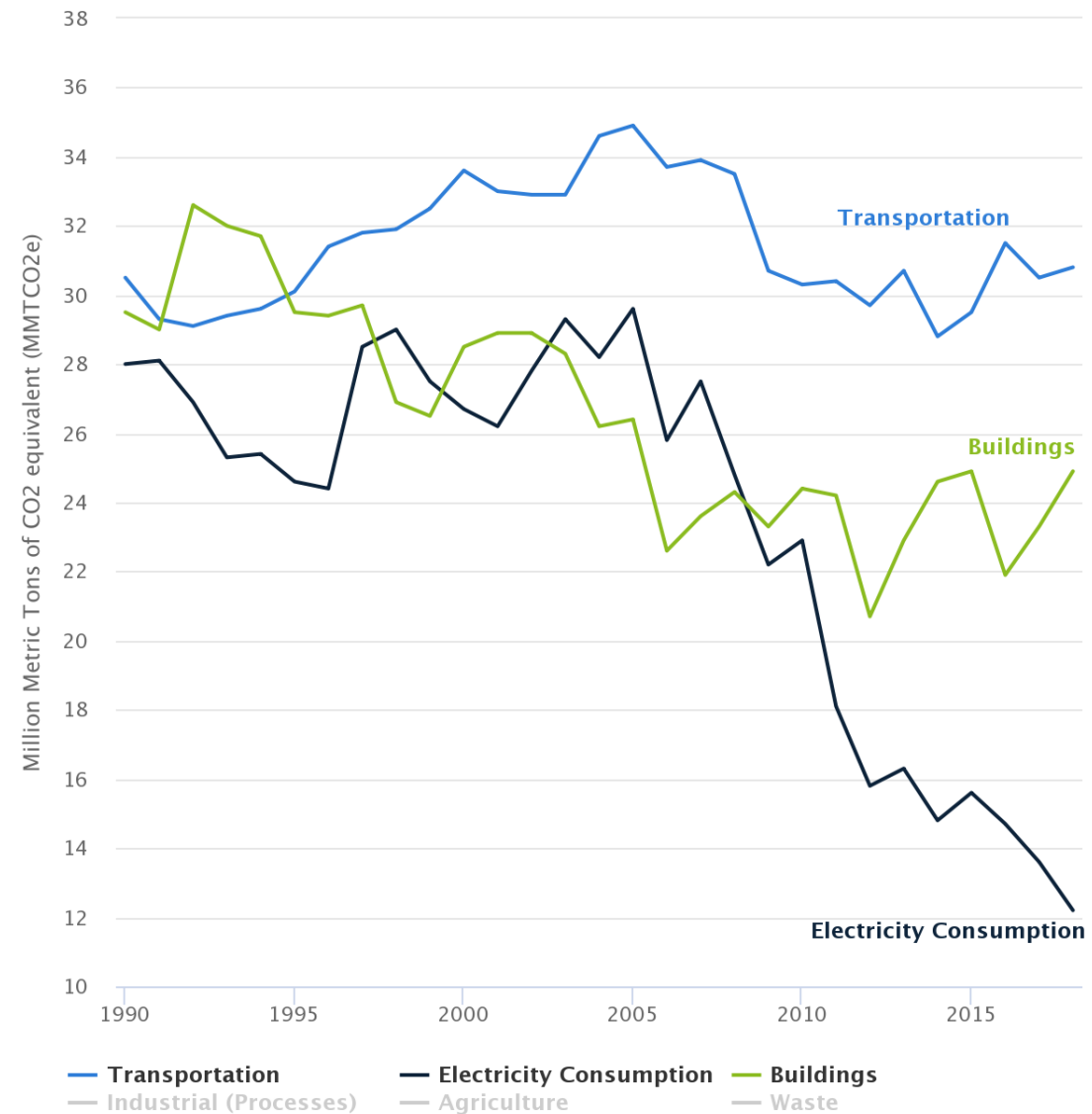
CLIMATE CHANGE & WORCESTER

Massachusetts Greenhouse Gas Emissions

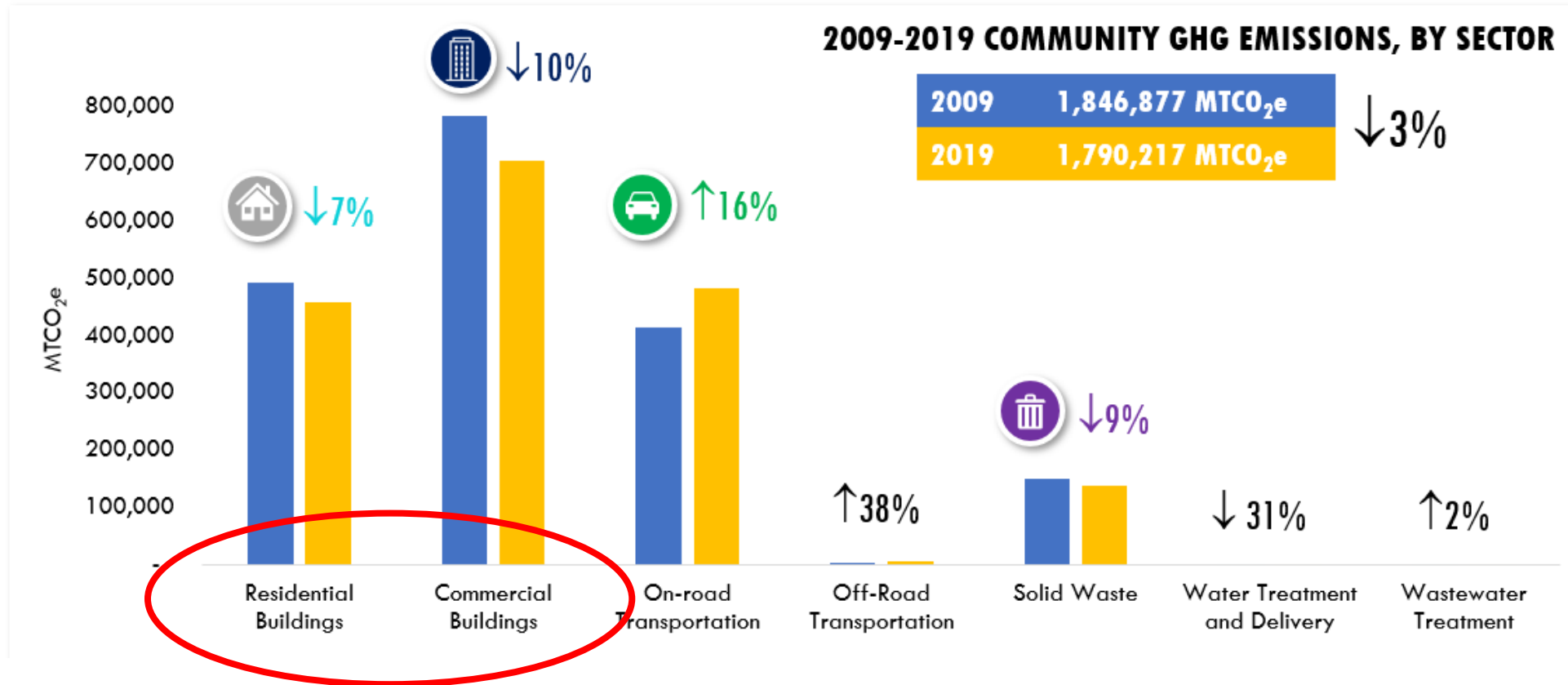
- Buildings and transportation are the highest contributors in the state and Worcester's data shows the same trend

MA GHG Emissions for Major Sectors, 1990–2020

Source: MassDEP (2021). Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990 through 2018



Worcester: 2009-2019 Community GHG EMISSIONS Trends by Sector



Though building emissions are trending down since 2009, buildings continue to be the single largest contributor to our greenhouse gas emission.

Tuesday was world's hottest day on record - breaking Monday's record

Average global temperature hits 17.18C and experts expect record to be broken again very soon



A taxi driver tries to cool off in Tehran as temperatures in the Iranian capital exceed : Photograph: Abedin Atehrkenareh/EPA

World temperature records have been broken for a second day in a row, which suggests, as experts issued a warning that this year's warmest days are coming - and with them the warmest days ever recorded.

The average global air temperature was 17.18C (62.9F) on Tuesday, according to data collated by the US National Centers for Environmental Prediction.

LOCAL

Heat advisory, flood watch, possible tornado: Worcester braces for wild weather

Henry Schwan
Worcester Telegram & Gazette

Published 1:37 p.m. ET July 27, 2023 | Updated 4:46 p.m. ET July 27, 2023

View Comments



Energy | Regulatory Oversight | Governance | Grid & Infrastructure | Gas

Arizona power demand breaks records during heatwave

Reuters

July 18, 2023 9:54 AM EDT - Updated 14 days ago



A man cools off at a water park during a heatwave in Phoenix, Arizona, U.S., July 16, 2023. REUTERS/Liliana Salgado/File Photo

Global greenhouse gas emissions at all-time high, study finds

Scientists say world is burning through 'carbon budget' that can be emitted while staying below 1.5C



Greenhouse gas emissions have continued to rise, despite a sharp fall in 2020 when Covid lockdowns were in place in many countries. Photograph: PNK Photo/Getty Images/Stockphoto

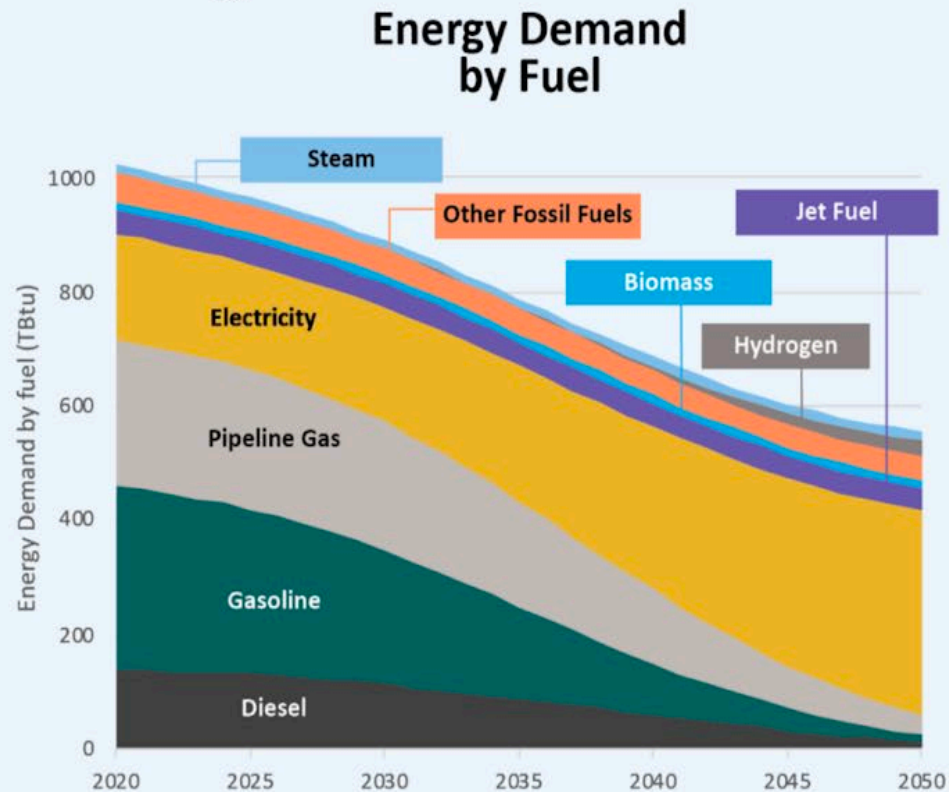
Greenhouse gas emissions have reached an all-time high, threatening to push the world into "unprecedented" levels of global heating, scientists have warned.

The world is rapidly running out of "carbon budget", the amount of carbon dioxide that can be poured into the atmosphere if we are to stay within the vital threshold of 1.5C above pre-industrial temperatures, according to a study published in the journal *Earth System Science Data* on Thursday.

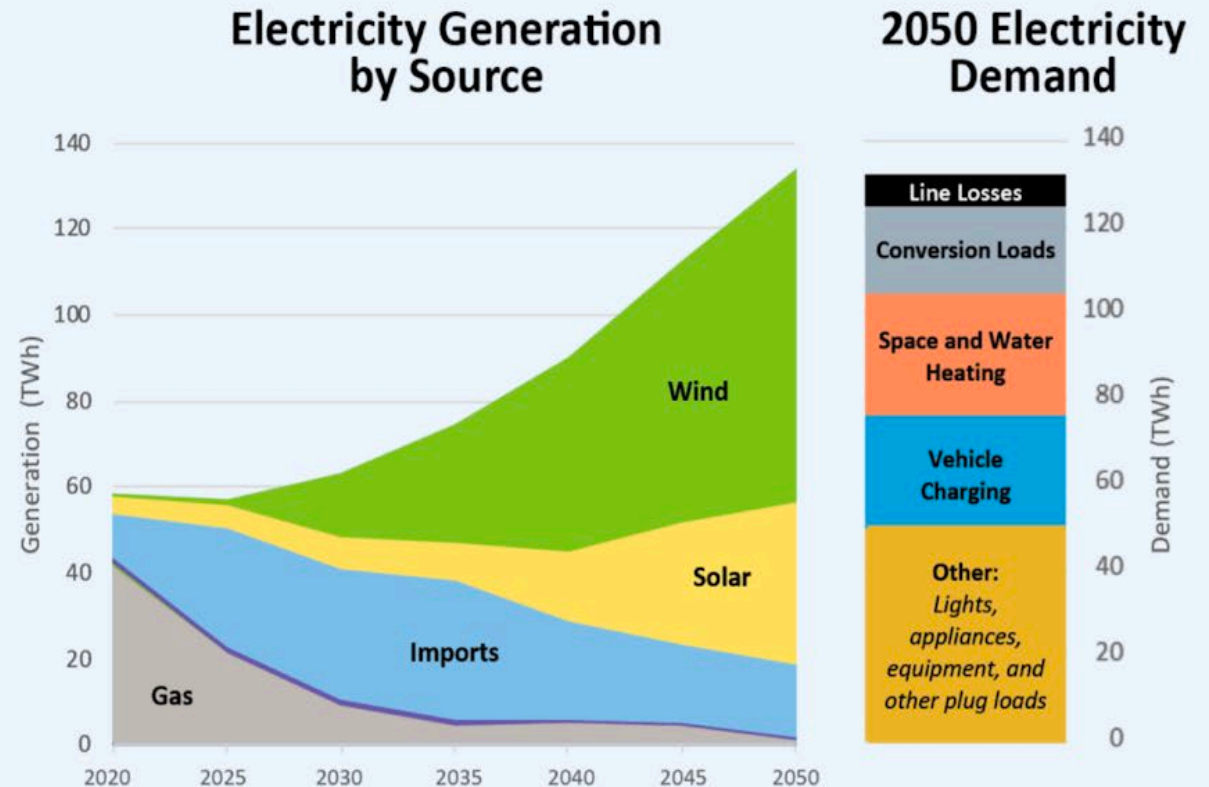
SUMMER 2023 - CLIMATE NEWS

The Massachusetts Path to a Net Zero Future

5. Over time, end uses in the buildings and transportation sectors are electrified resulting in efficiency savings and a reduction in overall energy demand.

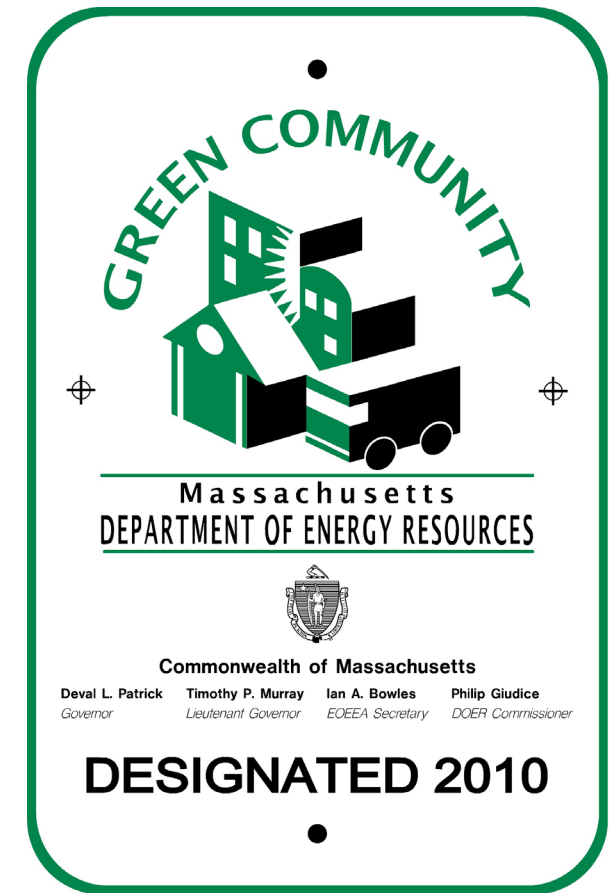


6. Electrification results in growing demand for electricity. Solar and wind generation increase dramatically from 2025 through 2050.



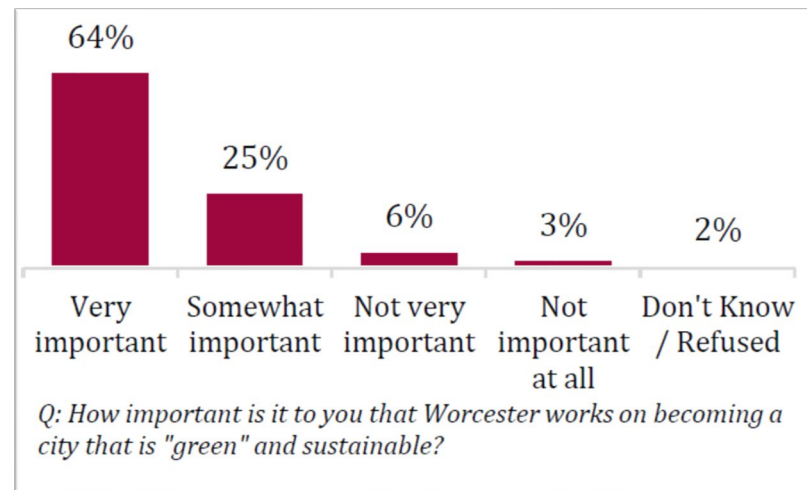
History of Dedication to Sustainability

- ✓ **Tradition of Sustainability Leadership**
- ✓ 2009: Adopted the Stretch Code and have remained a Stretch Code community since
- ✓ 2019: City Council Declaration of a Climate Emergency
- ✓ 2019: Municipal Electricity Aggregation – additional local green electricity in the mix! (currently 30% but with a plan to reach 100%)
- ✓ 2021: Green Worcester Plan
- ✓ Over a decade of investment in municipal buildings' energy efficiency



The Green Worcester Plan

- Its vision is for Worcester to become the greenest mid-sized city in the country!
- Our commitment that sustainability and resilience will benefit everyone who lives, works, and studies in Worcester.
- **Survey Results: Worcester residents value making the city more sustainable**



The cover features a vertical stack of four colored bands: light green, medium green, teal, and blue. The text is white and blue. A blue arrow points to the title, and another blue arrow points to the year 2020. The City of Worcester logo and the Green Worcester logo are at the bottom.

→ the green worcester
sustainability and
resilience strategic
plan

→ 2020

City of Worcester
and
Green Worcester Working Group

 The City of
WORCESTER

 **GREEN
WORCESTER**
Community | Resilience | Sustainability

Goal: 100% Clean and Affordable Energy

By 2030: 100% renewable energy for municipal facilities

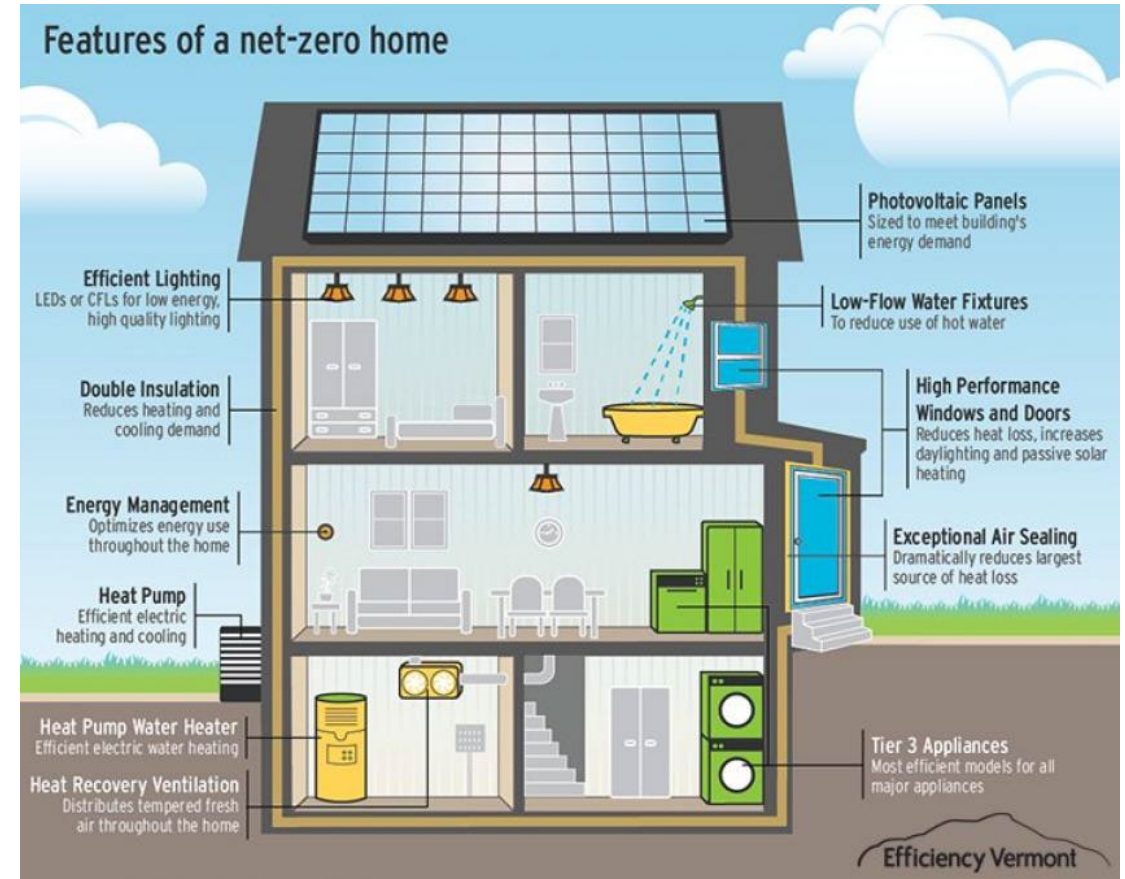
By 2035: 100% renewable electricity citywide

By 2045: 100% renewable energy that includes heating and transportation



Goal: Net-Zero and Climate Resilient Buildings

- Require new buildings to be net zero and climate-resilient, and to promote deep energy retrofits of existing buildings.
- Strategies:
 - Use no fossil fuels as primary source of building energy in new City buildings
 - Renewable electricity rather than fossil fuels for building energy systems
 - Promote energy retrofits for existing buildings





MASSACHUSETTS BUILDING ENERGY CODES

Building Energy Code Options

Base, Stretch, and Specialized – 3 Options

Base Code (IECC 2021)

- New construction in towns & cities not a green community
- **52 communities**

Expected from BBRs:
July 2023

Stretch Code (2023 update)

- New construction in towns & cities that are a green or stretch community
- **299 communities**

Residential : Jan 2023
Commercial: July 2023

Specialized Code ("Net-Zero")

- New Construction in towns & cities that vote to opt-in to this code
- **Effective date:**
Typically 6-11 months after Town/City vote

Applications of Stretch and Specialized Stretch Code

Same application as the base energy code

- Insulation
- Doors, windows, skylights
- Mechanical equipment
- Lighting
- Appliances
- Building tightness
- Duct tightness



Specialized Stretch Code

- Developed by the Commonwealth in 2022 as an option for municipalities
- A more rigorous set of regulations that build upon the state's existing codes for making buildings more energy-efficient
- Use of fossil fuels such as gas and propane or biomass is permitted but comes with additional requirements for on-site solar generation and pre-wiring for future electrification of any fossil fuel using equipment
- Aligns with Worcester's GHG emissions reduction goals

Specialized Stretch Code Goals

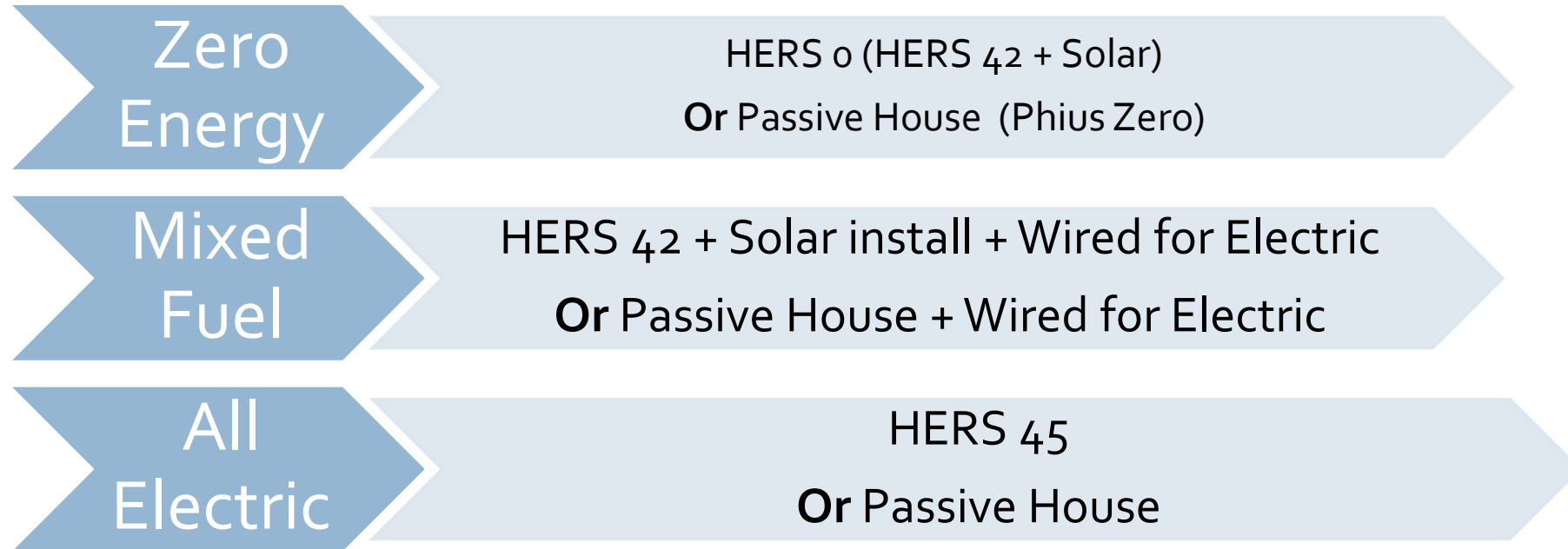
- All compliance pathways are designed to ensure new construction that is consistent with a net-zero Massachusetts economy in 2050, primarily through deep energy efficiency, reduced heating loads, and efficient electrification
- The code requires builders to meet high performance standards, prepare buildings for all-electric heating and cooling (if not going all-electric from the outset), and make parking ready for electric vehicle chargers

Specialized Stretch Code vs Stretch Code

- The Specialized Stretch Code:
 - has accelerated adoption of more efficient HERS rating thresholds (HERS 42 and 45)
 - provides three paths for low rise residential compliance, including a zero-energy pathway (with solar PV)
 - requires new homes over 4,000 sq ft to follow the all-electric or zero energy pathway
 - solar PV is required for any new construction utilizing fossil fuels for heating
 - For additions and alterations there are NO CHANGES from the Stretch Code. The SSC applies only to new construction.

Specialized Stretch Code Key Requirements

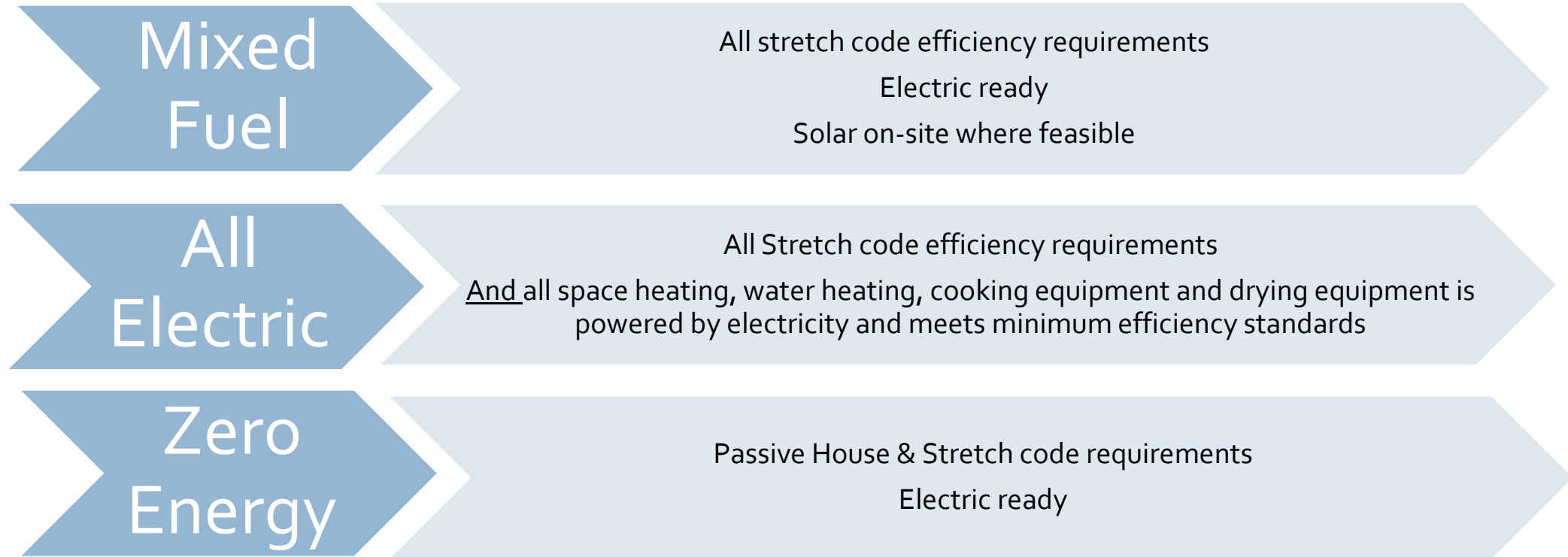
Residential buildings



- New homes over 4,000 sf must use *All-Electric* or *Zero Energy*
- Additions & Alterations: same as Stretch Code, i.e., no additional requirements beyond the Stretch Code
- Parking: both levels of code (Stretch and Specialized Stretch Code) require that any parking must be wired for at least one EV charger in small buildings, or 20% of spaces in multifamily buildings
- Multifamily buildings over 12,000 sq. ft. must meet: Passive House standards or Net-zero home performance scores

Specialized Stretch Code Key Requirements

Commercial buildings



- Requirements depend on building type
- Parking: both codes (Stretch and Specialized Stretch Code) require 20% of residential and business parking spaces to be wired for electric vehicle charging.

Additions, Alterations and Change of Use

Application for new/current Stretch and the proposed Specialized Stretch Code:

Scenario	Code Requirement
Additions up to 100% of existing building size; or, up to 20,000 SF	Follow Stretch Code Requirements
Alteration of existing building	Altered portions: follow Stretch Code Requirements
Change of use	Follow Stretch Code requirements

Stretch Code Costs and Savings

Costs and (savings) for residential construction under Stretch code (42 HERS) vs. base code (52 HERS)				
	Gas heat		Electric heat	
Size	Builder costs (savings)	Resident annual costs (savings)	Builder costs (savings)	Resident annual costs (savings)
4,000 sq. ft.	\$3,184	(\$302)	(\$20,062)	(\$548)
2,100 sq. ft.	\$7,907	\$496	(\$28,597)	(\$1,053)
Townhouse	\$62	(\$11)	(\$11,492)	(\$316)
Multi family	\$2,277	(\$14)	(\$15,690)	(\$683)

For more information on the residential cost studies, visit <https://www.mass.gov/doc/residential-stretch-code-costs-and-benefits-case-studies/download>

Studies on cost savings from the Specialized Stretch Code have not been completed, but are anticipated to be the same, if not greater than the above.

Specialized Stretch Code Co-Benefits

Financial Benefits

- Reduced energy demand
- 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 reduction



ADOPTING THE SPECIALIZED STRETCH CODE

Impacts of Adopting the Specialized Stretch Code

To property owners, developers, builders, and residents:

- Lowered life cycle costs for all building types
- Lowered upfront cost for some building types
- Higher levels of comfort for building occupants
- Healthier homes and offices due to cleaner indoor air
- Lower carbon emissions

Next Steps



Administration to review options as to when to recommend to the City Council to Adopt the Specialized Stretch Code.



Effective date is typically 6-11 months after formal adoption.



MA recommends effective date of January 1 or July 1.

THANK YOU FOR COMING!

QUESTIONS? COMMENTS?

**More information will be posted soon on
Worcesterma.gov/DSR**