

Whole Government Approach:

The Town of Truro recognizes that effective climate leadership requires the integration of climate change mitigation and adaptation into daily operations, decision-making, and planning for our municipality. The Truro Town government is committed to taking the lead on implementation of this Plan and the integration of climate change mitigation and adaptation throughout all Town Departments and will focus on three specific areas to achieve this:

Governance

Integrate climate change mitigation and adaptation goals, metrics, and evaluation criteria into Town planning and administration, including staff and department training, evaluations, and budgeting.

Education

Work with educators, parents, students, the School Board, and the State to bring climate education curricula into schools and student activities.

Resilience

Prepare businesses and residents for the adverse impacts of climate change through education and preparedness planning.

Departmental Responsibilities.

One of the first objectives is to align Town Departments' responsibilities with the goals of the Climate Action Plan and identify any areas where municipal activities may be in conflict with the goals of the Plan.

This process will result in the incorporation of a climate strategy into the goals of every Town Department's operations and planning.

END STAND ALONE PART Voted and approved

For LCP/ SB inclusion Edited 5-13/14 Fred and Bob

Purpose

To reduce the community's contribution to climate change, with a focus on ensuring our energy infrastructure is cleaner, leaner, and more resilient.
To prepare mitigation actions and adaptation strategies that respond to the anticipated effects of climate change before they occur.

Goal 1: Integrate climate change mitigation and adaptation as a focus for all Town Departments, Boards, and Committees.

1. Designate a Town staff position to coordinate with the Energy Committee and the Climate Action Committee other boards, committees, and departments as well as community groups to implement the climate change mitigation and adaptation goals set forth here.
2. Create climate change-ready standards and offer training opportunities for Town decision-makers, goal implementers, and committee members.
3. Implement the resolution passed at 2020 Town Meeting and any future related ATM Articles that requires regulatory and advisory bodies and the Town to adopt the objective of reducing Truro's net greenhouse gas emissions to zero by 2050 at the latest, and requests the Select Board to direct all departments, officers, committees boards and of the Town to take such immediate measures within the scope of their respective responsibilities and authority as may be necessary and prudent to implement this policy.
4. Create, track, and report Department-specific and measurable goals and objectives to implement and succeed with this policy.

Goal 2: Reduce the Town of Truro's non-renewable energy consumption and encourage energy conservation in order to reduce Greenhouse Gas emissions. In alignment with Commonwealth goals, achieve a reduction of greenhouse gas emissions over 1990 levels by at least 50% by 2030, 75% by 2040, and 100% ("net-zero") by 2050.

1. Continue to identify strategies and projects that will help us reach the Green Communities Act goal of reducing non-renewable energy consumption by 20% every five years.
2. Identify and apply for Green Communities grants, proposing projects that fully maximize potential funding (\$250,000 projects).

3. Identify and implement appropriate alternative energy generation on Town properties needed to reduce town fossil fuel reliance and electric energy cost and/or add renewable energy to the regional grid to offset the future demand projected in the Massachusetts 2050 Decarbonization Roadmap
4. Enact a policy of replacing conventional town owned vehicles with zero electric vehicles (EVs) first.
5. Reduce “peak hour” energy consumption for town buildings, including investigating the use of battery storage.
6. Measure baseline data and maintain ongoing measurement of municipal energy use and corresponding greenhouse gas emissions. (Mass Energy Insight) and use it to inform decisions on potential improvements.
7. Inform the public by creating displays of the energy use, emissions, and improvement data mentioned above. (The Truro CAC website offers one publishing opportunity.)
8. The Truro Energy Committee and the Truro Climate Action Committee will participate in Long-term Capital planning for municipal buildings, projects and properties to assist in identifying and implementing cost effective climate mitigation and adaptation actions aligned with Town and state goals
9. The Energy Committee and the Climate Action Committee will participate in Article votes and Comments on the Annual Town meeting warrant for all Articles related to Climate Change and energy conservation.
10. Investigate all alternative energy sources feasible for Truro, e.g., solar, wind, water.

Goal 3: Reduce the Truro community’s non-renewable energy consumption and encourage energy conservation for Greenhouse gas emission reductions in alignment with Commonwealth goals, i.e achieve a reduction of greenhouse gas emissions over 1990 levels by at least: 50% by 2030, 75% by 2040 and 100% “net-zero” by 2050.

Note: Truro began tracking municipal emissions in 2009, whole Town emissions in 2020

Measure baseline data and maintain ongoing measurement of community energy use and greenhouse gas emissions. Continue to work toward improved data sources for information needed for the Global Covenant of Mayors, such as resident vehicle information, improved

measurement techniques potential improvements to the Assessor's database, and possible state-mandated information from utility companies

1. Promote energy conservation, greenhouse gas reduction technologies, solar panel and air-source heat pump installation for homes and businesses, partnering with Cape Light Compact and other regional municipalities and agencies
2. Promote ways homes and businesses can reduce "peak hour" consumption, including investigating the use of battery storage. (During peak hours less efficient, higher emitting fossil fuel "peaker" plants make up the energy shortfall)
3. Inform the public by creating displays of the energy use, emissions, and our collective progress toward all of these community "net zero" goals.
4. Promote the acquisition of electric cars by residents by improving infrastructure (charging stations) and holding a promotional "electric car fair" event, perhaps jointly with neighboring towns.
5. Provide information regarding incentive programs by the Commonwealth and other entities for reducing greenhouse gas emissions.
6. Provide buying opportunities at reduced prices for greenhouse gas reducing technologies for consumers.
7. Adopt new or revised Bylaws that require and encourage the use of energy saving and greenhouse gas reduction for new and remodeling construction as well as existing structures.

Goal 4: Encourage both Town and Community wide climate change preparedness and adaptation.

1. Create an ongoing public awareness program to inform all residents of mitigation and adaptation techniques and opportunities.
2. Update Truro's vulnerability assessment and develop an action-oriented resiliency plan with grant support from the Massachusetts Executive Office of Energy and Environmental Affairs, *Municipal Vulnerability Preparedness (MVP) Grant Program*.
3. Build on the Town's Hazard Mitigation Plan to reduce vulnerabilities.
4. Encourage and coordinate emergency planning at the neighborhood level.
5. Work with the Cape Cod Commission and other County entities to develop grant applications for agreed-upon mitigation actions.

6. Develop database of grant sources and collaborative grant writing partners.

DRAFT

The “Stretchier” Code



As a Green Community, Truro must choose one of two codes under development, the **Stretch Code** or the **“Stretchier Code” (Municipal opt-in specialized energy stretch code)**

Why do we need a Stretchier Code?

- “Avoids the lock-in or use of combustion-based equipment “
- “Prevents the continuation of building low performance building envelopes “
- Early implementation would save 22 MMTCO₂e* in cumulative emissions.
- Aligns with Truro’s stated Net Zero Emissions goal

**22 Million Metric Tons of Carbon dioxide emissions*

End Use Energy



Transitioning buildings, vehicles, and other end uses away from consuming fossil fuels

Energy Efficiency and Flexibility



Aggressively pursuing energy efficiency and flexibility to enable cost-effective decarbonization

Decarbonizing Energy Supply



Producing zero and low-carbon energy supplies to power our energy system

Carbon Sequestration



Balancing remaining emissions by facilitating carbon dioxide removal

The International Energy Agency, World Economic Forum, National Academy of Sciences and the Massachusetts 2050 Decarbonization Roadmap advocate for stringent Energy Codes.

Truro could continue advocating for a Passive House level stretchier code

Image in 2050 Roadmap Cadmus Consulting

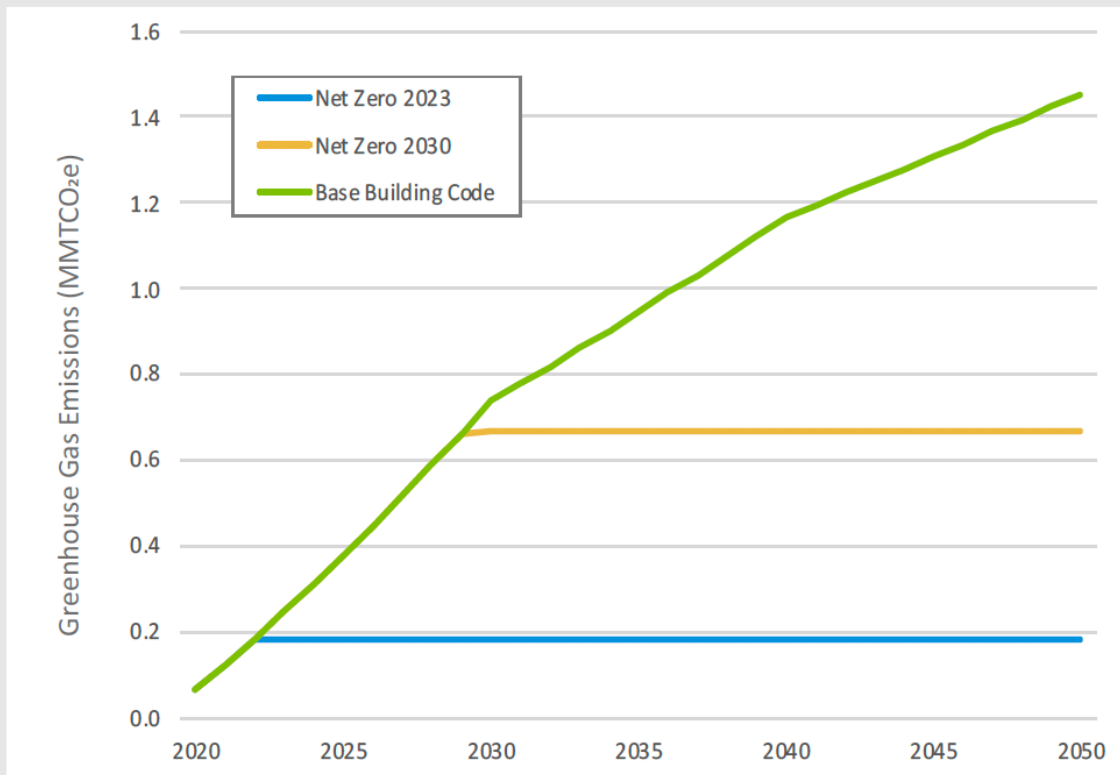
Why support the Stretchier Code?

- Advances several Climate Action & Energy Committee goals such as a Passive House level goal for the Cloverleaf and
- Ensures the Walsh property will have 2050 compliant Net Zero Structures
- Speaks to the Select Board's Goal #12
- Aligns Truro with the Commonwealth's 2050 Decarbonization Net Zero Goals

Data Dive: Emissions Reductions From A New Building Code

Emissions from new buildings are anticipated to grow to nearly 1.5 MMTCO_{2e} by 2050 under a base building code (Figure 12). This assumes a slow and steady advancement of the building code to 2050 without the implementation of a net-zero on-site emissions policy. The adoption of a net-zero on-site new construction code, however, would reduce 2050 emissions from residential and commercial new construction by 54% if implemented in 2030 and by 87% reduction if implemented in 2023, highlighting the benefit of early action in avoiding the lock-in of fossil fuel technologies.

Figure 12. Emissions from new buildings with and without a Net Zero code



“Since Massachusetts has committed to net-zero emissions in 30 years, electrification of heating equipment and improvement of building envelopes at end of life transition points is essential to avoid stranded assets and the costs of premature conversions”

Building sector report/ 2050 Massachusetts Decarbonization Roadmap December 2020

The Roadmap advocates we aggressively **Reduce emissions sooner rather than later**

The chart states that Massachusetts would gain an 33% additional emissions reductions by statewide adoption of a NZE code in 2023 rather than 2030.

The Law....

“An Act creating a Next Generation Roadmap for Massachusetts Climate Policy”

2021 Chapter 8 SECTION 31, 14

- “DOER must develop a **municipal code opt-in specialized energy stretch code** (our ‘stretchier’ code) that defines a net-zero building not later than 18 months from passage of this act.”

AND

- “...develop and adopt, as an appendix to the state building code.....a municipal stretch code that includes, but is not limited to, a definition of net-zero building” again our ‘stretchier code’”

To comply with the Climate Act in February 2022 DOER released the

“Building Energy Code Proposal: Updated Stretch Code & Specialized Opt-In Code ”

In the proposal DOER’s states Net Zero :

“Does not necessitate onsite or offsite renewables, nor the assumption that an individual building is net-zero energy”

AND:

“A building becomes Net Zero energy when MA electric grid is net zero .”

These codes are for new construction only.

Since 81% of the expected building stock in 2050 has already been built and placed into operation

Score one for Truro!

A reminder

- November 2021 letter from Truro to Secretary Theoharides of the Executive office of Energy and Environment (EEOE or EEA)

“A true net zero stretch code must cover all residential and commercial buildings. It must foster high performance building envelopes, such as those contemplated by Passive House standards. It must promote electrification, and at the very least provide the municipalities who opt in with clear authority to prohibit on-site combustion in new building and major rehabilitation. Moreover, since time is of the essence, any phase-in period must be short and supported by clear and convincing evidence.”

This was also submitted to the DOER during the first proposal comment period in March 2022.

This is in the spirit of the Climate Law and the text of the nonbinding 2050 Decarbonization Roadmap

Passive House (Passivhaus) Passive Building

Passive House (PH) is a set of design principles that:

- Attain a rigorous level of energy efficiency
- Creates comfortable indoor living spaces.
- Can be applied to all buildings, including single-family homes, multifamily apartment buildings, schools, skyscrapers and more.
- Can reduce energy use up to 90%

Passive House Costs

- Passive House and other highly efficient buildings cost more up front. **Or maybe not**
- Department of Energy and Resources (DOER) engineers state that these upfront costs can be repaid in 7 to 15 years

Passive House Challenge (2019)

1.4 to 2.8%

Actual costs (not estimates) from 8 low and mid-rise PH projects around Massachusetts

DOER Energy Code Analysis (2019)

1.9 to 2.9%

Detailed cost estimate by Consigli technical consultant

Pennsylvania Housing Authority (2015-2018)

-1.1% less

Actual costs (not estimates) from 74 PH projects and 194 non-PH projects

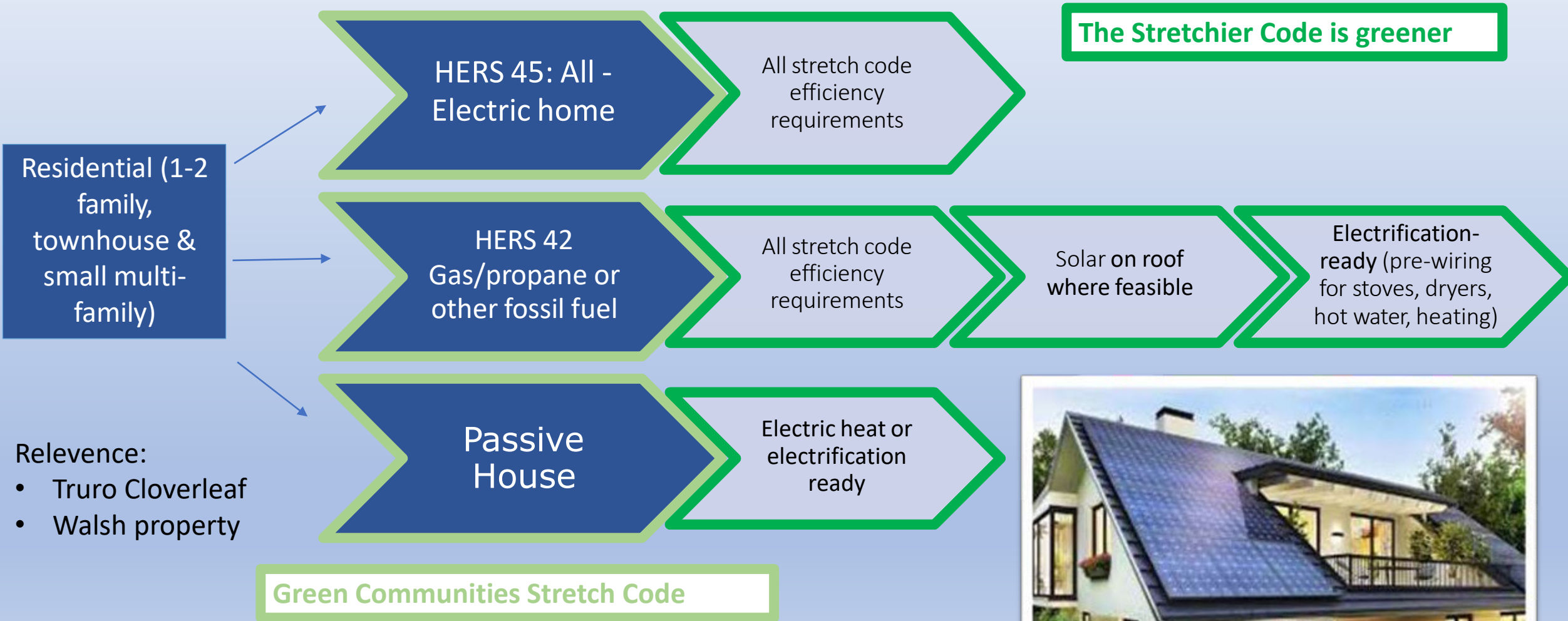
DOER proposed 2 upgrades-Residential Code

The updated residential Stretch Code and the Stretchier Opt-in specialized codes are very similar. The main differences are that gas, propane or other new fossil fuel heated homes must have solar on the roof where feasible, be prewired for stoves dryers, hot water heaters and heating and have a HERS 42* Score or lower whereas all electric homes may be HERS 45.

*HERS is a nationally recognized standard to measure energy efficiency for homes. Most new construction projects in Truro use a HERS rater for Stretch Code Compliance. Passive House (Passivhaus) is another pathway in the current and proposed Stretch Codes.

What's the Difference between the two proposed codes?

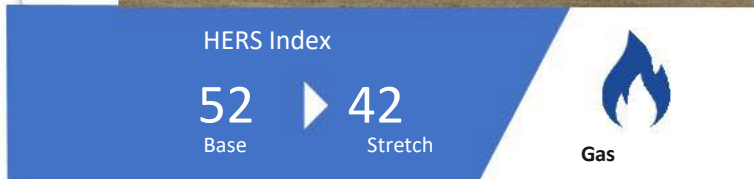
Stretchier Code (Specialized opt-in code) - Residential





MA 10th Edition Building Code | 2023
Small Single Family - Gas

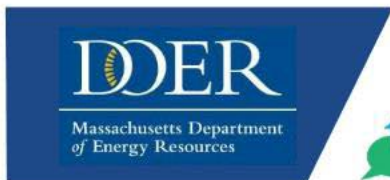
**A small HERS 42 gas Home costs more to build and more to operate
 It emits substantially more CO2**



Home Details

- 2,100 sq.ft.
- Small Single Family
- 3 Bedrooms
- Worcester, MA

Note GHG emissions



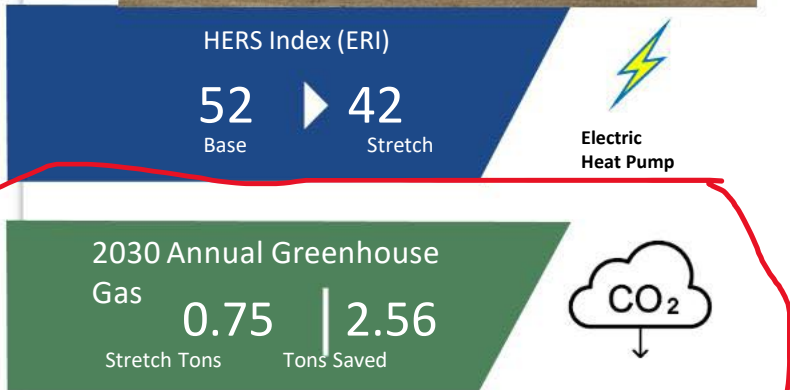
Costs and Benefits to Meet Stretch Code

	COSTS	BENEFITS	NET
BUILDER	\$14,064 Total Adjustments	\$6,157 Rebates & Tax Credits ¹	\$7,907 Cost Compared to Base Code
HOME BUYER	\$1,581 Change to Downpayment ³	\$344 Change to Annual Mortgage Payment ³	-\$153 Estimated Energy Cost Savings per Year ²
			\$496 Buyer Annual Net

1. Rebates are calculated on a per unit basis, using Mass Save® new construction program pay-for-savings Incentive calculations & 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 20% down payment at 3.5% 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



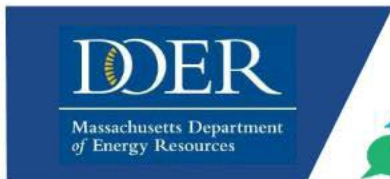
MA 10th Edition Building Code | 2023
Small Single Family - Electric



Home Details

- 2,100 sq.ft.
- Small Single Family
- 3 Bedrooms
- Worcester, MA

Note: GHG emissions are substantially less than Gas



Costs and Benefits to Meet Stretch Code

	COSTS		BENEFITS	NET
BUILDER	-\$11,597 Total Adjustments		\$17,000 Rebates & Tax Rebates ¹	-\$28,597 Cost Compared to Base Code
HOME BUYER	-\$5,719 Change to Downpayment ³	-\$1,244 Change to Annual Mortgage Payment ³	-\$191 Estimated Energy Cost Savings per Year ²	-\$1,053 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 20% down payment at 3.5% 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

Image DOER Straw Proposal

Stretchier Code: Multi-family Requirements

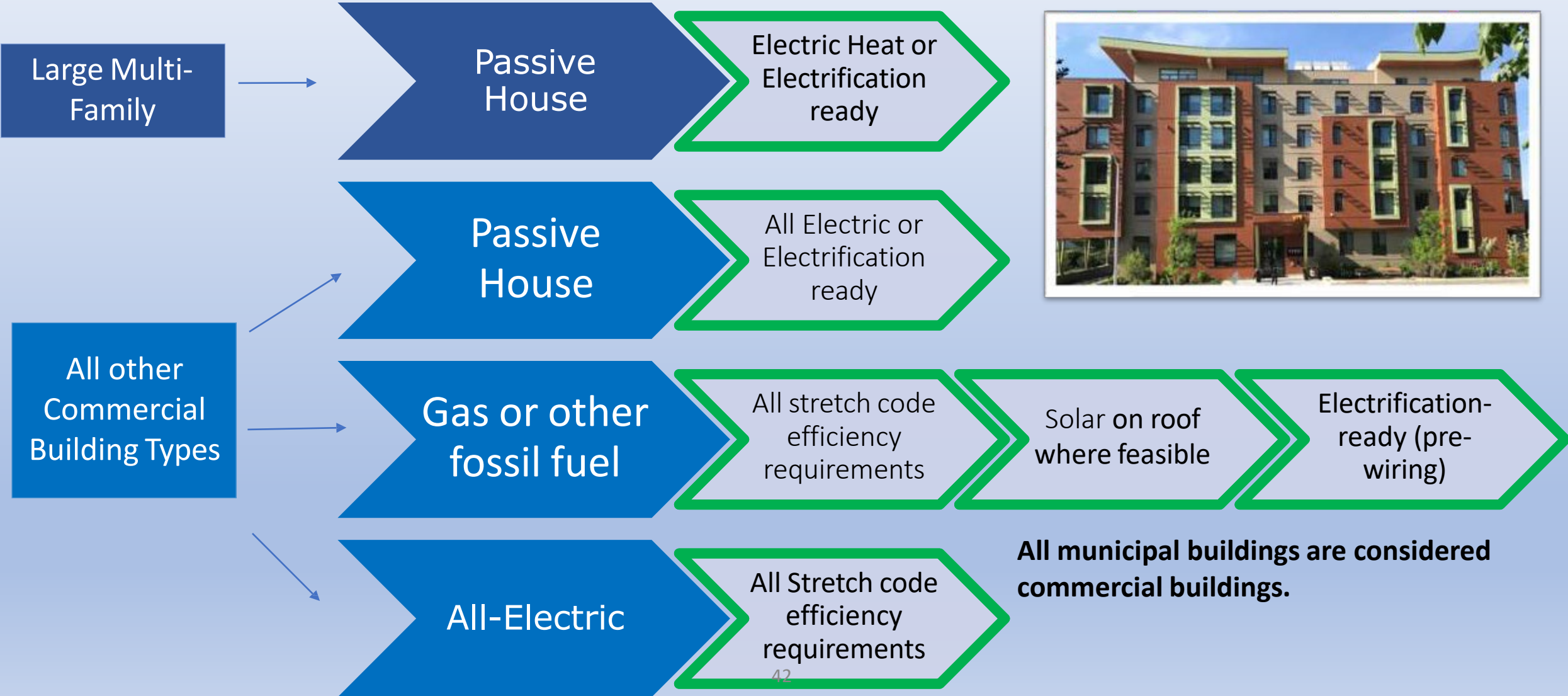
The multi unit building at the Truro Cloverleaf would need to be built to Passive House standards

- Passivehouse for Multi-family (6+ units):
 - Low-rise (up to 5 stories) required from Jan 2023
 - Mid-rise (6-9 stories) and high-rise (10+ stories) required from Jan 2024
- Targeted Performance Path (TEDI) in 2023 transition year for mid-rise and high-rise



Harbor Village – Affordable housing - Gloucester

Stretchier Code- Commercial



Expected Timeline for code adoption

We are here

	Winter 2022	Spring 2022	Summer 2022	Fall 2022	Winter/Spring 2023	Summer 2023 and beyond
Updated Base Code	Draft on BBRS 10 th edition code webpage		BBRS Public hearing on 10 th edition	BBRS vote on final 10 th edition	Effective Jan. 2023 as part of 10 th edition Code (MA IECC 2021)	
Updated Stretch Code	Outreach, public hearings, and comments on straw proposal	Draft code language available for public comment	Public hearings on draft code	Finalize code proposal & Publish Code	Effective Jan. 2023 to align with 10 th edition	Phase-in HERS requirements in Dec 2023
New Specialized Opt-in Code	Outreach, public hearings, and comments on straw proposal	Draft code language available for public comment	Public hearings on draft code	Finalize code proposal & Publish Code	Finalized Dec. 2022 - Municipal adoption begins	Likely effective dates - July 1, 2023, Jan 1, 2024

Help Truro strengthen the proposed “stretchier” code. Send comments to stretchcode@mass.gov with the subject line “Stretch Code Straw Proposal Comments.”

• Questions? Comments?

Resources

- <https://www.phius.org/passive-building/what-passive-building/passive-building-principles>
- <https://www.mass.gov/doc/780-cmr-ninth-edition-residential-chapter-11-energy-efficiency-amendments-as-of-272020/download>
- https://www.youtube.com/watch?v=qLb1B76t7fo&list=PLm8jHk8NkHyorpylWRhf6dFHmd_85fiiB&index=8
- <https://www.mass.gov/doc/building-sector-technical-report/download>
- <https://www.mass.gov/doc/building-energy-code-straw-proposal-updated-stretch-code-specialized-opt-in-code-feb-2022/download>
- <https://www.mass.gov/doc/ma-decarbonization-roadmap-lower-resolution/download>
- <https://www.hersindex.com/know-your-homes-hers-index-score/hers-index-understanding-the-hers-score/>
- <https://www.mass.gov/doc/residential-building-energy-modeling-analysis/download>
- <https://www.mass.gov/doc/residential-model-buildings-scenarios-report/download>
- <https://www.mass.gov/doc/residential-stretch-code-costs-and-benefits-case-studies/download>

END

Article 53 prepackaged standards or definitions of Net zero carbon building

SHIFT TO ZERO

<https://shiftzero.org/what-is-zero-net-carbon-building/>

What is Zero Carbon Building?

Building decarbonization—the elimination of greenhouse gas emissions caused by buildings—is central to shift! Zero’s mission, but what does that mean? Carbon dioxide and other greenhouse gas emissions related to buildings fall into two categories: (1) “operational carbon” emissions associated with heating, cooling, and operating buildings, and (2) upfront “embodied carbon” emissions associated with the manufacture and transport of building materials and the construction of buildings themselves. Our definition of zero carbon building encapsulates both.

The first step is to maximize energy efficiency so that we dramatically reduce the energy required to operate our buildings in the first place. As we make those energy efficiency improvements, we need to make material selection and building design decisions that minimize embodied carbon. We also need to eliminate the burning of fossil fuels onsite, and recognize that by electrifying buildings we can leverage at the building level the ongoing decarbonization of the larger electricity grid. Finally, our zero carbon buildings will run on 100% renewable energy, either generated onsite or procured offsite.

Steps to a Zero Carbon Building

STEP 1:



Maximize Energy Efficiency

- Efficient building envelope
- Efficient systems and appliances
- Operations and maintenance
- Change in user behavior

STEP 2:



Minimize Embodied Carbon

- Prioritize materials that use less carbon in production and transportation

STEP 3:



Eliminate Fossil Fuels

- Electric space heating, hot water systems, and appliances
- No combustion of fossil fuels

STEP 4:



Use Only Renewable Energy

- Maximize on-site renewable energy generation where practical
- Procure off-site renewable energy that is additional, local, equitable, and legally assigned to the building.

<https://www.arup.com/perspectives/publications/research/section/net-zero-carbon-buildings-three-steps-to-take-now>

International Energy Agency pg. 9 (I'll get the exact report title)

1 A zero-carbon-ready building is highly energy efficient and either uses renewable energy directly or uses an energy supply that will be fully decarbonised by 2050, such as electricity or district heat.

This is somewhat similar to whose definition does not include the words highly energy efficient

World Green Building Council (the LEED people)

<https://www.worldgbc.org/thecommitment>

- **Existing buildings:** reduce their energy consumption and eliminate emissions from energy and refrigerants removing fossil fuel use as fast as practicable (where applicable). Where necessary, compensate for residual emissions.
- New developments and major renovations are built to be highly efficient, powered by renewables, with a **maximum reduction in embodied carbon** and compensation of all residual upfront emissions.