Specialized Energy Code FAQ (Orleans)
September 26, 2023

The Specialized Energy Code will be considered by the Town of Orleans at its October 16 Special Town Meeting as Article 30 in the Warrant.

Contents

A Understanding the Specialized Energy Code

A-1 What is the Specialized Energy Code?

The proposed Specialized Energy Code comprises changes to the sections of the Town Building Code dealing with energy efficiency.

In 2021, the State of Massachusetts established statewide greenhouse gas emissions limits leading to an emissions limit in 2050 that "achieves at least **net zero** state greenhouse gas emissions." Thus, the Specialized Energy Code was created by the State to enable building codes to ensure new construction that is consistent with a net-zero Massachusetts economy in 2050.

This objective is to be achieved primarily through a combination of (a) energy efficiency, which in turn enables reduced heating loads, and (b) efficient electrification. Use of fossil fuels, such as gas, propane and biomass, is permitted but comes with additional requirements for on-site solar generation and pre-wiring for future electrification of any equipment using fossil fuels.

The Specialized Energy Code builds upon the "Stretch Code" adopted by the Town of Orleans in 2018. The Stretch Code is a more energy-efficient alternative to the base Building Code. The Stretch Code has now been adopted by 300 or the 351 municipalities in Massachusetts.

The Specialized Energy Code must be approved at Town Meeting in order to take effect. As of September 8, it has already been adopted by 19 municipalities: Truro and Wellfleet on the Cape, as well as Acton, Aquinnah, Arlington, Boston, Brookline, Cambridge, Concord, Lexington, Lincoln, Maynard, Newton, Northampton, Sherborn, Somerville,

Stow, Watertown, and Wellesley. Eastham is planning to consider it at its spring 2024 town meeting.

A-2 If adopted, when will the Specialized Energy Code be effective?

The proposed effective date is July 1, 2024.

A-3 Does the Specialized Energy Code have any requirements that apply to existing construction?

No. Existing construction will not be required to be "brought up to code."

A-4 What will the Specialized Energy Code cost existing homeowners?

Nothing.

A-5 What does the Specialized Energy Code require for renovations and additions, beyond what is already required in the Town Building Code, as updated 1/1/23?

Nothing.

A-6 What does the Specialized Energy Code require for *new* residential construction (up to three stories), beyond what is already required in the Town Building Code, as updated 1/1/23?

- All-electric: Nothing.

- Mixed-fuel <4,000 square feet: Must be pre-wired for future electrification and have on-site renewable energy (such as solar panels) of at least 4kW per dwelling unit.

- Mixed-fuel >4,000 square feet: Must be a Zero Energy Building, which includes highly energy efficient design and requires the use of on-site renewable energy such as solar panels to offset the energy use of the building, and be pre-wired for future electrification.

Note: See Section A-10 below for an explanation of "mixed-fuel."

A-7 How many new houses larger than 4,000 square feet were built in Orleans in 2022?

There were approximately 18-20 new houses built in 2022, and roughly half of them were larger than 4,000 square feet.

A-8 What does the Specialized Energy Code require for *new* construction of multi-family housing, beyond what is already required in the Town Building Code, as updated 1/1/23?

- ≤12,000 square feet (e.g., 12 units of 1,000 square feet each): Nothing.

- >12,000 square feet (e.g., 12 units of 1,000 square feet each): The building needs to be pre-certified as a "Passive House."

  The building must be pre-certified to meet the requirements of Passive House International (PHI) or Phius, a U.S. 501(c)(3) organization focused on making high-performance passive building the mainstream market standard.

  A "Passive House" reduces the reliance on active heating or cooling to greatly reduce a building's energy demand by (a) employing continuous insulation throughout its entire envelope without any thermal bridging, (b) creating an extremely airtight building envelope, preventing infiltration of outside air and loss of conditioned air, (c) employing high-performance windows (double or triple-paned) and doors – solar gain is managed to exploit the sun's energy for heating purposes in the heating season and to minimize overheating during the cooling season, (d) using some form of balanced heat- and moisture-recovery ventilation, and (e) using a minimal space conditioning system (https://www.phius.org/passive-building/what-passive-building/passive-building-faqs).

A-9 What does the Specialized Energy Code require for *new* commercial and municipal construction, beyond what is already required in the Town Building Code, as updated 1/1/23?

- All-electric: No additional requirements.

- Mixed-fuel:

  - On-site renewable energy with a rated capacity of 1.5 W/ft^2 multiplied by the sum of the gross conditioned floor area of the three largest floors (with an alternative requirement if the building cannot meet this requirement in full).
  - Pre-wiring for future electrification.

A-10 What is the difference between an all-electric building and a mixed-fuel building?

A mixed-fuel building uses a combination of fossil fuels (e.g., natural gas, propane or oil) and electricity for heating, cooling, cooking, etc.

All-electric buildings use electricity for all end-uses including heating, cooling, water heating and cooking. (An all-electric building can include a backup generator or an outdoor propane grill.)

A-11 What does "net zero" mean?

For the purposes of the Specialized Energy Code, a "net-zero" building is defined as "a building which is consistent with achievement of MA 2050 net zero emissions, through a combination of highly energy efficient design together with being an all-electric or Zero Energy Building, or where fossil fuels are utilized, a building fully pre-wired for future electrification and that generates solar power on-site from the available Potential Solar Zone Area" (https://www.mass.gov/doc/summary-document-explaining-stretch-energy-code-and-specialized-opt-in-code-language/download, p. 10).

Note: Other specific definitions of "net zero" can be found, but they are getting at the same general concept.

A-12 If the effective date of the incremental requirements under the Specialized Energy Code is July 1, 2024, how will that affect projects at different stages of development or construction?

If a building permit application has been stamped by July 1, 2024, the project will not be subject to the new requirements in the Specialized Energy Code.

A-13 How much are costs expected to increase in order to comply with the Specialized Energy Code?

a. General

Although Specialized Energy Code provisions have just begun to take effect (in four towns they were effective July 1, 2023; the earliest date for other towns so far is January 1, 2024, so estimates are preliminary), there have been some efforts to estimate the incremental costs of compliance with the Specialized Energy Code, with estimates so far in the 1%-4% range for incremental costs:

- HBRAMA study: A study by Wentworth Institute of Technology, the MIT Center for Real Estate, and the Home Builders & Remodelers Association of Massachusetts, has estimated that the cost of home construction will increase by 1.8%-3.8% (2.4% for large multi-family buildings).[1]

[1] https://hbrama.com/wp-content/uploads/2023/05/Public-Policy-for-Net-Zero-Homes-and-Affordability-Final-6-14-23.pdf

The Mass. Department of Energy Resources (DOER) has commented on the HBRAMA study. The comments are in Appendix A below. They point out, among other things, that DOER did a number of cost studies, that both DOER and the HBRAMA study agree that all-electric home construction is less expensive than mixed-fuel homes, and that the Specialized Code and the existing Stretch Code are almost identical for all-electric buildings, other than multi-family housing >12,000 sq. ft.

b. Passive House (see Section A-8 above): Passive House construction and certification will be required for multi-family housing larger than 12,000 sq. ft. and can be used for compliance in other categories. Given the thoroughness of energy efficiency features in Passive Houses, they qualify for significant subsidies (see the Brewster Woods example below).

- Incremental construction costs: According to Aaron Gunderson, Executive Director of Passive House Massachusetts, the currently available data for the incremental cost of Passive House construction estimates 1%-3%, and the best source is a 2022 study by the Massachusetts Center for Clean Energy and ICF International Inc.

- Example – Brewster Woods

  For Brewster Woods, a 30-unit affordable housing project in Brewster, the incremental capital cost of being Passive-House certified (compared to compliance with the building code in effect before 2023) was approximately 3%. The incremental cost when compared to the current building code, as updated on January 1, 2023, may be less.

  Cape Light Compact paid $966,250 of incentives, which covered the full cost of the HVAC system. This also more than covered the 3% premium for Passive House compliance.

- In addition to construction costs for Passive Houses, there are expenses for certifying the buildings as Passive Houses. The cost to design and certify Passive House construction currently is estimated at around $200,000 for multi-family projects between 14 and 30 units. (This was the amount of additional soft costs for Passive House certification for Brewster Woods, above, and a portion of those costs were covered by Cape Light Compact.) The best estimate for early participating single-family homes is in the range of $10,000 to $30,000, with costs expected to decrease as builders and Passive House raters work together to streamline the process.

c. Other

The cost of pre-wiring for electrification will be the relatively minor materials cost for wire and the labor to install it while the walls are open during construction. This will be less labor and cheaper than installing wire later in finished walls. The cost of minimum HVAC/service water requirements will depend upon the size of the building being constructed. The cost of solar PV panels on-site depends significantly on the size of the system being installed. For the fire station (Section C-3 below), we have estimated $3.00/Watt, but solar panels for a residence will be more costly.

A-14: What subsidies and other financial incentives are available to construct energy-efficient buildings?

Mass Save, through Cape Light Compact:

- All-electric homes of 1-4 units: up to $40,000, with single-family home incentives ranging from $15,000 to $25,000, depending on the level of energy efficiency being achieved.

- Multi-family Passive House:
  - Pre-construction feasibility costs up to $5,000.
  - Pre-construction energy modeling: 75%, up to $500 per unit (max $20,000).
  - Pre-certification: $500 per unit.
  - Post-construction certification: $2,500 per unit.
  - Post-construction performance bonus: $0.75/kWh or $7.50/therm.

- Low- and moderate-income projects:
  - High-efficiency HVAC: Up to 100% of cost for low-income; up to 80% for moderate income.
  - Weatherization: 100% of costs above the baseline.
  - O&M costs: HVAC maintenance covered for up to three years.
  - Engineering study: $2,000 per unit, up to $60,000.

Solar energy incentives:

- Federal tax credit: 30% of the cost of a solar photovoltaic (PV) system.
- State tax credit: 15% of the system cost, capped at $1,000.
- Net metering.
- SMART program.
- Community solar.

Federal Inflation Reduction Act of 2022 ("IRA"):

- Section 45L tax credit: $500 to $5,000 for energy efficient home construction.
- Section 179D tax deduction: Up to $5.00 per sq. ft. for commercial and municipal buildings, under specified conditions.
- Energy Star tax credits under the IRA (annual limit of $3,200, with sub-limits):

    - Heat pumps: 30%, up to $2,000.
    - Central air conditioners: 30%, up to $600.
    - Biomass stoves and boilers: 30%, up to $2,000.
    - Heat pump water heaters: 30%, up to $2,000.
    - Insulation: 30%, up to $1,200.
    - Windows and skylights: 30%, up to $600.
    - Exterior doors: 30%, up to $500.
    - Geothermal heat pumps, small wind turbines, fuel cells, battery storage technology: 30%.
    - Electric panel upgrade: 30%, up to $600.
    - Home energy audit: 30%, up to $150.

A-15: What counts as a Major Renovation, such that it triggers the current Stretch Code requirements in the Building Code, as updated on January 1, 2023?

The rules for renovations are ***already*** in the current Building Code as part of the Stretch Code (as updated 1/1/23) and won't be affected by the vote on the Specialized Energy Code.

That having been said, here are some answers to the questions relative to the Stretch Code under current law, as updated 1/1/23.

a. What if I want to just update my bathroom?

   A bathroom update alone is very unlikely to be covered unless it is extremely large and involves "reconfiguring" the space (e.g., adding or changing walls).

b. What if I don't move any walls?

   To be affected, renovations (distinct from additions) would need to reconfigure the space, which would generally involve moving walls.

c. Is it 1,000 square feet or a %?

   It's whichever one applies – adding or renovating and reconfiguring more than either (i) 1,000 square feet or (ii) an area at least as great as the existing conditioned

floor area of the existing dwelling unit (i.e., essentially doubling the size of the house).

d. What if I want to add a room for some live-in help to help me when I get old?

The rules deal with the changes made to the size of a home rather than the uses of the changed space. So, unless that room is larger than 1,000 square feet or more than 100% of the conditioned floor area of the existing dwelling unit (i.e., more than doubling the size of the house), the Stretch Code (existing law) would not apply to this work.

e. How many renovations were there in Orleans in 2022?

Approximately 136, with only a portion being over 1,000 square feet.

A-16: What case studies are available to estimate the cost of increased efficiency?

The Massachusetts DOER has done a number of recent case studies (https://www.mass.gov/info-details/stretch-code-residential-cash-flow-analysis).

Residential: Here is a summary of the cost/savings to improve energy efficiency by about 20% (58% better than the applicable building code before the Stretch Code took effect vs. 48% better), taking into account rebates and tax rebates. In each case, an all-electric home is less expensive to build and has greater annual savings than one using natural gas:

- 4,000 sq. ft. home in Worcester:
  - All-electric: $20,042 **lower** building cost; annual savings of $548, taking energy savings into account.
  - Natural gas: $3,184 higher building cost; annual savings of $302, taking energy costs into account.

- 2,100 sq. ft. home in Worcester:
  - All-electric: $28,597 **lower** building cost; annual savings of $1,053 taking energy savings into account.
  - Natural gas: $7,907 higher building cost; annual increase of $496, taking energy costs into account.

- 2,100 sq. ft. townhouse in Worcester:
  - All-electric: $11,492 **lower** building cost; annual savings of $316, taking energy savings into account.
  - Natural gas: $61 higher building cost; annual savings of $11, taking energy costs into account.

- Six-unit multi-family in Worcester:
  - All-electric: $15,690 **lower** building cost per unit; annual savings of $683 per unit, taking energy savings into account.
  - Natural gas: $2,277 higher building cost per unit; annual savings of $14 per unit, taking energy costs into account.

- Four-story multi-family in Worcester:
  - All-electric: $16,326 **lower** building cost per unit; annual savings of $738 per unit, taking energy savings into account.
  - Natural gas: $568 lower building cost per unit; annual savings of $75 per unit, taking energy costs into account.

There are also case studies for commercial buildings, comparing optimized designs using natural gas or electricity with designs based on the energy code in effect in 2020. In all cases, using optimized designs both reduces carbon emissions and lowers the lifecycle cost of paying for and operating the buildings studied:[2]

- Small office building (25,200 sq. ft. in two stories):
  - Optimized design (natural gas): 0.7% lower 50-year lifecycle cost, 3.3% higher cost initially (before Mass Save incentives)
  - Optimized design (electric): 0.2% lower 50-year lifecycle cost, 4.5% higher cost initially (before Mass Save incentives).

- Large office building (614,400 sq. ft. in 15 stories, with 40% window-to-wall ratio (WWR)):
  - Optimized design (natural gas): 8.7% lower 50-year lifecycle cost, 4.6% lower cost initially (before Mass Save incentives)
  - Optimized design (electric): 8.3% lower 50-year lifecycle cost, 4.0% lower cost initially (before Mass Save incentives).

- Large office building (614,400 sq. ft. in 15 stories, with 50% window-to-wall ratio (WWR)):
  - Optimized design (natural gas): 9.1% lower 50-year lifecycle cost, 4.6% lower cost initially (before Mass Save incentives)
  - Optimized design (electric): 8.7% lower 50-year lifecycle cost, 4.0% lower cost initially (before Mass Save incentives).

[2] Stretch Energy Code Development Support Documentation | Mass.gov.

- Primary school (73,960 sq. ft. in two stories):
    - Optimized design (natural gas): 1.4% lower 50-year lifecycle cost, 1.0% higher cost initially (before Mass Save incentives)
    - Optimized design (electric): 1.9% lower 50-year lifecycle cost, 2.7% higher cost initially (before Mass Save incentives).

- Secondary school (328,000 sq. ft. in four stories):
    - Optimized design (natural gas): 2.3% lower 50-year lifecycle cost, 0.2% higher cost initially (before Mass Save incentives)
    - Optimized design (electric): 2.5% lower 50-year lifecycle cost, 0.8% higher cost initially (before Mass Save incentives).

- Office-lab (55/45) building (422,400 sq. ft. in 9 stories, plus 2 below grade):
    - Optimized design (natural gas): 6.0% lower 50-year lifecycle cost, 1.1% lower cost initially (before Mass Save incentives)
    - Optimized design (electric): 6.3% lower 50-year lifecycle cost, 0.6% lower cost initially (before Mass Save incentives).

- Multi-family (63,200 sq. ft. in four stories and 58 apartments, mid rise, slab-on-grade):
    - Optimized design (natural gas): 2.2% lower 50-year lifecycle cost, 1.7% higher cost initially (before Mass Save incentives)
    - Optimized design (electric): 5.6% lower 50-year lifecycle cost, 0.7% higher cost initially (before Mass Save incentives).

- Multi-family (71,100 sq. ft. in eight stories and 81 apartments, mid rise, over podium):
    - Optimized design (natural gas): 0.6% lower 50-year lifecycle cost, 2.6% higher cost initially (before Mass Save incentives)
    - Optimized design (electric): 1.9% lower 50-year lifecycle cost, 3.2% higher cost initially (before Mass Save incentives).

- Multi-family (267,100 sq. ft. in 26 stories and 352 apartments, high rise):
    - Optimized design (natural gas): 0.1% lower 50-year lifecycle cost, 3.9% higher cost initially (before Mass Save incentives)
    - Optimized design (electric): 1.1% lower 50-year lifecycle cost, 4.2% higher cost initially (before Mass Save incentives).

B Affordable Housing

B-1 How will the Specialized Energy Code affect new construction of affordable housing?

- Cost: This will depend on the nature of the new construction, as described in Sections A-6 and A-8 above. For houses over 4,000 sq. ft. and multi-family housing over 12,000 sq. ft., it may raise the cost by an estimated 1%-4% after factoring in incentives and grants, but the increased efficiency, through insulation, air sealing, etc. will result in significant operating cost reductions and much more comfortable living space for those most economically vulnerable.

- Schedule: If adopted, the Specialized Energy Code will be effective as of July 1, 2024. Thus, it will apply only to projects that do not have their applications stamped before that date.

B-2 What about the Pennrose/Cape Cod 5 project?

The Cape Cod 5 project's application for a building permit has been stamped, so the Specialized Energy Code provisions will not apply. That being said, it will need to meet the version of the existing Building Code applicable to its schedule.

B-3 What about the 107 Main Street project?

If the 107 Main Street project's application is stamped before July 1, 2024, it will not be impacted by the Specialized Energy Code. That being said, it will need to meet the version of the existing Building Code applicable to its schedule.

B-4 What about the Governor Prence Project?

It appears to be unlikely that the Governor Prence project will have a stamped permit application by July 1, 2024, in which case the Specialized Energy Code provisions, if adopted, may apply. They are summarized in Section A-6 and A-8 above. Section 6.6 of the RFP issued by the Town of Orleans for the Governor Prence project mentions the Specialized Energy Code, so it will not be a surprise to applicants.

B-5 What happened in Wellfleet with the 95 Lawrence Road affordable housing project and the Specialized Energy Code?

According to Jay Coburn, President and CEO of Community Development Partnership (CDP), which, together with Preservation of Affordable Housing Inc. (POAH), is sponsoring the Residences at Lawrence Hill project in Wellfleet (also known as 95 Lawrence Road), the incremental cost of complying with the updated Stretch Code is expected to be about 3%. This project will have up to 46 one- to three-bedroom

apartments. It is not clear if the project, already designed, meets the Specialized Energy Code requirements, though if they do not get their permit application stamped by January 1, 2024, they may need to do so. That development is going all electric, which should facilitate compliance with the Specialized Energy Code.

B-6 How will the Specialized Energy Code requirements, beyond what is already required in the Town Building Code, as updated 1/1/23, affect the upfront and ongoing costs of various kinds of affordable housing?

a. Single-family homes <4,000 sq. ft.

No changes from existing requirements for all-electric homes. Mixed-fuel homes will need to be pre-wired for future electrification and have on-site renewable energy, such as solar panels, as summarized above in Section A-6.

b. Single-family homes >4,000 sq. ft.

New construction of homes that are larger than 4,000 sq. ft. (not typical for affordable housing) will have to meet one of two requirements, as summarized above in Section A-6:

i. Be all-electric, or

ii. If mixed-fuel, be a Zero Energy Building, which requires the use of on-site renewable energy such as solar panels to offset the energy use of the building (see Section A-6 above) and be pre-wired for future electrification.

c. Multi-family homes ≤12,000 sq. ft.

No changes from existing requirements.

d. Multi-family homes >12,000 sq. ft.

This applies only to new construction. The following information comes from Section A-8 above.

The building must be pre-certified to meet the requirements of Passive House International (PHI) or Phius, a U.S. 501(c)(3) organization focused on making high-performance passive building the mainstream market standard. (A “Passive House” reduces the reliance on active heating or cooling to greatly reduce a building’s energy demand by (a) employing continuous insulation throughout its entire envelope without any thermal bridging, (b) creating an extremely airtight building envelope, preventing infiltration of outside air and loss of conditioned air, (c) employing high-performance windows (double or triple-paned) and doors – solar

gain is managed to exploit the sun's energy for heating purposes in the heating season and to minimize overheating during the cooling season, (d) using some form of balanced heat- and moisture-recovery ventilation, and (e) using a minimal space conditioning system (*https://www.phius.org/passive-building/what-passive-building/passive-building-faqs*).)

C Other Questions

C-1 Will the town's electrical grid be able to accommodate the requirements under the Specialized Energy Code?

Eversource and the Independent System Operator for New England (ISO-NE) plan years in advance. ISO-NE the ISO forecasts that both energy usage and peak demand will increase slightly over the next 10 years, but the effect of electrification of transportation and buildings is largely offset by state-sponsored energy efficiency (such as the Specialized Energy Code) and behind-the-meter solar PV resource.

The New England Electrification Load Forecast, prepared by Synapse Energy Economics, states that under the Commonwealth's most energy-intensive, all-options pathway: "While electrification will undoubtedly increase electric demand and energy consumption in New England, we conclude that the electric grid is well-suited to handle this transformation for the upcoming decade in the context of energy, capacity, and transmission system planning."

C-2 How will the Town reconcile the incremental requirements of the Specialized Energy Code with the requirements of historic districts, such as the Old Kings Highway Historic District?

Historic buildings are exempt from the Specialized Energy Code, the current Stretch Code, and the base energy code.

C-3 What will be the effect of the Specialized Energy Code on the upfront and ongoing costs for municipal buildings, such as the new fire station and library, and on taxes paid by Orleans residents?

a. Fire station

If the building is not all-electric, the Specialized Energy Code will require 1.5 watts of solar per sq. ft. of the conditioned space (two floors). A rough estimate of the cost of this solar installation is $162,000, or less than one-half of one percent of the estimated $40 million capital cost of the new fire station. It is estimated to be a two-story building of 36,000 sq. ft., and 36,000 sq. ft. x 1.5 watts/sq. ft. = 54,000 watts (54

kilowatts). At an estimated $3/watt = the rough cost would be $162,000 before considering substantial tax credits under the Inflation Reduction Act of 2022.

A rough estimate of the electricity generated by 54 kilowatts is 65,000 kWh per year, so that, although the future price of electricity cannot be reliably predicted, the income from that generation can be expected to offset much or all of the incremental capital cost over a reasonable time frame.

b. Library

Since the new library is planned to be all-electric, neither upfront nor ongoing costs will increase as a result of the Specialized Energy Code.

C-4 What will be the effect on taxes for Orleans residents?

The effect on taxes for the new fire station will be based on the additional upfront and ongoing costs and savings. As discussed in Section C-3 above, the incremental costs are expected to be small, especially taking into account the use of electricity generated by the required solar panels and in the context of the Town's overall budget.

For the new library, there will be no effect on taxes, because neither upfront nor ongoing costs will increase as a result of the Specialized Energy Code.

C-5 How will anyone be able to afford rentals if builders will have to spend so much more on up front accommodations?

The energy-efficiency improvements such as insulation and air sealing will actually reduce the ongoing energy use of tenants. For single-family residences, these provisions only substantially impact the high-end market: homes greater than 4,000 sq. ft. that are not all-electric.

Please send questions and comments to Roger McDaniel, Orleans Energy and Climate Action Committee, (914) 953-7333, roger.mcdaniel@madiganresources.com.

Appendix A

DOER's responses to the HBRAMA study discussed in Section A-13:

DOER studies on cost

- Building codes apply to new construction and major renovations, NOT existing properties that are sold in the real estate markets. The Stretch Code and specialized Stretch Code[3] focus on decarbonizing and reducing consumer energy burden.
- To develop the updated and new opt-in codes,[4] DOER worked with expert consultants to conduct independent analysis over a two-year period that assessed different Building Code standards specific to Massachusetts, including analysis of costs, energy, and emissions impacts.
    - The analysis helped inform energy codes that are aligned with the unique uses and needs of different building types in Massachusetts and will ensure the Commonwealth is cost-effectively achieving the necessary greenhouse gas emissions reductions.
    - Detailed documentation of assumptions and results on this analysis can be found at https://www.mass.gov/lists/stretch-energy-code-development-support-documentation, including the "Residential Stretch Code costs and benefits case studies."
- **Both the DOER analysis and the Home Builders & Remodelers Association of Massachusetts (HBRAMA) study conclude that all-electric is less expensive to build than mixed-fuel (a.k.a. gas heated) residential buildings**.
    - DOER found lower incremental costs in general in its analysis. DOER studied more home types and sizes than the HBRAMA study and was able to leverage data on thousands of recently built homes in MA and model over 10,000 homes for its cost analysis.
- **If builders choose the lower cost option and build all-electric homes they will comply with the Stretch code, Specialized Code and the Demonstration Project without having to worry about the local adoption – except for passive-house in large multifamily buildings.**
    - If builders choose gas heating in new homes – they are presumably doing so to attract a less price sensitive market segment.
- The other big shift in the Building Code is improved ventilation (with balanced filtered systems) – which we learned from Covid-19, and more recently from wildfire smoke, is important for the health of building occupants.
- In many cases, the cost to build with heat pumps is lower due to the shift from a gas furnace and central A/C to more efficient and less expensive heating equipment, as well as significant incentives available through Mass Save for highly efficient, all electric construction.
- The combination of Mass Save rebates and federal tax credits for different building sizes more than covers any incremental costs for these all-electric residential buildings, and also

[3] I.e., the Specialized Energy Code.

[4] [Such as the Specialized Energy Code.]

results in a better product to sell to customers, i.e. buildings with healthier ventilation, better resilience due to better envelopes, greater comfort from improved windows and lower air leakage etc., as well as lower operating costs due to the increased energy efficiency.
    - With the recent increases in energy costs, those lower operating costs due to increased energy efficiency further increase the benefits of more efficient homes.
    - Mass Save incentives will help builders and developers comply with the new code, and DOER estimates approximately $600 million in Mass Save incentives for new construction over the next decade.
    - The 2022-2024 Three Year Energy Efficiency Plan includes new all-electric new construction incentives for residential homes that comply with the new Stretch Code (HERS 45 or lower), as well as new incentives for commercial new construction. For example, Mass Save offers $15,000 in incentives for an all electric HERS 45 home (Mass Save | All-Electric Home).
    - Newly expanded federal tax credits for builders (available for the next 10 years) will also help builders and developers comply with the new code.
- The Stretch code, Specialized code and the Municipal Fossil Fuel Free Building Demonstration Program are all almost identical for all-electric buildings.
    - The only notable difference is that multi-family buildings over 12,000 sq ft have to be passive-house certified under the Specialized code (the Specialized code is required for the Demonstration Program).

The assumptions and design for the cost analysis can be found here:

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