CLIMATE ACTION FACT SHEET

Strive toward net zero energy buildings: New non-municipal buildings

Housing & Development

INCREASE ENERGY EFFICIENCY IN NEW NON-MUNICIPAL BUILDINGS BY ADOPTING THE SPECIALIZED CODE

Description and purpose of strategy: Municipalities can take action to reduce energy use in newly constructed non-municipal buildings by adopting the Municipal Opt-In Specialized Code, which ensures new construction is consistent with Massachusetts GHG limits set every five years from 2025 to 2050. The Specialized Code sets stricter building requirements than the current Stretch Code. By adopting it, municipalities can reduce environmental impacts such as greenhouse gas (GHG) emissions, while also increasing local jobs, promoting equity, and realizing cost savings.

Content of fact sheet: Overview of the costs and benefits of energy efficiency practices in new non-municipal buildings (private, commercial, and industrial), equity considerations, implementation steps, and resources available including by adopting the Specialized Code and achieving the broader "Green Community" designation.

Implementation support: This fact sheet expands upon strategies and actions from the Climate Actions Database, which can be found at: capecodcommission.org/climate.

BENEFITS

- ☑ Greenhouse gas (GHG) emissions reductions or sequestration
- ☑ Health improvement from reduced pollutants
- ☐ Increased recreation
- ☑ Lower maintenance/operational costs
- ☐ Environmental enhancement/protection
- ☐ Less damage to infrastructure
- ☑ Higher property values
- ☑ Increased resilience
- ☑ Job and economic growth

COSTS

- ☑ Higher capital costs
- ☐ Higher maintenance costs
- ☐ Higher operational costs
- ☑ Additional time for municipal staff to implement

KEY FINDINGS

Equity: Socially vulnerable and low-income populations can benefit from increased economic opportunities and better air quality, though care is needed to ensure burdens (utility costs, increased housing costs) are not disproportionately placed on low-income renters.

Financial benefits: Compared to Stretch Code construction projects, Specialized Code projects can have lower operational costs as a result of decreased energy use and may have lower capital and other up-front costs due to incentives currently available for energy-efficient new construction. Increased job opportunities from energy-efficient new construction can also provide financial benefits to the community.

Non-market benefits: Promoting energy-efficient construction can yield improvements in health from reduced pollution.

GHG reductions: Energy-efficient new construction in accordance with the Specialized Code can ensure new construction is consistent with state GHG limits set in the forthcoming years, providing significant reductions relative to the baseline energy code.

Ease of implementation: Adopting the Specialized Code ensures that energy efficiency is considered during the design and construction of all new buildings in a way that is consistent with state GHG limits.

KEY TERMS DEFINED: STRETCH CODE, SPECIALIZED CODE, PASSIVE BUILDINGS, AND GREEN COMMUNITIES

The **Stretch Code** is an opt-in energy code that ensures energy efficiency is considered during the design and construction of new residential or commercial buildings, or during major renovations. The Stretch Code includes requirements for ventilation and insulation, and it requires electric vehicle wiring for at least 20% of spaces in multi-family parking lots.

The **Specialized Code** builds off the Stretch Code but is even stricter. It requires new construction to meet net zero building performance standards. To meet the net zero standard, new construction must be either fully electrified, pre-wired for future electrification, or built to meet the passive buildings criteria.

Passive buildings are a specific type of building certification. These buildings are built with similar energy-efficient methods to the ones outlined in the Stretch and Specialized Codes, including reducing heating and cooling demands through improved insulation. To comply with the Specialized Code, passive buildings must be constructed in accordance with the Phius ZERO requirements, which requires that annual energy use be net zero.

Achieving a **Green Community** designation provides the community with access to resources, including exclusive financial and technical support, to increase clean energy use and decrease energy use. There are five criteria that a community must meet to receive the designation—adopting the Stretch Code is one of the five criteria.

BENEFIT COST ANALYSIS

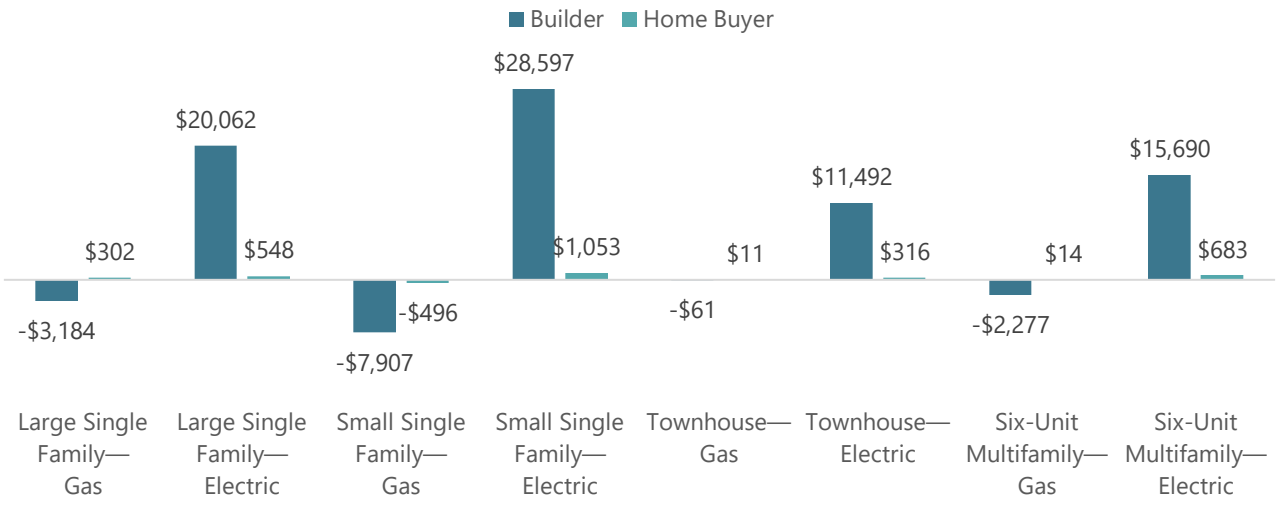
The capital and other up-front costs of developing and constructing energy-efficient non-municipal buildings fall in large part to the builders, but may be passed on to owners and renters. Higher energy efficiency can lead to lower operational costs, which can provide a benefit to those paying energy bills, including owners and renters.

The Massachusetts Department of Energy Resources (DOER) has conducted a "Residential Cash Flow Analysis" (MA DOER, 2022) through an independent building energy consulting firm to assess the cost and benefit implications of new residential buildings (of various sizes and housing types) constructed under the 2023 Stretch Code as compared to the base code. Given that the Specialized Code implements the Stretch Code but with additional requirements, this analysis provides a basis for understanding the costs and benefits of adopting a building code focused on energy efficiency. The assessment took the following features into consideration:

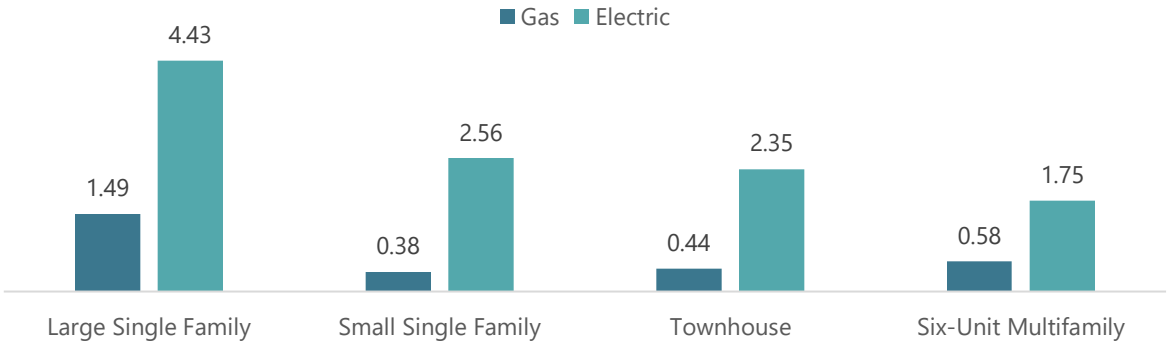
- Rebates from the Mass Save new construction program pay-for-savings incentive calculations
- Tax credits
- High-efficacy lighting
- Heating and cooling
- Hot water
- Windows
- Mechanical ventilation
- Duct leakage to outside
- Insulation (foundation, floor, walls, and ceiling)
- Air infiltration

The figures below show the results of the Stretch Code cash flow analysis, including the annual tons of GHG emissions saved as compared to the baseline energy code. The Specialized Code would likely lead to greater net benefits for builders when considering financial incentives, as well as for home buyers due to lower operational costs. The Specialized Code would also lead to greater GHG emissions saved due to restrictions on combustion heating equipment.

NET BENEFIT TO BUILDERS AND ANNUAL NET BENEFIT TO HOME BUYERS OF STRETCH CODE RESIDENCES



ANNUAL TONS OF GHG EMISSIONS SAVED: STRETCH CODE COMPARED TO BASELINE CODE



The rebates and tax incentives currently available for energy-efficient new construction help make these cost-effective options for builders. Those paying energy bills, such as home buyers or renters, will generally save annually as well. Though construction capital costs may be higher than costs for Stretch Code projects, financial incentives are available that may make them—and other up-front costs—lower in practice. Operating costs under the Specialized Code should also be lower, given the increased energy efficiency (and decreased energy demand) of buildings meeting the Specialized Code requirements.

Financial benefits can also be realized through increased jobs related to energy-efficient new construction, including new opportunities for construction workers, electricians, and engineers. An analysis of Massachusetts job creation from investments in energy efficiency and building retrofits found that this sector supports 3.5 times as many jobs per dollar as the state's 10 largest industries (Climate XChange).

Given that the Specialized Code is stricter than the Stretch Code, adopting it can be expected to yield greater environmental benefits. Homes built with electric heat pumps provide greater GHG emissions reductions than gas-heated homes and are in line with the Specialized Code requirements that specify using electrically heated

CRITERIA POLLUTANT REDUCTIONS

An economic analysis for the Town of Acton assessed the health savings from reductions in criteria pollutants (SO_2, NO_x, and $PM_{2.5}$) from LEED certified homes and found annual cost savings can be as high as $30–$67 for natural-gas-heated homes, and as high as $117–$264 for oil heated homes.

buildings. Energy-efficient construction can provide further benefits by reducing criteria pollutant emissions. (See the text box for an example.)

EQUITY

Newly constructed, energy-efficient non-municipal buildings can provide a number of benefits, if carefully implemented, to low-income and socially vulnerable populations. Some of the benefits include:

- **Targeted resource distribution.** Exclusive grants and technical assistance are available for designated Green Communities. These funds can be allocated to areas with socially vulnerable populations, which could provide community benefits by ensuring that new construction incorporates energy-efficient practices and technologies. These grants and technical assistance can be accessed through the Green Communities Designation and Grant Program webpage.
- **Increased economic opportunity.** Construction of energy-efficient buildings could be an opportunity for job growth, and thus economic opportunity for socially vulnerable and low-income communities. "Green economy" job trainings could be targeted toward these populations to provide a clear avenue for socially vulnerable and low-income populations to have skills for, and access to, new job opportunities and associated benefits.
- **Improved air quality.** Socially vulnerable populations are often more likely to reside in areas with poorer air quality. Given that energy-efficient practices have been shown to improve the health of residents (Maidment et al., 2014), socially vulnerable populations serve to benefit the greatest from the improved air quality.

Optimizing Equity During Implementation

Special consideration must be given to ensure that low-income communities and socially vulnerable populations reap the benefits of newly constructed energy-efficient buildings. Increasing energy efficiency in new buildings often has stratified economic effects that benefit landlords, owners, and developers, but create burdens for renters and low-income communities as rents often increase (read more about these disproportionate burdens in the American Council for an Energy-Efficient Economy's 2016 report). "Greening of neighborhoods" can mark the beginning of gentrification as it increases an area's desirability and may increase rent prices, which could price low-income households out of the area. To avoid these potential burdens, municipalities must ensure that affordable housing options are included within newly constructed energy-efficient buildings. The State of Maine has explored these important equity considerations in detail in its Equity Assessment (p. 15), which can be used as a starting point to understand the challenges related to Cape Cod.

CASE STUDY: MULTIFAMILY PASSIVE HOUSING

Passive housing can provide significant energy emissions reductions for new construction, meeting the standards outlined by the Specialized Code. In 2022, Simmons and McKneally assessed five completed multifamily passive housing projects in Massachusetts; they found that these projects cost 1.5% to 4.3% more than projects built to the base code, though the analysis did not take into account incentives from Massachusetts Clean Energy Center (MassCEC) or Mass Save, which can provide significant cost reductions. Simmons and McKneally (drawing on their 2020 energy use analysis) also reported that the energy use of multifamily passive housing was less than half that of multifamily housing built to the base code.

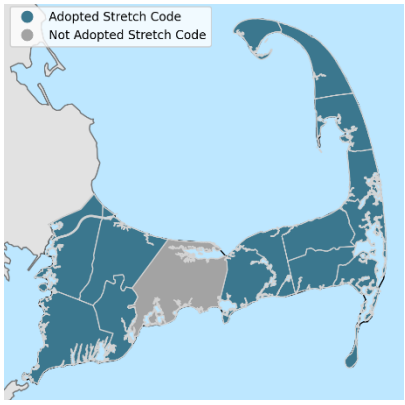
STATE OF PRACTICE

General State of Practice

With the passing of the Stretch Code in 2009, Massachusetts became the first state to adopt an above-code appendix to its base building energy code. Since 2009, the Stretch Code has been updated multiple times, with the most recent update to take effect in 2023. It has been adopted by 300 towns, representing over 95% of all towns in the state. Expanding on the Stretch Code, the Climate Act of 2021 required the development of the Specialized Code. Finalized in December 2022, the Specialized Code goes beyond the Stretch Code by ensuring that new construction is consistent with Massachusetts GHG emissions limits and building sector sub-limits set every five years from 2025 to 2050, aligning with the state goal of achieving a net zero emissions economy by 2050. As of late January 2023, Brookline, Cambridge, and Watertown had adopted the Specialized Code.

Cape Cod Context

As of late 2022, the Town of Barnstable was the only remaining town on Cape Cod that had not adopted the Stretch Code. Except for Sandwich and Barnstable, all of the other towns on Cape Cod have been designated as Green Communities. Nearly all of these Stretch Code adoptions and Green Community designations have been made in the last five years, demonstrating the recent and rapid progress by Cape Cod towns. With the new Specialized Code, Cape Cod towns have the opportunity to ensure new construction aligns with the state's goal of a net zero emissions economy by 2050.



IMPLEMENTATION

The actions below outline the process for implementing the Specialized Code. The process for adopting the code, including sample language for a town meeting or town council warrant article, town meeting or town council motion, and bylaw, are provided by DOER.

REQUIRED EXPERTISE

Internal: Building officials, town planners, housing departments

External: Builders, architects

- **Educate the community.** Garner support for adopting the Specialized Code by educating the community about its benefits (e.g., increases energy efficiency of new construction; helps achieve GHG emissions reduction goals, including a net zero economy by 2050).
- **Adopt the Specialized Code.** Seek adoption of the Specialized Code as a general bylaw through a town meeting or town council vote. Municipalities that have already adopted the Stretch Code may choose to amend their existing Stretch Code bylaws in accordance with the Specialized Code. **Recommendation:** Specify an effective date (suggested either January 1 or July 1) to ensure all know when it takes effect.
- **Advertise training resources.** Advertise energy code trainings provided by Mass Save (open to all and free for building officials). Other trainings specifically related to passive buildings and all-electric homes are also available (read more here).

Resources for improving energy efficiency in newly constructed, non-municipal buildings through adoption of the Specialized Code are provided below.

FINANCIAL AND TECHNICAL SUPPORT	
Massachusetts Green Communities Grants	Grants and technical support for local energy efficiency initiatives available for designated Green Communities.
Massachusetts Energy Code Training	Mass Save trainings on building energy codes available to all, designed to serve building officials and other building professionals (e.g., builders and architects). Free training for building officials. Counts toward a new Board of Building Regulation and Standards requirement that building officials be trained in energy efficiency.
Cape Light Compact	Provides financial and technical assistance to homeowners, renters, and businesses to improve energy efficiency in buildings.
ADDITIONAL INFORMATION	
Summary of 2023 Stretch Code Update and Specialized Code	Summarizes 2023 Stretch Code update and Specialized Code. Outlines requirements by building type.
Specialized Code Adoption Process	Instructions for municipalities on the process of adopting the Specialized Code, developed by DOER's Green Communities Division.
Stretch Code Adoption Process	Instructions for municipalities on the process of adopting the Stretch Code, developed by DOER's Green Communities Division.
Mass Save Passive House Incentives	Incentives and assistance for constructing Passive House multi-family buildings (five units or more).
Mass Save Passive House and All-Electric Homes Training	Training supports workforce development and market transformation in the energy efficiency and building construction industries.
Mass Save Residential New Home Construction Incentives	Financial incentives for residential new construction that exceeds the Massachusetts building energy code.
MassCEC Funding for Equity Workforce Training	Grant funds and technical support valuing up to $1.2 million across two to three years for programs that provide job training and support services to underserved people seeking employment in the clean energy sector.

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Additional climate change information and resources can be found at capecodcommission.org/climate.