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Sent: Friday, April 5, 2024 5:11 PM
To: STRETCHCODE (ENE)
Subject: Comments

Follow Up Flag: Follow up
Flag Status: Flagged

Hello,
Please find some highlights of my comments made at the "listening session".

- The Stretch Code as presently written is confusing for many beyond Building Inspectors. We as Building Inspectors are at the front line of trying to enforce such a problematic document. We suffer the rath of homeowners, building owners, contractors, etc. and are faced with many taking the chance to perform such work on existing buildings without permits to avoid the expense and added work required to conform. I understand the need to work to the goal of carbon reduction but at the same time I believe we need to introduce and educate at a more sustainable pace. It is difficult to attract people to the field of Building Inspectors and the weight of the pressure to not only work with this Code but also the enforcement I fear is burning out Building Inspectors.
- The difficulty is mainly in regard to the code as it involves existing houses and not new construction. The goal should always have an existing one or two family safer than before. The thresholds of requiring compliance and the level of compliance can be very costly when we are also trying to help homeowners be able to stay in their home or welcoming someone into homeownership with an older family home.
- There needs to be more support) training, technical assistance for not just inspectors but for the public.

I have many more comments and concerns which I would like to elaborate on but due to time constraints I could not attach.

Thank you,

Kathleen Nugent
Building Inspector representing myself

617-967-0135

Date: 4 April 2024

To: Paul Ormond and Ian Finlayson, Department of Energy Resources

From: Christopher N. Grey, Matthew J. Colturi, Mary C. Arntzen, and Other Contributors. Simpson Gumpertz & Heger, Inc. (SGH)

Subject: Code Comments, 225 CMR 23: Massachusetts Commercial Stretch Energy Code Comments on 2023 MA Stretch and Specialized Code

The following document summarizes our comments on the 2023 Massachusetts Commercial Stretch Energy Code. We include 19 comments. Each comment provides general background commentary and recommendations.

Comment 1. Section C503 – Alterations – Thermal Derating

General Comment: The current alterations section refers the reader to Sections C503, C402, C403, C404, and C405. Section C402 includes many varying requirements for the envelope thermal performance that may be challenging and/or not applicable to alterations of existing buildings (thermal derating, air testing, etc). We have found that in many cases, the breadth of this section and how it applies to alterations is confusing. We have also found that the requirement for thermal derating often results in the altered portions failing to meet the required U-factors (particularly in cases of mass masonry structures), which results in the need for a variance. Many thermal bridges are inherent to existing buildings and can't necessarily be resolved in existing building alterations, depending on the scope of work. We propose language similar to that present in the NY City Energy Code (Section C402.6.3) for documenting/showing thermal bridges (as required for thermal bridges in the alteration scope), but excluding these from the overall U-factor calculation.

Recommendation: Section C503.2: Revise Section C503.2 as follows:

Replace "Sections C402.1 through C402.5" with "Section C402".

Section C503.2.4: Add Section C503.2.4 with commentary as follows:

C503.2.4 Derating and Thermal Bridges: Existing linear thermal bridges inherent to the building structure and/or components that are not part of the alteration shall not be accounted for per C402.7.3. Construction documents shall include the following documentation in tabular format for these linear thermal bridges that may be excluded from vertical envelope performance:

1. Linear thermal bridge type.
2. Aggregate length of each type of linear thermal bridge.
3. Relevant detail in the construction documents showing a cross-section through the thermal bridge.

Commentary – The intent of the code is not to require unaltered portions of a building to be upgraded. The intent of this language is to clarify that existing components that are unaltered should not be taken into account in the thermal derating calculations.

Some alterations require building envelope upgrades despite limited or no exterior work. For example, consider two existing buildings with no exterior insulation and linear thermal transmittance (PSI) of the intermediate floor to exterior vertical wall intersection. Project A proposes an interior renovation that includes insulating the framing cavity or interior side of the exterior walls, but does not include exterior work. Project B proposes a reclad from the exterior that extends over the intermediate floor slab edges. Project A cannot improve the PSI of the intermediate floor since the slab edge interrupts the interior insulation and is an existing structural condition beyond the scope of work, and therefore can exclude this existing linear thermal bridge from derating vertical wall insulation. Project B can improve the PSI of the intermediate floor by including exterior insulation over the slab edge, and shall account for this thermal bridge in derating vertical wall insulation.

Comment 2. C503 – Alterations - Air Testing

General Comment: The current alterations section refers the reader to Sections C503, C402, C403, C404, and C405. Section C402 includes a requirement for air infiltration testing of new buildings. It is unclear how this applies to alterations. It is often impractical to perform air infiltration testing of an entire space when only a portion has been altered.

We provide the following screenshot from the "How-To Guide: Supporting Documentation" issued with the 2020 NYCECC, as a basis for our recommendations for alterations and additions.

AIR LEAKAGE/BARRIER TESTING & AIR BARRIER CONTINUITY PLAN – ADDITIONS & ALTERATIONS

Drawings must specify mandatory air barrier testing/inspection requirements specific to the building type.

▪ **Residential Buildings** – See R202 for the definition of Residential Building — 1 RCNY §5000-01 (g)(5)(iv), R502, R503

Building Types	Required Testing/Inspection	Required Progress Inspections	Reference Code
• Any Additions • Alterations to the existing building envelope	(A)	IA6	R402.4.1.
• Additions thermally isolated from the existing building envelope • Alterations of the entire existing building envelope including air barrier	(A) AND (B)	IA6 AND IA7	R402.4.1.2
• Additions with dwelling units ≥ 2	(A) AND (B) or (C)	IA6 AND IA7	R402.4.1.3
• Additions with dwelling units ≥ 8	(A) AND (B) or (D)	IA6 AND IA7	R402.4.1.3.1

(A) Visual Inspection of Air Barrier
Visual inspection of openings and penetrations in the building envelope, including site-built fenestration and doors to verify continuous air barrier installation

(B) Whole Building Air Leakage Testing [maximum 3 ACH]
Testing conducted at a pressure differential of 50 Pascals must verify that the Building air leakage rate does not exceed 3 air changes per hour (3 ACH).

(C) Air Leakage Testing of ALL "Testing Units"
Testing conducted at a pressure differential of 50 Pascals must verify that the air leakage rate of EACH testing unit does not exceed 0.3 cfm/sf of the testing unit envelope.

(D) Air Leakage Testing of SAMPLE "Testing Units"
Testing conducted at a pressure differential of 50 Pascals must verify that the air leakage rate of EACH Sample testing unit does not exceed 0.3 cfm/sf of the testing unit envelope. SAMPLE Testing Unit selection must follow the code provision.

▪ **Commercial Buildings** – See C202 for the definition of Commercial Building — 1 RCNY §5000-01 (g)(5)(iv), C502, C503

Building types	Required Testing/Inspection	Required Progress Inspections	Reference code
• **Additions with conditioned space < 10,000 sf** • **Alterations to the existing building envelope**	**(A)**	IIA6	1 RCNY §5000-01 (g)(5)(iv), C503.3
• **Additions with conditioned space ≥ 10,000 sf and < 50,000 sf, & Height ≤ 75'** • Alterations of the entire existing building envelope including air barrier	**(A) AND (E)**	IIA6 AND IIA7	C402.5.1.3 5.4.3.1.3
• **R-2 occupancy Only: Additions with conditioned space ≥ 10,000 sf and < 50,000 sf, and Height ≤ 75'**	**(A) AND (E) or (D)**	IIA6 AND IIA7	C402.5.1.3 5.4.3.1.3
• **Additions with conditioned space ≥ 10,000 sf and < 50,000 sf, & Height > 75'** • **Additions with conditioned space ≥ 50,000 sf**	**(A) AND (F) or (D) or (E)**	IIA6 AND IIA8 or IIA7	C402.5.1.3 5.4.3.1.3
• R-3 occupancy Only: Additions thermally isolated from the existing building envelope	**(A) AND (B) or (C)**	IIA6 AND IIA7	C401.2.1

(E) Whole Building Air Leakage Testing [maximum 0.4 cfm/sf]
Testing conducted at a pressure differential of 75 Pascals must verify that the Building air leakage rate does not exceed 0.4 cfm/sf of the building envelope.

(F) Testing/Inspection conducted per Air Barrier Continuity (ABC) Plan
Air Barrier Continuity Plan must be developed to specify the below.
- **List (Schedule of Details) of each unique assembly, joint, seam and penetration, keyed to building thermal/air boundary section diagrams (on Architectural Plans)**
- **Testing/Inspection standards (e.g., ASTM E1186) and performance criteria for each assembly, joint, seam and penetration type (on Architectural Plans)**
- **Specifications of sealing (continuity-ensuring) materials/measures, and Remediation procedures**
- **Sampling protocol, if applicable, and Test reporting/submittal guidelines**

ABC Plan, and Final Reports of Testing/Inspection conducted per the ABC Plan shall be provided to DOB upon request.

Recommendation: Add Section C503.2.5 as follows:

C503.2.5 Air leakage compliance: Alterations (except alterations of the entire existing building envelope including the air barrier) shall not be required to comply with Section C402.5.2.

Comment 3. C502 – Additions – Air Infiltration Testing

General Comment: The additions section states that the additions must comply with C402 through C406. C402 includes a requirement for air infiltration testing. It is not always practical to apply air infiltration testing requirements to new additions, particularly when the addition is an 'extension of space' of the existing building. Partial building air leakage testing often includes air leakage through non-building envelope conditions in the results. Our proposed language requires that only the addition itself comply with air infiltration testing requirements, and if the addition and existing building is tested, it be documented for record only.

Recommendation: Section C502.3.7: Add Section C502.3.7 as follows:

C502.3.7 Air Infiltration Testing. Additions shall be required to comply with air infiltration testing requirements in accordance with Section C402.5 for the addition only; alternatively, for additions that cannot be separated from the existing building, project shall perform air infiltration testing of the addition and existing building together and document results for record only. Test results for additions that include existing building components shall not be required to meet the maximum air leakage requirements of C402.5.2.2.

Comment 4. C503 – Alterations – Existing Wall Cavities

General Comment: The stretch code eliminates a prior exception that allowed for wall cavities and ceiling cavities which were uninsulated to be filled with insulation (without meeting code u-factor requirements). It is unclear how this applies to situations where portions of a wall assembly are removed (i.e. small sections of drywall).

Recommendation: Add the following exception under Section C503.1:

"Wall cavities that are exposed during construction shall comply with Section C402.1.4 only when the cavity is exposed across the full interstory height of a wall area. Localized removal of interior finishes does not require upgrading the wall assembly for compliance with Section C402.1.4."

Comment 5. C505 – Change of Occupancy or Use – Clarify Intent

General Comment: This section states that spaces undergoing a change in occupancy that results in an increase in demand for fossil fuel or electrical energy shall comply with C401.3, C402 through C406, and C408. It is unclear what threshold of increase in energy use constitutes upgrading the space (i.e. is it any increase, or is there a minimum threshold?). In addition, this requirement would often result in building owners needing to upgrade existing systems that are not being altered (that are in acceptable shape) to meet the requirements of the new code. This also may result in removing/replacing existing components which is counter to sustainability/embodied carbon reduction goals. Similar to Comment 1 above, we recommend excluding linear thermal bridges that are inherent to the structure from requirements for derating and thermal bridges.

Recommendation: C505.1: Add the following language to Section C505.1:

"An increase in fossil fuel or electrical energy of 10% or more over the existing building energy use shall be required to comply with this section. Design team shall perform a performance energy model in accordance with ASHRAE 90.1 Appendix G showing the existing base building energy performance and the proposed new performance. When showing compliance with Section C402.1.4 and Section C402.1.5, existing linear thermal bridges inherent to the building structure and not part of the alteration shall not be taken into account for derating vertical wall insulation."

Comment 6. Table C402.4: Clarify Revolving Door Requirements

General Comment: There is no requirement in the code related to revolving door U-factors. Revolving doors often do not include U-factors, as there is no industry standard that provides a procedure for U-factor calculation of revolving doors, and will not meet the prescriptive requirements of the code for other exterior door types. Since revolving doors are included in the building thermal envelope, they must be reported with the component performance alternative in accordance with Section C402.1.5. We recommend providing default U-factors for use in the component performance alternative by reference to ASHRAE Handbook of Fundamentals, Ch. 15, Table 7, which contains representative U-factors for revolving doors determined through testing.

Recommendation: Section C402.4: Add the following language to Section C402.4:

"Revolving doors shall shall not be subject to the requirements of C402.1.4 and C402.4. Use representative U-factors contained in ASHRAE Handbook of Fundamentals, Chapter 15, Table 7 when showing compliance with C402.1.5."

Comment 7. C402.5.2.1 Whole Building Test Method and Reporting – Clarify Scope

General Comment: This section states that buildings <10,000 SF shall have the entire building thermal envelope tested, and buildings >50,000 SF shall have portions of the building tested. It is not clear what happens between 10,000 and 50,000 SF.

Recommendation: Change the required threshold for either the upper or lower bound to provide clear direction.

Comment 8. C202 Glazed Wall System Definition Clarification

General Comment: The definition of a glazed wall assembly is unclear and differs from the examples given in the technical guidance document. This states that it is a system consisting of "both vision glass and/or spandrel sections", but the technical guidance indicates that both spandrel and vision glazing shall be included. We recommend updating the definition of a glazed wall assembly; our understanding from discussions with DOER is that the intent is to ensure higher performance for systems that bypass slabs (i.e. multi-story systems). Coordinate definition with notes in the technical guidance document.

Recommendation: Section C202: Revise the definition for Glazed Wall System as follows:

Glazed Wall System: System consisting of fenestration assemblies that extend multiple stories, and include vision glass and/or *spandrel sections* to create an above-grade wall that is designed to separate the exterior and interior environments. These systems include, but are not limited to, curtain walls, window walls, and storefront windows.

Comment 9. Table C402.4 – Existing Spandrel Section U-factor

General Comment: There is currently no prescriptive U-factor for spandrel assemblies. Most spandrel assemblies will not comply with opaque u-factors listed in Table C402.1.4 or C402.4. For additional information, see Thermal Performance of Spandrel Assemblies in Glazing Systems Research Roadmap, Phase 1 (https://www.pankowfoundation.org/our-work/research-grants/exterior-wall-systems/sustainability/thermal-performance-of-spandrel-assemblies-in-glazing-systems-research-roadmap-phase-1/). This is particularly challenging on existing building situations where there is a replacement of a localized area of spandrel glass/spandrel panels. We recommend including a prescriptive target specific to existing building situations, based on tabulated default performance values for spandrel assemblies which have been included in several state-level energy codes (e.g., California, Washington, New York).

Recommendation: C503.2.6: Add Section C503.2.6 as follows:

C503.2.6 Spandrel Sections: Existing window replacements are not subject to the requirements for glazed wall systems; existing window replacements shall meet the requirements of Table C402.4. Spandrel assemblies that are replaced shall meet a prescriptive U-factor based on the Table below.

TABLE C402.1.4.2
EFFECTIVE *U*-FACTORS FOR SPANDREL PANELS[a]

FRAME TYPE	SPANDREL PANEL	RATED R-VALUE OF INSULATION BETWEEN FRAMING MEMBERS						
		R-4	R-7	R-10	R-15	R-20	R-25	R-30
Aluminum without Thermal Break[b]	Single glass pane, stone, or metal panel	0.242	0.222	0.212	0.203	0.198	0.195	0.193
	Double glass with no low-e coatings	0.233	0.218	0.209	0.202	0.197	0.194	0.192
	Triple or low-e glass	0.226	0.214	0.207	0.200	0.196	0.194	0.192
Aluminum with Thermal Break[c]	Single glass pane, stone, or metal panel	0.211	0.186	0.173	0.162	0.155	0.151	0.149
	Double glass with no low-e coatings	0.200	0.180	0.170	0.160	0.154	0.151	0.148
	Triple or low-e glass	0.191	0.176	0.167	0.159	0.153	0.150	0.148
Structural Glazing[d]	Single glass pane, stone, or metal panel	0.195	0.163	0.147	0.132	0.123	0.118	0.114
	Double glass with no low-e coatings	0.180	0.156	0.142	0.129	0.122	0.117	0.114
	Triple or low-e glass	0.169	0.150	0.138	0.127	0.121	0.116	0.113
No framing or Insulation is Continuous[e]	Single glass pane, stone, or metal panel	0.148	0.102	0.078	0.056	0.044	0.036	0.031
	Double glass with no low-e coatings	0.136	0.097	0.075	0.054	0.043	0.035	0.030
	Triple or low-e glass	0.129	0.093	0.073	0.053	0.042	0.035	0.030

a. Opaque assembly U-factors based on designs tested in accordance with ASTM C1363 or NFRC 100 shall be permitted. Interpolation outside of the table shall not be permitted. Spandrel panel assemblies in the table do not include metal backpans.
b. Aluminum frame without a thermal break shall be used for systems where the mullion provides a thermal bridge through the insulation.
c. Aluminum frame with a thermal break shall be used for systems where a urethane or other nonmetallic element separates the metal exposed to the exterior from the metal that is exposed to the interior condition.
d. Structural glazing frame type shall be used for systems that have no exposed mullion on the interior.
e. No framing or insulation that is continuous shall be used for systems where there is no framing or the insulation is continuous and uninterrupted between framing.

*Table above is Table C402.1.4.2 from the 2020 NYCECC.

Comment 10. C402.7 Derating and Thermal Bridges

General Comment: This section allows for prescriptive, reference, or model derating of assemblies. The prescriptive values are unrealistic and end up with systems that will not meet code-required U-factors. The available reference values are limited for common commercial building applications in Massachusetts. This is resulting in projects that need to perform extensive 2D and 3D modeling to meet U-factors, yet no acceptable modeling standards are provided in the code (See Comment 14).

Recommendation: We recommend that DOER request development of a thermal bridging guide with modeled conditions and reference psi values for commonly used assemblies. Some that are currently missing include mass masonry wall assemblies, roof-to-wall conditions, many wood-framed wall conditions, etc. For project-specific custom modeling, provide a list of acceptable standards for determining the thermal bridging psi values. SGH is happy to assist with this effort of developing these modeled conditions, if desired by the DOER.

Comment 11. Section C402.1.5 Above Grade Walls within Below-Grade Conditioned Spaces & Inclusion in Component Performance Alternative

General Comment: We are requesting clarification on the thermal requirements at conditioned below-grade spaces. Specifically, rooms that are within below-grade parking garages where the majority of the useable space is unconditioned, but the core contains conditioned spaces, such as the following:

- Spaces connected to the main thermal envelope (i.e. stairs and elevators)
- Spaces with both heating and cooling, but separated from the main thermal envelope (i.e. locker rooms, other misc. spaces)
- Spaces with heating only, with set points just above freezing to avoid freezing pipes (i.e. mechanical spaces, storage)

These spaces would be difficult to include in the C401.2.5 compliance path, as it is essentially impossible to eliminate the thermal bridging that occurs at the slab to wall intersection as this is a key structural component (core) of the building. These spaces are also typically a small percentage of the building and exist within a below grade space that is tempered by the geothermal effect on the perimeter garage walls.

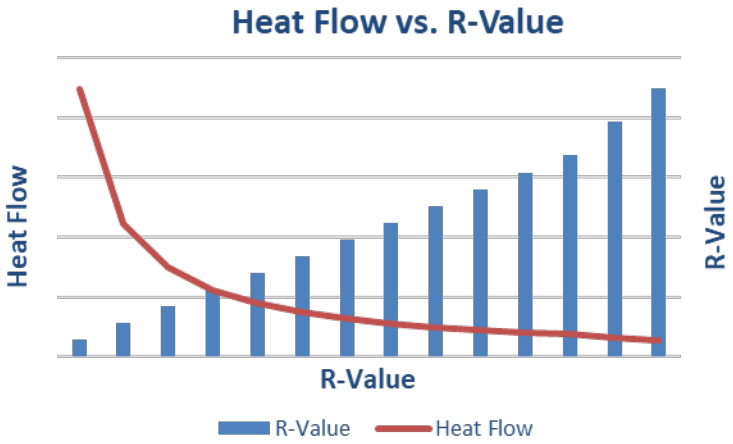
Recommendation: We recommend including the following clarification:

- Spaces connected to the main thermal envelope (i.e., stairs and elevators) – **Follow the prescriptive U-Factor requirements in the 2021 IECC Table C402.1.4 at all walls, ceilings, and floors that separate conditioned space from unconditioned space.**
- Spaces with both heating and cooling, but separated from the main thermal envelope (i.e. locker rooms, other misc. spaces) – **Follow the prescriptive U-Factor requirements in the 2021 IECC Table C402.1.4 at all walls, ceilings, and floors that separate conditioned space from unconditioned space.**
- Spaces with heating only, with set points just above freezing to avoid freezing pipes (i.e. mechanical spaces, storage) – **No thermal envelope required. Air Barrier Required.**

Comment 12. C402.1.4.1.1 Tapered, above-deck insulation based on thickness.

General Comment: Section C402.1.4.1.1 allows the R-value at the "average thickness" of tapered, above-deck insulation to be used in U-factor for compliance with Section C402.1.4. Using the R-value at the average thickness of tapered insulation to calculate the U-factor for an entire roof area is not representative of the actual thermal performance of the roof and allows roofs with tapered insulation to be significantly less energy efficient than the previous code versions required and significantly less energy efficient than roofs with continuous flat-stock insulation.

The heat flow through roof insulation is non-linear. As seen in the chart below, heat flow is inversely proportional to the R-value of insulation. There is a diminishing return of adding insulation beyond a certain plateau in heat retention performance, and therefore, the heat retained in areas of increased thickness of insulation (high points) is not equal to the heat lost in areas of reduced thickness of insulation (low points). Using the average insulation thickness assumes a linear relationship and inaccurately represents the actual thermal performance of the roof insulation.



In addition, Section C402.2.1.2** allows the above-deck roof insulation to taper down to as little as 1 in. without quantifying the impacts of this reduction on the building energy use. With this language, for example, you could have 1 in. of insulation at a low point and 10 in. at a high point, and the average R-value would be the equivalent of 5.5 in. of insulation. However, the heat loss through the areas with 1 inch of insulation will be much greater than the heat savings gained in areas with 10 inches of insulation, so the actual energy efficiency is not equivalent to that of a roof with a 5.5 in. of insulation.

In summary, using the average thickness of insulation in U-factor and R-value calculations is not representative of the thermal performance of the roof, and the average thickness method allows for worse energy performance than previous codes, which used a minimum insulation thickness to determine U-factor and R-value.

** We assume Section C402.2, and therefore Section C402.2.1.2, is intended to apply to all compliance methods. If that is not the intent, this should be clarified in Section C402.2.

Recommendations:

- For roof insulation with tapered insulation, the insulation thickness used to demonstrate compliance with the prescriptive maximum U-factor should be the minimum thickness (not average thickness), with an exception allowing tapered insulation to locally taper to 1 in. less than the base thickness, consistent with previous versions of the IECC (e.g., Section C402.2.1, Exception 2 of the 2018 IECC).

- With the change described above, Section C402.2.1.2 is no longer needed. We recommend deleting that section.

Proposed Changes to Code Language:

We recommend the changing the current code as shown below in red:

C402.1.4.1.1 Tapered, above-deck insulation based on thickness. Where used as a component of a maximum roof/ceiling assembly *U*-factor calculation, the sloped roof insulation *R*-value contribution to that calculation shall use the ~~average thickness~~ in inches (mm) along with the material *R*-value-per-inch (per-mm) solely for *U*-factor compliance as prescribed in Section C402.1.4.

"thickness at a point 1 inch thicker than the minimum"

~~**C402.2.1.2 Minimum thickness, lowest point.** The minimum thickness of above-deck roof insulation at its lowest point, gutter edge, roof drain or scupper, shall be not less than 1 inch (25 mm).~~

Delete section.

Comment 13. References to Deleted R-value-based method (Section C402.1.3 and Table C402.1.3)

General Comment: The prescriptive "Insulation component R-value-based method," (Section C402.1.3 and Table C402.1.3), is deleted in the current MA Stretch Code, but other sections of the code still reference the deleted Section and/or Table, or include language referring to the R-value-based method. Some examples of these of Sections are included below, but there are additional references to the deleted R-value-based method in the code not included below.

Recommendations: We recommend either updating the references to the applicable U-factor-based method or deleting the sections that are not applicable per MA amendments.

Comment 14. Section C402.7.3.3, Industry Standards for Modeled PSI value calculations.

General Comment: Section C402.7.3.3 allows use of calculated PSI values based on two or three-dimensional finite element analysis, but does not provide a procedure or reference standard for calculations. There is no current American standard for PSI calculations to our knowledge, but there are industry standards from Europe (referenced by PHI/PHIUS and ASHRAE 90.1-2022) and Canada (CSA Z5010:21).

Recommendations: C402.7.3.3: Add the following language to Section C402.7.3.3:
"Develop finite element models and perform calculations in accordance with ISO 10211:2017."

Comment 15. Section C402.7.4, Spandrel Analysis

General Comment: Multiple comments on Section C402.7.4; Refer to SGH Comment 9 above as well.

1. Spandrel panels are most often provided to conceal interior conditions such as intermediate floors or interior walls, or at individual penetrations such as structural members for canopies. Section C402.7.4 is unclear if thermal resistance of spandrels need to include linear thermal bridges (conditions listed in Section C402.7.3), or if the R-value of the spandrel system alone should be used. Section C402.7.4.3 requires three-dimensional modeling to calculate the spandrel R value when there are point thermal bridges, but Sections C402.7.4.1 and C402.7.4.2

do not require consideration of point thermal bridges. There are no requirements to include point thermal bridges (other than cladding attachment components) in the code.

2. Table C402.7.4.1 is limited only to differentiating spandrels within thermally broken or non-thermally broken curtain wall framing systems. Other variations impact spandrel thermal resistance including spandrel infill (e.g. glazing, metal panel) and insulation between framing members. We recommend providing tabulated default performance values for spandrel assemblies which have been included in several state-level energy codes (e.g., California, Washington, New York).

3. C402.7.4.3 requires three-dimensional modeling for thermal bridging in multiple planes, but does not reference published industry standards for a procedure. Additionally, there is not industry consensus on whether all spandrel sections require three-dimensional modeling. NFRC 100-2020 (referenced by IECC 2021) provides procedure to calculate spandrel U-factor only with two-dimensional modeling. ASHRAE RP-1365 and CSA Z5010 provide procedures for three-dimensional simulation, but are not specific to spandrel sections. Ongoing industry research has shown that three-dimensional modeling is recommended to accurately calculate thermal resistance of spandrel sections. For additional information, see Thermal Performance of Spandrel Assemblies in Glazing Systems Research Roadmap, Phase 1 (https://www.pankowfoundation.org/our-work/research-grants/exterior-wall-systems/sustainability/thermal-performance-of-spandrel-assemblies-in-glazing-systems-research-roadmap-phase-1/).

Recommendations:

1. Section C402.7.4: Add the following sentence to Section C402.7.4:
   (If both linear and point thermal bridges are required to be considered; recommended) – "Thermal resistance of opaque spandrel sections shall include the effects of linear and point thermal bridges. Alternatively, spandrel sections shall be derated for linear thermal bridges where the spandrel section intersects intermediate floor, interior wall, roof/parapet, and point thermal bridges where the spandrel section intersects structural framing or MEP penetrations."

   (If both linear and point thermal bridges are not required to be considered; not recommended) – "Thermal resistance of opaque spandrel sections are not required to include the effects of linear and point thermal bridges and shall consider the spandrel section independently of intersecting building components."

2. Replace Table C402.7.4.1 with Table C402.1.4.2 from the 2020 NYCECC (screenshot below).

TABLE C402.1.4.2
EFFECTIVE *U*-FACTORS FOR SPANDREL PANELS[a]

FRAME TYPE	SPANDREL PANEL	RATED R-VALUE OF INSULATION BETWEEN FRAMING MEMBERS						
		R-4	R-7	R-10	R-15	R-20	R-25	R-30
Aluminum without Thermal Break[b]	Single glass pane, stone, or metal panel	0.242	0.222	0.212	0.203	0.198	0.195	0.193
	Double glass with no low-e coatings	0.233	0.218	0.209	0.202	0.197	0.194	0.192
	Triple or low-e glass	0.226	0.214	0.207	0.200	0.196	0.194	0.192
Aluminum with Thermal Break[c]	Single glass pane, stone, or metal panel	0.211	0.186	0.173	0.162	0.155	0.151	0.149
	Double glass with no low-e coatings	0.200	0.180	0.170	0.160	0.154	0.151	0.148
	Triple or low-e glass	0.191	0.176	0.167	0.159	0.153	0.150	0.148
Structural Glazing[d]	Single glass pane, stone, or metal panel	0.195	0.163	0.147	0.132	0.123	0.118	0.114
	Double glass with no low-e coatings	0.180	0.156	0.142	0.129	0.122	0.117	0.114
	Triple or low-e glass	0.169	0.150	0.138	0.127	0.121	0.116	0.113
No framing or Insulation is Continuous[e]	Single glass pane, stone, or metal panel	0.148	0.102	0.078	0.056	0.044	0.036	0.031
	Double glass with no low-e coatings	0.136	0.097	0.075	0.054	0.043	0.035	0.030
	Triple or low-e glass	0.129	0.093	0.073	0.053	0.042	0.035	0.030

a. Opaque assembly U-factors based on designs tested in accordance with ASTM C1363 or NFRC 100 shall be permitted. Interpolation outside of the table shall not be permitted. Spandrel panel assemblies in the table do not include metal backpans.
b. Aluminum frame without a thermal break shall be used for systems where the mullion provides a thermal bridge through the insulation.
c. Aluminum frame with a thermal break shall be used for systems where a urethane or other nonmetallic element separates the metal exposed to the exterior from the metal that is exposed to the interior condition.
d. Structural glazing frame type shall be used for systems that have no exposed mullion on the interior.
e. No framing or insulation that is continuous shall be used for systems where there is no framing or the insulation is continuous and uninterrupted between framing.

3. Replace Section C402.7.4.3 with the following text:
   Use a two-dimensional finite element analysis to calculate R-value of opaque spandrel section in accordance with NFRC 100-2020. A three-dimensional model is recommended, but not required*.

   *If point thermal bridges required (see Item #1 in this comment), add “except when there are point thermal bridges”.

Comment 16. Section C402.1.5 - Glazed Wall System, Vision Glass Max Whole Assembly U-Factor

General Comment: Section C402.1.5.1 and Section C402.1.5.2 state vision glass used in the glazed wall system shall have a maximum whole assembly U factor of U-0.25. The technical guidance document states that in certain cases, this maximum can be increased to U-0.30 (detailed on pg 7 of Attachment A, Envelope Performance and Thermal Bridge Derating).

Recommendations: Add the language from the technical guidance document to an exception in Section C402.1.5.1 and C402.1.5.2. We recommend modifying the technical guidance language as follows:

Remove the following requirement “the glazed wall system is a thermally broken, triple glazed, has two low-e coatings, and has argon filled cavities and warm edge spacer”. Some projects may be able to achieve the COG U-factor without triple glazing, so this requirement is not needed.

Comment 17. Section C402.7.3 - Linear Thermal Bridge Conditions and Prescriptive PSI Values

General Comment: The types of linear thermal bridges are listed inconsistently between Section C402.7.3 and Table C402.7.3.1, or it appears that some common conditions are missing. Thermal bridge type is unclear for horizontal to vertical wall intersections such as floor/soffit to vertical wall, and roof to vertical wall above (i.e. rising wall). These conditions are not considered parapets, and our understanding of vertical wall plan transition is for vertical-to-vertical intersections.

Recommendations: Section C402.7.3: Add floor/soffit to the list of linear thermal bridge conditions. Table C402.7.3.1: Revise "Type of Linear Thermal Bridge" to clarify linear thermal bridge type for horizontal-to-vertical intersections.

Comment 18. Section C402.7.3.2 - Linear Thermal Bridge Reference PSI Values

General Comment: ASHRAE 90.1-2022 Table A10.1 contains Psi-factors and Chi-factors for thermal brdiges based on data from ASHRAE Research Project 1365 and the BC Hydro Thermal Bridging Guide (which is already listed as an acceptable reference in C402.7.3.2. IECC 2021 references ASHRAE 90.1-2019. We recommend incorporating this table as an acceptable reference for Psi values.

Recommendations: Section C402.7.3.2: Add the following language after "BC Hydro Power Smart": "or ASHRAE 90.1-2022 Table A10.1".

Comment 19. Section C402.7.3 - Linear Thermal Bridge Free

General Comment: With continuous exterior insulation, some linear thermal bridge conditions have a very low PSI value. Current reference materials do not include common details, forcing design teams to perform thermal modeling when there is minimal thermal bridging by inspection. Past PHIUS guidelines have defined thermal bridge-free construction PSI<0.006 BTU/hr-ft-F. Other industry standards currently in development (e.g. ASHRAE 227P) are developing language that allows designers to exclude conditions that are thermal bridge-free by inspection (e.g. including continuous insulation with no penetration or reduction in R-value of the insulating layer). We recommend adding language for similar conditions (for example, where an interior partition wall intersects the exterior wall or an exterior building corner, but the exterior wall has continuous insulation).

Recommendations: We recommend including prescriptive PSI values that may only be used for mitigated linear thermal bridges, and defining "mitigated" as including continuous insulation with no penetration or reduction in R-value of the insulating layer.

Fennick McCredie Architecture

Memorandum

Date:	April 3, 2024
To:	Ian Finlayson
Affiliation:	Department of Energy Resources
From:	Katherine Brekka
Project:	NA
Project No:	NA
Subject:	MA Stretch Code comments

On behalf of FM, I have prepared the following Stretch Code comments for consideration.

1. **Vestibule additions for existing buildings.** We propose that the DOER consider including an exception for small vestibule additions, specifically as it relates to requirements under C402 Building Envelope Requirements. These types of transitory spaces are not typically conditioned to the same level as regularly occupied areas and are essentially creating a secondary building envelope outside of the existing thermal envelope. We recently worked on a public dormitory project with a proposed vestibule addition. While the energy code did not require that our building entrance be protected with a vestibule (since our entrance opened directly into a space less than 3,000 SF) the owner was concerned with occupant thermal comfort, as well as operational efficiency. Project specifics are outlined below.
   a. Dormitory project is designed as a non-separated mixed use (780 CMR 508.3) building. Primary occupancies include (Group B - Business, Group R-2 – Residential, and Group S-2 – Light Hazard Storage). This building is greater than 3-stories tall, therefore the code defines this as a "Commercial Building" and the Commercial Provisions of the code will apply.
   b. Ch. 5 [CE] Existing Buildings: Section C502 Additions
   "Additions to an existing building where the addition is up to 100% of the size of the existing building and less than 20,000-sf shall comply with Sections C401.3, C402 through C406, and Section C408."
      i. Our project includes a small 100 sf heated vestibule addition and will need to comply with sections C401.3, C402 through C406, and Section C408 per section C502.
         - Clarification: C402 Building Envelope Requirements are only applicable to the *Building Thermal Envelope* which is defined as follows:
           (a) "The basement walls, exterior walls, floors, ceiling, roofs and any other building element assemblies that enclose ***conditioned space*** *or provide a boundary between conditioned space and exempt or unconditioned space."*
           (b) It's worth noting here that we considered removing the unit heater from our vestibule all together to simplify our code compliance path for this addition.
         - Our addition does not comply with either of the exceptions listed under C402.1.1 (Low-Energy Buildings and Greenhouses) as this space would exceed the peak

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design rate of energy usage (3.4 btu/h x ft^2 or 1.0 watt per square foot) and the vestibule is conditioned.

- C402.3 Roof Solar Readiness – with such a small roof area, we question why this requirement should apply to our project, as this area would not yield any significant about of solar power generation.
  (a) In addition to providing a Solar-Ready Zone area, Appendix CB contains additional requirements for Electrical Energy Storage System-Ready Area (CB103.7), Interconnection Pathways (CB103.6), etc.
  (b) In our case we had proposed a 1 story vestibule on the west side of an existing 4 story building, so this new roof area would be in the shadow of the existing building for approximately 50% of the day (not quite hitting exception #2: *"A building with a solar-ready zone that is shaded for more than 70 percent of daylight hours annually.")*

2. **Derating and Thermal Bridges.** We would like to request that additional reference details be added to the Building Envelope Thermal Bridge Guide. We are currently working on a new project for a non-profit and found we needed to submit an additional service request in the amount of $7,500 to model three typical details not represented in the guide. This only included one round of modeling and does not support an iterative design process.

Thank you for your consideration. We greatly appreciate the work that has been done on these energy code updates and support the vision of a decarbonized future.

Sincerely,

Katherine Brekka,
Senior Associate | Sustainability Practice leader

To whom it may concern:

Please forgive me for emailing these written comments after the stated deadline of Wednesday, April 5, 2024 at 5PM. If your team is still soliciting comments regarding the Stretch Code in MA, please see comments below from myself and colleagues/coworkers of mine.

For background purposes, I am an architect, project manager, and building envelope consultant at Building Enclosure Science, LLC (BES), headquartered in Providence, RI but with a Boston, MA office and a largely institutional MA-based clientele/portfolio specific to the building envelope of mostly existing buildings. We also have consultants on our team whose work is predominantly in new construction consulting and commissioning or existing multifamily housing (both mid- to high-rise urban condominiums and suburban wood-framed multifamily housing communities). I am a licensed architect in MA, RI, and ME, with my initial licensure being issued by the Commonwealth of MA.

BES Comments Regarding MA Stretch Code:

- For those of us whose work as architects, designers, engineers, and consultants is predominantly focused on the building envelope of EXISTING buildings, both commercial and residential, it feels that missing from the MA Stretch Code-related commentary thus far is how to go about developing projects that meet new code for restoration or alteration work in these existing buildings; For example, questions abound regarding what does ONLY a window replacement project look like or what does ONLY a section of cladding replacement look like, and what are the relevant requirements/code sections/processes for those isolated envelope scopes of work that aren't ground up new construction whose likely code compliance pathways can be undertaken early in schematic design and design development?
- As stated often during the Zoom listening session on 03/28/24, there seems to be a need for demonstrating how existing buildings can be brought up to current code, and when this is required/triggered based on project scope, size, extents, etc. (i.e. for existing buildings with construction such as mass masonry, balloon frame construction, platform construction, etc. as examples of building types needing more specific direction for updated code application to EXISTING construction).
- Existing construction "alterations" language is very confusing within the code; Designers within our existing construction/building envelope "niche" are often asking "What exactly applies to commercial vs. residential structures, and how are these requirements to be applied by existing building type, existing construction type, alteration scope/size/extents, etc.?" Again, further guidance and/or specific resources would be very helpful from DOER and/or partnering organizations.
- It seems that new construction and renovations may be significantly impacted and stalled until many of the issues raised during the March 28th listening session are further clarified and better understood; This can be viewed as a major disappointment when considering that Massachusetts is one of only a handful of states continually losing population mainly due to high living and construction costs and because there is such a housing shortage. Less construction, not more, may then result, and/or such a huge shift (in code

requirements) may push owners to do more unpermitted work, the opposite of what the updated code (and theoretical enforcement) is trying to accomplish.
- There appears to be a need for more/greater connection between the DOER, BBRS, and the Healey administration on meeting housing needs while also meeting "Net 0" goals.

Thank you for your time! Please take care,
Dan Nowlan, RA, AIA

Hello Ian and all,

Thank you for taking comments. Sorry I'm late! I hope you still consider!

1. Please develop a platform where feedback shared with one team can be seen by other teams to speed up answering questions. Can MassSave funding be used for this platform?
2. Please clarify what happens if a building on the passive house path is not able to pass the blower door test. With other pathways, there are provisions and allowances to pass a less stringent requirement.
3. Is there a way the TEDI pathway can provide a provision that if the building has a certain low EUI/Net Zero Energy, it is not required to meet the TEDI model, since teams have been finding the TEDI model onerous to pass due to the inability to control the given targets?

Much appreciation for all the work you are doing!
Keihly

Keihly Moore, AIA
Phius Certified Consultant (CPHC)
Pronouns I use: she/her
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April 3, 2024
Department of Energy Resources (DOER)
100 Cambridge Street, Suite 1020
Boston, MA 02114
Attention: Ian Finlayson
Via email: stretchcode@mass.gov

RE: CODE COMMENTS

AIRLIT studio appreciates the opportunity to provide comments on the Massachusetts Stretch Energy Code following the Zoom listening session that took place on March 27, 2004.

Our comments and suggestions are divided into the following sections:

1. Create a public record with responses to DOER inquiries.
   The Stretch Code includes new concepts and requirements that have not been included in previous versions of the energy code or in codes in other localities. As Project Teams learn to comply with the new requirements, requests for clarification are unavoidable, especially as some of the language of the code and the accompanying guidelines are subject to interpretation. We have submitted clarification requests to DOER several times in the last few months. The response we receive is sometimes inconsistent with past conversations or with responses other teams have received.
   To avoid further confusion, we request the creation of a public record with the responses to DOER inquiries so that the clarification process is expedited and more consistent.

2. Amend language related to change of use/occupancy.
   Massachusetts-amended section 505.1 of the 2021 version of the International Energy Conservation Code (2021 IECC) requires any space that, as the result of undergoing a change in occupancy, increases its demand for either fossil fuel or electrical energy, to comply with all the requirements of the code as they pertain to new construction. It is understood that the intent of this section of the code is to improve the conservation of energy of the renovated building. However, we have seen existing building projects avoiding electrifying their fossil fuel-based heating system, because electrifying the building invariably results in an increase in the demand for electrical energy, even if this is accompanied by a reduction in fossil fuel or overall building consumption. The result of the language in section 505.1 goes against the widespread adoption of electrification and replacement of fossil fuel systems in existing buildings.
   We request an amendment to section C505.1 to change the language that refers to “an increase in demand for either fossil fuel or electrical energy” to “an increase in demand for either fossil fuel or total building energy.”

3. Reconsider increasing currently unreasonably low TEDI thresholds for schools.
   This feedback was provided in June of 2022 and, after almost two years and after working on several more TEDI models, we remain convinced that the TEDI limits, particularly the heating TEDI limit, are unreasonably low. As a result, meeting these low values require replicating energy modeling strategies from the prototype models published online, which are not standard practice in the industry. Moreover, several key modeling strategies used in the prototype models are not explicitly stated in the modeling guidelines, Attachment C of the Final Stretch and Specialized Code Guidelines, published in September of 2023. This includes, for instance, atypical "setpoint manager" configurations after the coils of the air handling units in the model.
4. Update the prototype models so they match the modeling guidelines.
   There are more than a few instances where the prototype models do not match the modeling guidelines. As an example, the U-values of the façade of a few of the prototype buildings seem unreasonably high, as these are supposed to be derated values. Another example is implementing "air cascading" from the cafeteria to the kitchen to reduce the amount of makeup air provided in the kitchen. This strategy was recommended to us in a model review session with DOER, however the guidelines do not explicitly explain how this strategy should be modeled. Ensuring that the prototype models match the modeling guidelines, by updating either or both of them, will reduce unnecessary confusion and frustration.
   As we have modified the prototype models to better align with the guidelines, we have found that the prototype models themselves do not comply with the TEDI thresholds (see comment 3). We have yet to find, for example, a school project -including in the prototype models- that can comply with the thresholds when following the "Default HVAC" modeling path.

Thank you for the opportunity to provide comment on this important issue. If you have any comments, please do not hesitate to reach out.

Sincerely,

Alejandra Menchaca, PhD, LEED AP, WELL AP
Principal
AIRLIT studio, LLC

Alonso Dominguez, PhD
Principal
AIRLIT studio, LLC

April 3, 2024

Mr. Ian Finlayson
Massachusetts Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

Re: Code Comments

Submitted via email: stretchcode@mass.gov

Dear Mr. Finlayson,

These comments are submitted on behalf of the Massachusetts Net Zero Building Coalition, facilitated by Northeast Energy Efficiency Partnerships (NEEP). The undersigned Net Zero Building Coalition participants and supporters, individually and collectively, thank Massachusetts Department of Energy Resources (DOER) for its significant progress-to-date and urge DOER to address six important concerns and issues detailed in this letter.

The Massachusetts Net Zero Building Coalition is a first-of-a-kind assembly of elected and appointed municipal officials, building industry professionals, including architects, engineers, and developers, and non-profit organizations, facilitated by technical experts at NEEP. The group is unique because of its collective technical expertise, practical experience in the field, public-sector representation, and effective advocacy. Meetings are monthly and volunteers participate on an ad hoc basis. In March 2022, more than 300 signatories including elected representatives of nearly 60 cities and towns representing approximately 40 percent of the Massachusetts population signed the Massachusetts Net Zero Building Coalition letter to the Massachusetts DOER regarding detailed stretch code recommendations.

NEEP, as a non-profit organization dedicated to advancing the Northeast and Mid-Atlantic regional collaboration for energy efficiency, strongly supports measures that promote energy efficiency and energy resilience in homes, buildings, industry, and communities.

General Comments – Updated Stretch Energy Code and Specialized Code Are Vital

The Massachusetts Net Zero Building Coalition appreciates the diligent efforts of the Massachusetts DOER in the development and implementation of the updated Stretch Energy Code and Specialized Code. These codes are vital to promoting energy efficiency, electrification, and renewable power as necessary to ensure safe, resilient, and healthy residential and commercial buildings.

The recent update of the Stretch Energy Code and addition of the Specialized Code geared toward achieving net zero building energy performance are commendable achievements. These initiatives, mandated by the 2021 Climate Act, reflect a proactive approach to aligning building standards with Massachusetts' greenhouse gas limits and long-term goals for a net zero economy by 2050.

We recognize the positive strides made toward decarbonization and preparing buildings for the future while preventing costly retrofits. Today's new mixed-fuel building is tomorrow's electrification challenge, posing technical complexity and financial burdens that the updated Stretch Energy Code and Opt-In Specialized Code seek to minimize.

Five Positive Developments

Moreover, the updated Stretch Energy Code and Opt-In Specialized code embody these positive developments:

1. **Expanded choices**: The choice between three strong codes - the Base code, the Stretch code, and the Specialized code - empowers Massachusetts cities and towns to adopt building energy standards that suit their specific needs and aspirations.

2. **Widespread adoption:** The successful adoption of the Stretch Energy Code, with 301 municipalities participating as Green Communities, shows its effectiveness in driving energy-efficient practices and sustainable development across the state.

3. **Extensive early adoption of the Opt-In Specialized Code**: The successful adoption of the Opt-In Specialized Code, with 33 municipalities already on board (as of March 2024) just 15 months after its promulgation on January 1, 2023, shows its effectiveness in driving energy-efficient and renewable energy practices and sustainable development across the state.

4. **Net-zero focus**: The Opt-In Specialized Code sets forth additional requirements to ensure alignment with the long-term goal of achieving a net zero economy by 2050. Driving progress towards a clean energy future is particularly important to ensuring climate equity for Massachusetts residents who bear the greatest energy costs in proportion to household income, including many who live in Gateway Cities.

5. **Enhanced stringency translates into energy savings**: The updated Stretch Energy Code imposes stricter guidelines on energy efficiency for new construction and alterations, affecting municipalities that have opted in. With approximately 90% of Massachusetts' population living in municipalities that have adopted the Stretch Energy Code or the Specialized Code, these standards significantly impact building energy savings statewide. Energy savings are essential to a practical, affordable clean energy transition.

Six Concerns Based on Feedback

While we applaud these efforts, we request that DOER address the following feedback and concerns raised by stakeholders, including building practitioners and municipal officials who are members of the MA NZB Coalition. We call DOER's attention to these six concerns:

1. **Clear documentation:** We recommend compiling and publishing an ICC-ratified "blended code," which integrates base code language with the various overlay provisions for the updated Stretch and Opt-In Specialized Codes for easier reference and transparency. We understand that this is in process. The compiled code document should also include the Technical Guidance documents as

commentary. Other items that could be added include clear compliance documentation tools (COMCheck), universal reporting forms, and thermal bridge database specific to Massachusetts.

2. **Consistency in support**: We recommend increased consistency in responsiveness and assistance provided to design professionals and contractors seeking guidance from DOER, which would ensure equal access to resources. In addition, there is a need for adequate support and dissemination of information to under-resourced small businesses so that they may navigate the updated codes effectively.

3. **Existing building clarification**: There is notable confusion surrounding energy code compliance for existing buildings. We recommend that DOER emphasize that the Opt-In Specialized Code applies solely to new construction, not existing buildings. We also recommend that DOER address many questions surrounding additions and changes of use of building by giving practical examples to illustrate how the codes are meant to be applied. Clear guidance from DOER is essential to address this confusion and ensure consistent interpretation and application of the energy codes.

4. **Assistance with energy model reviews**: Stakeholders have expressed uncertainty about the process for review of submitted models to ensure compliance. We recommend DOER providing on-call experts to assist with energy model reviews.

5. **Enhancing clarity**: To facilitate compliance and implementation, it is vital to streamline and clarify requirements regarding complex calculations and definitions. Specific areas requiring attention include curtainwall de-rating for thermal breaks, where clear guidelines are needed to assist builders, developers, architects, and engineers in meeting requirements. Additionally, for existing building projects, it is crucial to clarify what constitutes a "change of use that increases energy consumption," and determine the baseline. Questions arise, for example, on whether renovations to an empty building automatically result in increased energy consumption. There are many empty office buildings with the potential to be converted to residential use**.** We recommend that DOER issue a statement that conversion from office to residential use shall not be considered a change that increases energy consumption. We do not want to discourage conversion of space from office to residential, especially given the acute housing shortage in Massachusetts.

6. **Review of TEDI**: Reviewing the Thermal Energy Demand Intensity (TEDI) guidelines to enhance their effectiveness and relevance in future code cycles is paramount to ensuring meaningful outcomes. Additional considerations include addressing challenges with TEDI modeling protocols. There are aspects of TEDI limits that may present difficulties for some well-designed net-zero buildings with low Energy Use Intensity (EUI). Addressing these concerns will be crucial in refining the TEDI guidelines to better accommodate diverse building designs and promote truly sustainable outcomes.

Conclusion

The Commonwealth's 2030 emissions reduction goals are mandated by law. However, meeting the building sector emissions reduction goals will be especially challenging in the six years remaining until the end of this decade given strong demand for housing, schools, and laboratories. The shortfall is likely to be significant even though the state's greenhouse gas inventory currently accounts for building operations and not embodied carbon (from sourcing, production, and transportation of construction materials). In the future, embodied carbon must also be addressed, thereby regulating the full carbon impact of the building sector.

We appreciate DOER's commitment to advancing energy efficiency and reducing greenhouse gas emissions through robust building energy codes. By addressing this feedback, DOER can enhance the effectiveness and impact of these codes, driving Massachusetts toward a more sustainable and equitable future. Additionally, leveraging significant federal funding will accelerate code implementation and development efforts, reinforcing Massachusetts' leadership in decarbonizing buildings.

We appreciate your attention to this letter and the work you and your staff have put into the effort so far. We look forward to continued collaboration and progress in advancing energy efficiency initiatives across the state.

Sincerely,

Massachusetts Net Zero Building Coalition,

Facilitated by Northeast Energy Efficiency Partnerships (NEEP)

Municipal officials & building industry practitioners

- Alejandra Menchaca PhD. Founding Principal, AIRLIT studio
- Alison Nash, AIA LEED AP ID+C WELL AP CPHC, Sustainability Coordinator, Sasaki
- Fred Bunger, Town of Wellesley
- Ellen Watts, FAIA, LEED AP
- Hank Keating AISA, President, Passive House Massachusetts
- Mark Sandeen, Town of Lexington Select Board Member, President, MassSolar
- Martine Dion, FAIA, LEED AP BD+C, Director of Sustainable Design, SMMA
- Patrick M. Hanlon, co-chair Sustainable Arlington
- Petersen Engineering Inc.
- The Green Engineer, Inc.
- New Ecology, Inc.
- Quinton Zondervan, President & Board Chair, Climate XChange Education & Research

Organizational partners

- Built Environment Plus
- Green Energy Consumers Alliance
- LISC Boston
- Metropolitan Area Planning Council (MAPC)
- Phius
- Sustainable Arlington
- ZeroCarbonMA

NEHERS
NORTHEAST HOME ENERGY RATING SYSTEM ALLIANCE

April 3, 2024

Department of Energy Resources
c/o Ian Finlayson, Deputy Director, Energy Efficiency Division
100 Cambridge Street, Suite 1020
Boston, MA 02114

Dear Mr. Finlayson:

These comments are submitted on behalf of the Northeast Home Energy Rating System Alliance (NEHERS)'s Embodied Carbon Committee. The NEHERS Alliance was formed in 1998 to foster, unify and promote HERS Industry in the Northeast, including the following states: CT, MA, ME, NH, NJ, NY, OH, PA, RI and VT. We represent 9 providers, over 250 rater members, plus over 50 RFI, Modeler, and HERS Rater candidates in training. The Energy Codes Committee is responsible for reviewing the Residential Energy Code with respect to HERS Raters concerns and taking actions where appropriate to attempt to improve the clarity and implementation of the Residential Energy Code.

We applaud Massachusetts' efforts to create an energy code that is ambitious and designed to meet the state's climate goals.

The demand for HERS Raters across the commonwealth is significant, and we want to make sure that there are adequate resources available to support the industry as we prepare for a significant increase in stringency for new construction on July 1,2024 when the HERS index drops to a 42. HERS Raters are available to track Materials Embodied Carbon as evidenced by the new RESNET/ANSI/ICC Standard 1550 for Materials Embodied Carbon

To that end, we are recommending an Embodied Carbon adder, similar to the Clean Energy Table for Adjustments used in previous Stretch Codes

MAXIMUM ENERGY RATING INDEX

	Maximum HERS Index Score[a, b]	
On-site Renewable Energy Application	New Construction	Whole House Renovations; Additions
None	55	65
Solar Electric Generation	60	70
Clean Space Heating	60	70
DHW	57	67
Solar Electric and Clean Space Heating	65	75
Solar Electric and DWH	62	72
Solar Electric, Clean Space Heating and DHW	67	77

The Embodied Carbon HERS adder can be presented in at least 2 ways

1) A Performance Path
    a. 1 HERS point per xxx kilograms/sq ft of Materials CO2 reduction" up to 5 HERS points
        i. Reference the MASS CEC 100-Home Study (or previous Builders for Climate Action studies) as a possible benchmark to target Embodied Carbon improvement in the performance path?
        ii. Possibly use the MASS CEC study to create a Baseline home
    b. Use HERS Raters and the developed Ekotrope to BEAM integration tool or Other software as Embodied Carbon data points

2) A Prescriptive Path - with concrete insulation glass etc. as categories to show improvement over the industry standards – up to 5 HERS points
    a. 3 points for low carbon concrete (with EPD support)
    b. 2 points for low carbon insulation
    c. 1 point each for additional categories

We recognize there is a huge opportunity for existing homes to leverage embodied carbon as well, and Embodied Carbon HERS credit would make HERS 55/52 for existing buildings approachable in many ways.

The Northeast HERS Alliance appreciates the opportunity for public comment, and we encourage the DOER to reach out to us with any questions or concerns,

Thank You!

NEHERS Embodied Carbon Committee

To Whom It May Concern,

We're currently encountering some challenges with the TEDI model for the Pierce School project in Brookline, and I wanted to bring them to your attention. The TEDI model has been done and reviewed by 3 different entities and its still not meeting the heating threshold. These are strong teams that have worked directly with DOER in the last year, have followed the guidelines and are struggling to make this highly efficient building meet the requirements.

Originally, the HVAC system modeled based on the default HVAC systems, Sections 13.2 and 13.4 for the Targeted Performance Simulation Guidelines by our engineers. The model was not meeting the heating TEDI despite significant changes to the envelope, window to wall ratio, removal of mullions at the windows, added exterior insulation and other strategies suggested by our team experts. We met with DOER to review the project and it was suggested to have a peer reviewer check the model against the published guidelines. The first Peer reviewer checked the original model and followed the guidelines for the model. They also did a Passive House model, which showed it did meet the PHIUS requirements for both heating and cooling. A new model was done based When the second set of modelers tried every possible way to meet the heating TEDI, it improved but not to the 2.2 threshold we had to meet. Our team then had a second peer reviewer check the results of the model, because they've been successful in getting the TEDI model to meet the requirements for other school projects. They suggested to model the project with as-designed mechanical zoning and systems (based on Targeted Performance Simulation Guidelines Section 13.3). All this soft cost has been absorbed by our team, frustration that despite a geothermal system with PV's, it still there is no clear path for compliance. We have followed the guidelines that were published, yet we understand from one of our reviewers that the guidelines and the example models do not align with each other, meeting the guidelines is not clear and different teams have different information.

Other existing buildings projects, the path to keeping the existing building to meet the new stretch code is arduous and costly to the client. There are clients that are deciding whether to complete a project because it is too costly and complicated make the existing building compliant. The Derating system doesn't work for all instances and building types and it is so cost prohibitive that there are owners that are opting for demolition of existing to build new(AIA MA Survey done). This is the opposite from what we want in terms of embodied carbon solutions for the Commonwealth.

We urgently need clearer guidelines that align with sample models, flexibility for diverse project types, especially for existing building renovations, and consistent information dissemination across the community to ensure successful outcomes.
We need clear guidelines that align with the sample models, we need flexibility for types of projects that done fall under the simple box with a slab on grade approach that were modeled for the stretch code for all building types, we need flexibility with existing to remain projects for projects that can't meet the code as currently written, and we need the entire community to be provided the same information so we can be successful.
I urge you to address these issues promptly to avoid further complications and ensure the project's success. Your assistance in this matter would be greatly appreciated.

Thank you for your time.

Nereyda

Nereyda Rodriguez, RA, LEED AP BD+C, PHI DESIGNER, MCPPO
Principal
She/her

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Hello MA DOER,

Thank you for your amazing work on the Stretch and Opt-In Codes. RDH has gained substantial experience with the finer details of the code, in many new construction and existing buildings. We encourage leadership at the Commonwealth and DOER leadership to allow the DOER Energy Code team to continue their work on revising and refining the code language and Guidelines, as it is apparent that there are further modifications that need to be made, some of which are substantial. There is further work to be done.

Please consider some of the following commentary:

Chapter 5 Existing Buildings:

- Additional existing building code compliance pathways need to be allowed, including PHI EnerPHit and Phius Revive (when the current beta version is codified).
- Derating of unmitigable thermal bridges should not be required, particularly floor plates in mass masonry interior insulation retrofits. This would make prescriptive and backstop compliance more technically feasible to achieve.
- Alternately, a prescriptive U value for insulation to be added to the interior of existing buildings, without derating, should be provided and be allowed for use for existing buildings.
- The prescriptive wall U-values required should be the same for both metal stud walls and masonry backup walls. Right now the masonry walls are only required to hit U-0.90 whereas the metal stud walls are required to hit U-0.55. This is likely a leftover piece of the IECC where derating is currently not accounted for, like it is in the MA amendments. Particularly for a metal stud wall and CMU wall with insulation fully outboard of the wall, the opaque U-values should be the same. Right now backstops are more easilly achieved with masonry back up walls. There are cost and embodied carbon implications to this which deviate from the intent of the Stretch Code.

Prescriptive Path 402.1.4:

- A prescriptive U value should be given for the use of spandrels in the prescriptive path. Right now, spandrels are treated as a metal framed wall, which needs to hit U-0.55, which a spandrel will never be able to do. This triggers the need for buildings that might otherwise be able to follow the prescriptive path to be required to follow the backstop per C402.1.5.
- Further clarification to the language distinguishing between Fenestration and Glazed Wall Systems needs to be clarified. Currently spandrels count as opaque wall when looking at window to wall ratio, which is different from the “glazed area” considered in the backstop C402.1.5 which counts spandrel as part of the glazed wall system. This needs some simplification.

TEDI Path C407.1

- The TEDI Guidelines by Karpman need to be reviewed against the prototype models by SWA. They do not match.
- TEDI targets need to be reconsidered against the modeling guidelines in tandem with the above mentioned review of guidelines against prototype models. Even very skilled design teams, designing nearly perfect buildings are running into problems meeting the targets.
- Ventilation loads that would be considered as “process loads” need to be reevaluated in the Guidelines. Process loads, integral to the program of the building, should not count against the TEDI target, particularly when using very stringent Default HVAC System Configuration per section 13.1 of the Guidelines.

Thank you,
Andrew

RDH BUILDING SCIENCE
Andrew Steingiser | RA, CPHC, LEED AP
Associate | Senior Project Architect | Passive House Consultant

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Re: Stretch Energy Code and Specialized Municipal Opt-in Code

To: Ian Finlayson
Deputy Director, Energy Efficiency Division
Massachusetts Department of Energy Resources (DOER)

Dear Deputy Director Finlayson,

Greater Boston Physicians for Social Responsibility (GBPSR) is a physician-led group of health professionals and community members working to address two of the existential threats to human health: nuclear war and climate change. Our members include nationally-recognized experts in public health, cancer epidemiology, occupational medicine, environmental health, emergency medicine, disaster preparedness, and the health effects of climate change.

We are writing to you in support of the Stretch Energy Code and Specialized Municipal Opt-in Code

The use of fossil fuels is causing climate change and air pollution, both of which are harmful to health. The building sector is responsible for 35% of greenhouse gas emissions in Massachusetts. Methane, also known as natural gas, is the predominant fossil fuel used to heat buildings in Massachusetts. It is 86 times more potent than carbon dioxide in warming the climate and it is leaking in massive amounts from our aging pipe systems. In 2021, 11,624 new gas leaks across Massachusetts emitted nearly 7,000 metric tons of methane — equal to an estimated 600,000 metric tons of carbon dioxide, or $7 million in wasted dollars, according to HEET.[1]

Our reliance on methane to run our buildings is costly, wasteful, and damaging to the environment and our health.

To combat the climate crisis, we need to decarbonize our buildings. The health of Massachusetts residents will be improved by decarbonizing our buildings. The use of natural gas or methane in homes, especially gas stoves, leads to indoor air pollution and causes asthma in children.[2]

The use of methane in heating and water heating systems contributes to outdoor air pollution, emitting carcinogens like benzene into our neighborhoods and streets as well as nitrogen dioxides, a criteria air pollutant regulated by the EPA. The added cost of constructing new buildings implementing the stretch code

of 1.8 -3.8 % is trivial compared to the money which will be saved by getting rid of our wasteful gas system, the savings of health care dollars, and the savings from reduced frequency of extreme weather events. [3]

The cost of continuing to rely on fossil fuels to power our buildings is too high to bear for ourselves and future Massachusetts residents.

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[1] *https://www.mma.org/online-maps-illustrate-progress-of-gas-leak-repair-program/*
[2] *Int. J. Environ. Res. Public Health 2023, 20(1), 75; https://doi.org/10.3390/ijerph20010075*
[3] *Int. J. Environ. Res. Public Health 2023, 20(1), 75; https://doi.org/10.3390/ijerph20010075*
https://www.mma.org/online-maps-illustrate-progress-of-gas-leak-repair-program/ https://cre.mit.edu/news-insights/advocating-for-more-energy-efficient-and-affordable-housing-in-ma/

Sincerely,
Susan Racine, MD for Greater Boston Physicians for Social Responsibility

Susan Racine, MD
Co-Chair of the Board
Greater Boston Physicians for Social Responsibility
sracine@gbpsr.org
Facebook I Twitter I Instagram I LinkedIn

I'm late with comments by a day, but have a few concise recommendations to the process or regulations.
I approve of what the DOER is attempting and realize there is likely a lot of push-back, but we need to move forward rather quickly. Here are my suggestions:

- DOER instructional guide does a reasonable introduction to de-rating of systems and gives a good example of actual resulting U/R value of an assembly. For architects and builders of all levels, start with 2x6 wall example with sheathing and continuous insulation with various support systems. Extend example to more complex assemblies, up to curtain wall systems for high rise construction
- Example in Guide of continuous vs. discontinuous insulation for de-rating example was not quite clear and multiple views, including plan would clarify difference in assembly
- For older wood framed construction, say local historic home in a town (such as Acton) with 2x4 balloon framing, provide realistic prescriptive options for builders and architects to achieve a reasonable, achievable U value for walls and roof construction. I'm limited on a project to 3 ½" for cavity depth and would fear extending siding out beyond 2 inches over continuous insulation, especially for a historic home
- Clarify tenant space selections to provide maximum points for removal of old finishes (or just newly introduced finish) on exterior masonry walls to install continuous insulation with air space and new finish. As long as it can be engineered to not create a moisture dilemma tenants need to be pushed to cover exposed exterior masonry construction. Prescriptive options would be helpful here, such as spray on vapor barriers, etc.

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Visit www.artseekerconcierge.com to view artwork by the Architect

Our 3rd decade (2002-2024) creating Architecture

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Home Builders & Remodelers Association
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April 3, 2024

To Whom It May Concern:

We look forward to working with DOER on the Massachusetts Stretch Energy Code to try and make it a regulation that makes sense for the environment and homeowners alike.

We have found since the new Stretch Code has come out there are multiple areas in the code that are not clear and/or discourage the types of projects that we find to be most common.

While there are many conditions, we found that would exclude certain projects as they would not meet the code without a significant financial burden to the homeowner, below is the most common.

In the Case of Additions with 1,000 SF or 100% Exceeding Existing

CHAPTER 5 [RE] EXISTING BUILDINGS SECTION

R502 ADDITIONS.
SECTION R502 ADDITIONS.
R502.1 *Revise Subsection R502.2 by replacing the third and fourth sentence as follows:*

An addition shall be deemed to comply with this code where the addition alone complies, where the existing building and addition comply with this code as a single building, or where the building with the addition achieves a certified HERS rating in accordance with Table R406.5. Additions shall be in accordance with Section R502.1.1, R502.2 or R502.3.

R502.1.1 *Add Subsection R502.1.1 as follows:*

R502.1.1 Large additions. *Additions to a dwelling unit exceeding 1,000 sq. ft. or exceeding 100% of the existing conditioned floor area, shall require the dwelling unit to comply with the maximum HERS ratings for alterations, additions or change of use shown in TABLE R406.5.*

R503.1.5 *Add new subsection as follows:*

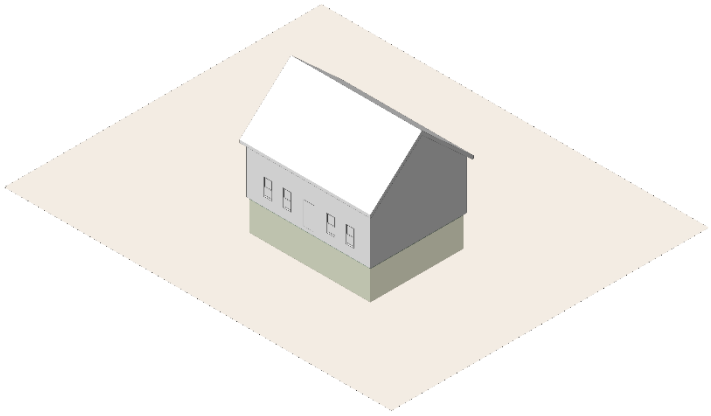
R503.1.5 Level 3 Alterations, or Change of Use*. Alterations that meet the IEBC definition for Level 3 Alteration or the IRC definition for Extensive Alteration, exceeding 1,000 sq ft or exceeding 100% of the existing conditioned floor area, shall require the dwelling unit to comply with the maximum HERS ratings for alterations, additions or change of use shown in Table R406.5.*

The software used by HERS Raters does not recognize a project that is specifically an addition. It will only recognize/rate a complete home, inclusive of bedroom(s), specific equipment (HVAC systems, appliances, etc.) This eliminates the opportunity for additions only to be rated as per - **"R502.1 -** ***An addition shall be deemed to comply with this code where the addition alone complies".***

In total there are four (4) paths that can be taken to meet Stretch Code as it is currently written. However, for additions, the only available route is the HERS rating.

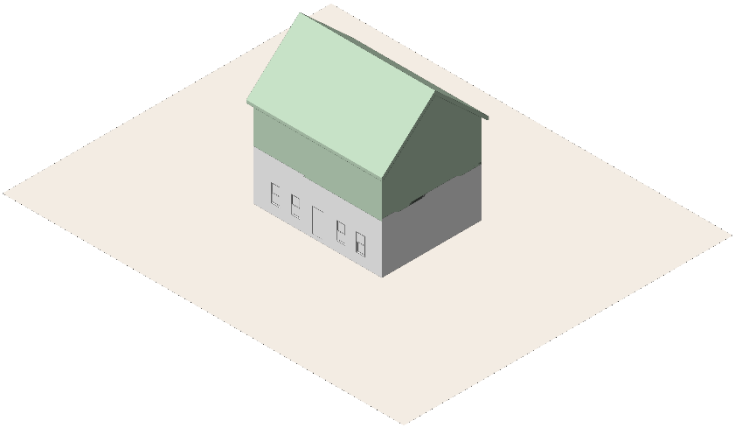
Below are some examples the industry has encountered where the new Stretch Code has not allowed homeowners to upgrade their homes. The major reason these projects were abandoned is these projects become too costly as the entire home would need to be renovated to meet the new Code, rather than just being able to do a smaller project (i.e. an addition).

Cape House with New Basement



Many homes of this style are small in size. To gain more space, an owner may want to finish an unconditioned basement being 1,000 sf or matching 100% of the existing floor. These types of projects would be eliminated as most homeowners cannot afford to, and/or do not want to, renovate the majority of their existing home.

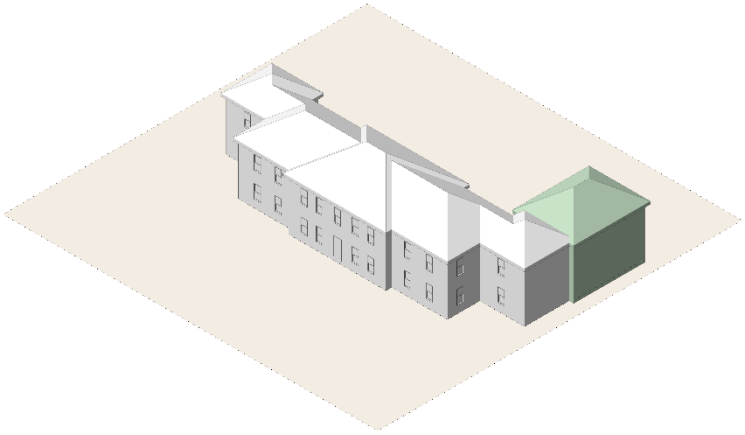
Cape House with Second-floor Addition



Many Massachusetts homes are Cape-style homes. Many of these homes were built post-WW2 and are still purchased as ‘starter homes’. Initially many of these homes were renovated to upgrade the kitchen, bathroom(s), HVAC and/or insulation. A typical “next phase” for a growing family would be to add a

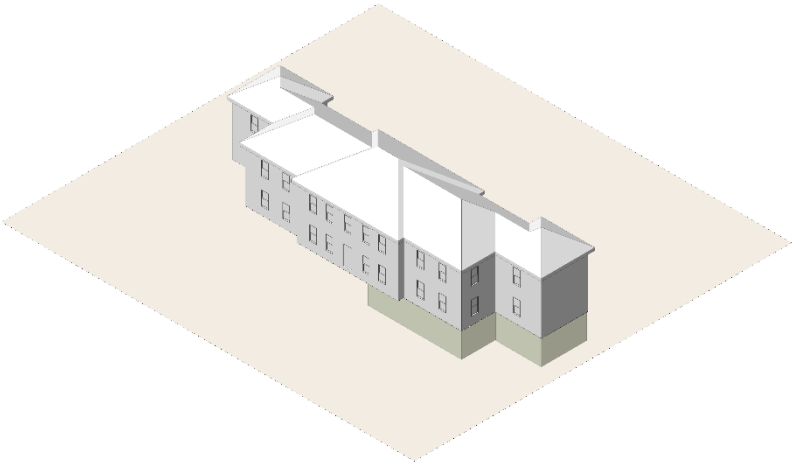
second floor. This second floor would match the floor size below being 100%, and could meet the 1,000 sf requirement/cap. In general, homes that had been updated already were done under a renovation permit following possibly the 2009 IECC and would now required to follow either the 2015 IECC or 2021 IECC. This forces the owner to remove any already-upgraded elements (i.e. windows, insulation, etc.) and redo them. This turns what was a second-floor addition into a whole-home remodel, and makes the project no longer viable. As such, these homes are left with then with fossil fuel HVAC systems and dated insulations.

Large House with New Addition



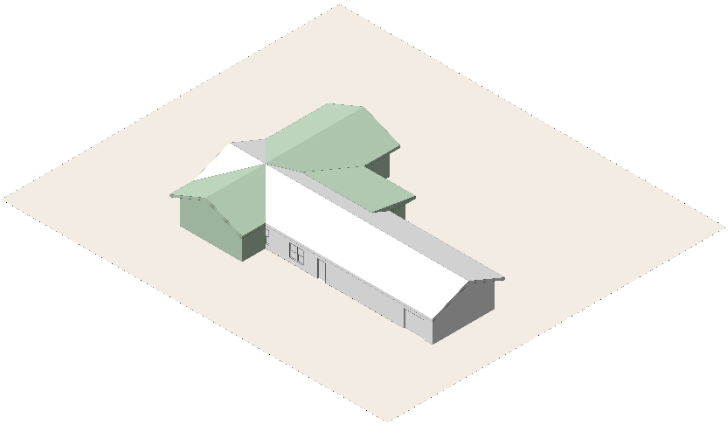
Regarding a home that is larger in size, an appropriately-scaled addition could easily be over the 1,000 sf. Again, turning a relatively smaller project into a whole-home renovation. Additionally, the existing home may have newer windows, insulation, and HVAC but might not meet the newest Stretch Code criteria but did meet. The new addition as stated above would then force a HERS rating for the entire home and such a scaled home would be very costly. This has been leaving these types of projects abandoned and a large carbon footprint home without needed updates.

Large House with New Basement



As with the above example, converting an existing basement in a larger home into additional living space may exceed the 1,000 sf. requirement. The need for additional space for a family would trigger the same issues as represented above leaving abandoned projects and an inefficient existing home due to costs to renovate the entire home.

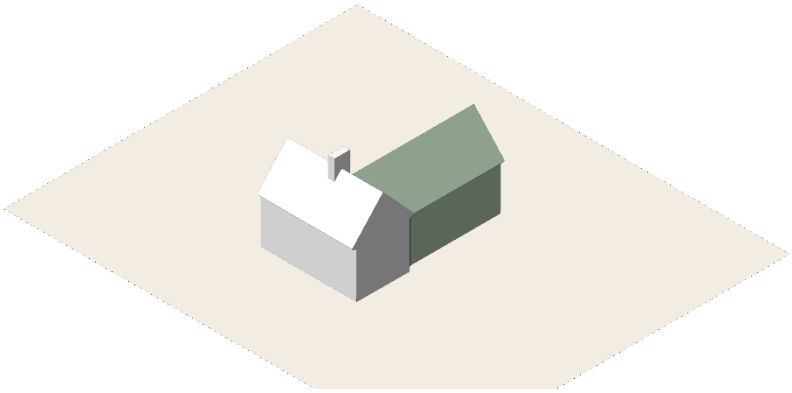
Ranch House with Slab on Grade



Many ranch homes were built between the 1950's – 1970's as a 'slab on grade'. These homes also often have minimum ceiling heights, rafter depths being only 5 ½" and walls only 2 ½" deep. It has been found, with the new Stretch Code, that it is not financially viable to simply put an addition on this style home. Due to the need to insulate the floors, and not raise the ceiling heights, a majority of these homes would simply be torn down.

This would most-likely irradicate a very popular and recognized version that is indicative, and was started in Massachusetts – the Campanelli Home. There were approximately 15,000 of these homes built by the Campanelli brothers in Massachusetts.

Small House Addition



There are a majority of small homes that are less than 1,000 sf. Many of these were "starter homes" at one point. Some of these, similar to the Cape home mentioned above, were previously renovated with newer materials, but that might not meet the new Stretch Code. An addition to gain more living space could then a project into a whole-home renovation, which could make this hoped-for renovation non-viable. As such, these homes are left with then with fossil fuel HVAC systems and dated insulations.

Guy A. Webb
Government Affairs
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April 3, 2024

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We look forward to working with DOER on the Massachusetts Stretch Energy Code to try and make it a regulation that makes sense for the environment and homeowners alike.

We have found since the new Stretch Code has come out there are multiple areas in the code that are not clear and/or discourage the types of projects that we find to be most common.

While there are many conditions we found that would exclude certain projects as they would not meet the code without a significant financial burden to the homeowner, below is the most common.

Historic Homes with Additions of 1,000 SF. Or 100% Exceeding Existing

CHAPTER 5 [RE] EXISTING BUILDINGS SECTION

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SECTION R502 ADDITIONS.

R502.1 *Revise Subsection R502.2 by replacing the third and fourth sentence as follows:*

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R502.1.1 *Add Subsection R502.1.1 as follows:*

R502.1.1 Large additions. *Additions to a dwelling unit exceeding 1,000 sq. ft. or exceeding 100% of the existing conditioned floor area, shall require the dwelling unit to comply with the maximum HERS ratings for alterations, additions or change of use shown in TABLE R406.5.*

R501.6
Provisions of this code relating to the construction, repair, alteration, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings provided that a report has been submitted to the code official and signed by the owner, a registered design professional, or a representative of the State Historic Preservation Office of the historic preservation authority having jurisdiction, demonstrating that the compliance with the provision would threaten, degrade or destroy the historic form, fabric or function of the building.

The software used by HERS Raters does not recognize a project that is specifically an addition. It will only recognize/rate a complete home, inclusive of bedroom(s), specific equipment (HVAC systems,

appliances, etc.) This eliminates the opportunity for additions only to be rated as per - **"R502.1 - *An addition shall be deemed to comply with this code where the addition alone complies"***

In total there are four (4) paths that can be taken to meet Stretch code as it is currently written. However, for additions, the only available route is the HERS rating.

Although Historic Homes are exempt in their listed elements, this provision is now 'null and void' due to the inability for a HERS rater's ability to rate additions alone.

ADDITIONAL INFORMATION:

Approximately 30% of Mass homes were built in 1950 or prior.

There are 150 towns with Demolition Delay bylaws where local historic commissions regulate homes older than 75 years (+/-) and their additions (i.e. - the removal of siding, windows, etc.).

There are 220 Historic Districts in Massachusetts. Many are regulated districts with commissions with more power than a demolition delay by-law not allowing historically incorrect windows, sidings, and/or the removal of authentic materials.

Many historic homes are:

- Regulated by local historic commissions not along windows other than divided lights matching exact historic details.
- Not historically listed but are contributing to a historic streetscape, or personal story or maybe architecturally significant having the last chimney of a type, or window or plaster.
- Have deed restrictions from local historic commissions, societies, and façade restrictions from nonprofits and Historic New England as some examples. These restrictions typically do not allow the changes, covering or removal of:
    - Windows
    - Plaster
    - Siding
    - Paneling
    - Wood fireplaces or ovens
    - Stone foundations and chimneys

Guy A. Webb

Guy A. Webb
Government Affairs
HBRA of Massachusetts

To Whom it may concern,
We are working on the Pierce K-8 School in Brookline. Dealing with the TEDI modeling requirement has been an extremely frustrating, time consuming and costly process because the default HVAC settings simply do not work: The building we are designing has an extremely high performance envelope and high performance geothermal system with PV's, and has been demonstrated to meet passive house standards, yet we do not come close to passing the TEDI requirement. How is this possible? We have had to pay for, in addition to the HVAC engineer's original TEDI model, a peer reviewer of the model, a second peer review of the peer review, and an analysis of the option to pivot to passive house as a compliance alternative. Now we are going to pay for yet another TEDI model from scratch that does not use the default settings. Time is of the essence on our project, yet we are struggling with a problem manufactured by the DOER and still do not have a clear path towards compliance. It is apparent to everybody that I have talked to, that there are flaws in the regulations and discrepancies between regulations and the sample projects which is costing us an enormous amount of time and money without any benefit to the energy performance of the building, in fact the opposite appears to be true according to the engineers and modelers I have been talking to, meeting the TEDI requirements may negatively affect the EUI of the building.

I implore you to fix this extremely flawed regulation as quickly as possible.

William Spears, AIA, LEED AP
Principal

Will Spears, AIA, LEED AP, MCPPO
Senior Principal
He/him

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ARCHITECTS

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Just wanted to share our experiences in the office. We really want to guide owners to reuse existing buildings and we are seeing that the new energy code is pushing us to rather tear down and build new. I hope that DOER can find a way to improve energy for existing bldgs and encourage reuse.

We conducted feasibility studies for a large lab project in MA where the goal was to figure out whether the owner would update their 1980's building (which would involve some additions that were over 40,000SF), or whether they would demolish the building and build a completely new building. They ended up not pursuing the renovation option. The issue of a renovation triggering façade upgrades proved to be too costly and logistically challenging. The owner wanted to keep the building occupied during the construction of the additions, and upgrading the façade while people occupy the building is challenging. Finding ways to meet the solar requirement in the renovation scheme was also more difficult than in the new-build scheme.

Thanks,
Kristen

Kristen Fritsch AIA LEED AP BD+C WELL AP
Senior Associate
Sustainability Coordinator

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April 3, 2024

Department of Energy Resources
c/o Ian Finlayson, Deputy Director, Energy Efficiency Division
100 Cambridge Street, Suite 1020
Boston, MA 02114

Dear Mr. Finlayson:

The Nantucket Builders Association appreciates the opportunity to provide comments regarding the 2021 International Energy Code Council (IECC) Massachusetts Stretch Code.

On behalf of our membership, which represents over 300 Nantucket-based builders, contractors, design professionals, and others who help to drive the island's construction economy, we submit the following:

Variance Pathways

We urge the DOER to provide clearly defined variance pathways to address the inherent challenges of historic preservation, historic district restrictions, and affordability in building construction, particularly on Nantucket.

- **Historic Windows:** Nantucket, like many Massachusetts communities, has a rich and abundant stock of historically-significant structures. To ensure that these buildings remain authentic and contributing to the Nantucket National Historic Landmark, the Nantucket Historic District Commission (HDC) ***requires*** single glazed windows be used for buildings located in the island's historic core districts. However, the performance of these windows makes the ERI/HERS targets nearly impossible to achieve due to their poor performance.

  One possible solution would be to model a "digital twin" using the code minimum for the building's window performance, along with all the other required components of the building. This comparative analysis would help demonstrate, or trigger, a "Variance" of the HERS requirements to allow for the integration of historical windows within these designated zones.

- **Historic Fabric not to be disturbed**: Similarly, if the interior fabric is to remain undisturbed due to historical preservation requirements, those areas of construction could be modeled as a digital twin to the code minimum to prove energy code compliance.

- **Solar permitting restrictions in historic districts:** While solar is possible and growing in popularity on Nantucket, all solar projects must be designed according to strict historic guidelines and approved by the Nantucket Historic District Commission (HDC) prior to the issuance of a building permit. Concern and confusion remain about how certain building projects will meet stretch code compliance, or be enforced, if solar is not allowed by the local permitting authority.

- **Financial Hardships:** On Nantucket, where there is a severe shortage of affordable, year-round housing stock, and the cost of construction is naturally higher due to import premiums (on materials and labor), there is a pressing need for a variance pathway for demonstratable financial hardships, for both existing homes and new construction.

  Hardship metrics should take into account local datapoints, such as the actual costs of construction per county.

We are therefore supportive of an alternative compliance path for structures—new construction, renovations and additions—when located within a federally-designated historic landmark district. The need for a "Good Cause" variance process for challenging permit applications cannot be overstated.

Support for Building Commissioners, Inspectors, and Specialty Inspectors

We also urge that the DOER provide additional training for local permitting officials in a convenient and easy to access format. With electrification comes a greater need for education and training, such as for adequately sizing and selecting HVAC equipment (i.e., Manual J, D, S support).

Other suggestions for improving the engagement and education of permitting officials, contractors, and the general public include:

- Online trainings in HERS, ERI and Passive House pathways to support each compliance pathway.
- Hotlines for permitting officials
- Calendars of code adoption including ALL applicable codes with reference materials, which should be circulated widely with builders, homeowners, construction subcontractors and the general public, as well as maintained and posted on the DOER website.
- A checklist including best practice tips for new code features and technologies, which can serve as a helpful reference guide for information such as:
  - EV-charging infrastructure and best practice for electricians and electrical inspectors
  - Continuous insulation, vapor barriers and best practice assemblies for builders and homeowners
  - Heatpump hot water systems– tips and clarifications (i.e. can they be used for baseboard radiant heating?)

We thank you again for your consideration of our feedback. Should you have any questions, please do not hesitate to contact us as the information listed below.

Respectfully,

Frank Daily

Frank Daily; President
On Behalf of the Board of Directors
Nantucket Builders Association

NAIOP
COMMERCIAL REAL ESTATE DEVELOPMENT ASSOCIATION
MASSACHUSETTS

April 1, 2024

Elizabeth Mahony, Commissioner
Department of Energy Resources
Boston, MA 02133

Re: NAIOP Comments on Recently Promulgated Stretch Code and Municipal Opt-In "Specialized" Code

Dear Commissioner Mahony:

NAIOP Massachusetts, The Commercial Real Estate Development Association, **appreciates the opportunity to provide feedback on the implementation of the Stretch Energy Code and Specialized Municipal Opt-in code.**

NAIOP Massachusetts, The Commercial Real Estate Development Association, represents the interests of companies involved with the development, ownership, management, and financing of commercial properties. NAIOP's 1800 members are involved with office, lab, industrial, mixed use, multifamily, retail, and institutional space across Massachusetts.

Until 2009, Massachusetts had one statewide energy code. Now Massachusetts has the base code, the stretch code, the specialized municipal opt-in code, and 10 communities who are each adopting their own slightly different version of the fossil fuel ban. The level of confusion around what code is in effect where and when – and what the requirements are to comply with each version - is unlike anything the industry has ever experienced. It is significantly impacting new development as well as renovations of all product types.

NAIOP members represent large and complex projects, typically employing teams with global expertise on design, construction and energy efficiency. Unfortunately, even with robust resources and highly sophisticated consultants, construction on already approved and entitled projects in communities that have adopted the Municipal Opt-in code is unable to move forward due to the cost implications of these codes. The codes are directly halting the production of desperately needed new housing and preventing critical economic development projects from moving forward.

For example, NAIOP knows of approximately 900 units of desperately needed, middle-market housing fully approved in the City of Boston that are unable to move forward with construction due to the City's adoption of the Opt-in code – this is just one example from one developer but NAIOP has heard examples like this from others trying to build. Developers have determined that the Municipal Opt-in code adds approximately $30-$50 of hard cost per square foot to a building. When this hard cost premium is compounded by the current interest rate environment, it results in a total project cost increase of at least 10% overall. This premium makes the project itself worth less than the cost to build – resulting in no financing.

These challenges also exist for projects already planning to be all electric. For one national multifamily developer, **who advances projects ranging from 180-350 units of housing that include substantial inclusionary requirements of 17-25%, the costs increases are insurmountable**. Commercial developers have shared similar concerns as they try to navigate these new codes. The costs are so significant for both multifamily and commercial development, there is now real concern that the existence of the Municipal Opt-in code gives municipalities an avenue to stop development altogether without having to explicitly come out against new housing. The developers NAIOP represents are supportive of green and climate ready projects– but the additional costs being associated with the implementation of these codes are making investors look elsewhere. Something must be done to ensure that that the implementation of these codes will no longer worsen the housing crisis or stop economic development projects. **Without action, these codes will continue to threaten Massachusetts' competitiveness and future economic security.**

Additionally, NAIOP has heard consistent feedback from members that even in situations where projects can achieve overall building performance targets, the methodologies outlined in the code are not possible – or come at such a time and financial premium that it dissuades investors – without appreciable improvements to the overall building and little to no change in achieving the decarbonization target.

For example, a number of consultants have reviewed the technical guidance and the new stretch code and have come to the conclusion that office to lab conversions are considered a 'change in use' for existing buildings. While NAIOP understands that this code methodology and language around existing buildings has been in place for a number of prior code versions, the new stretch code going into effect made the glazed exterior wall thermal performance criteria much stricter (going from a U-value of .32 down to .16). These new stricter performance values mean that every glazed façade on an existing building (typically double-glazed) would not comply with the new code. It is the industry's understanding they would be required to be demolished and re-built with triple-glazed facades under the new stretch code. By demolishing the typically glass and aluminum existing exterior walls and then replacing them with triple glazing, the embodied carbon footprint of an existing building conversion becomes much higher and is counter-productive to the sustainability goals the code is trying to achieve (not to mention a much higher cost that is making these conversions uneconomic under the new code).

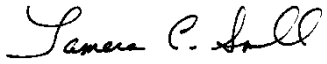
NAIOP has also heard from both municipal officials and project proponents that DOER's management of code review by individual persons within the department causes significant delays – and allows for inconsistent review determinations without oversight.

Finally, for the building code, project proponents have an opportunity to seek relief from its provisions (780 CMR) in the form of a variance or interpretation of the applicability of a particular code section. Appeals Board members are not allowed to waive code requirements in their entirety but may consider alternative methods of complying with the intent of the code. However, there is no such relief pathway for the stretch and specialized energy codes. **NAIOP strongly recommends the creation of a relief pathway modeled on the existing Board of Building Regulations and Standards frameworks to allow project proponents the ability to**

present hardship (including financial) and navigate solutions that advance climate goals without harming projects.

Please contact me if you have any questions.

Sincerely,



Tamara C. Small
Chief Executive Officer
NAIOP Massachusetts, The Commercial Real Estate Development Association

CC:
Secretary Rebecca Tepper, Executive Office of Energy and Environmental Affairs
Secretary Edward Augustus, Executive Office of Housing and Livable Communities
Secretary Yvonne Hao, Executive Office of Economic Development

Hello,

The attachment here is simply the comments I made on the mechanical aspect of the code at the listening session. Below are additional written comments on the code in general.

The Stretch Energy Code in its current form is wrought with deficiencies which cause confusion among builders, inspectors, designers, owners and other stakeholders. There are also significant increased costs with some of the regulations. We who are in the trenches day in and day out, know that cost is a factor that drives work underground and people are willing to take the chance and do work without permits. This helps to defeat the purpose of all our codes. As a Building Inspector well versed in the implementation, administration and enforcement of codes, I offer the following to help resolve some of the most glaring issues while continuing to help achieve the intended goals of carbon reduction.

As code developers, I think it important that the DOER understand that the primary purpose, the main reason we have a 1 & 2 family dwelling code (the residential code) is to help keep homes, home ownership and continued home ownership affordable and achievable. Some of the current requirements most certainly detract from this important goal.

My specific comments are as follows:

1. There needs to be a codified appeal process, whether it is to the Building Code Appeals Board or some other entity. I believe this is the only building regulation in the Commonwealth without an appeals process. Building regulations often apply unfairly to certain situations and the owners must have an avenue for appeals. The have the right to present their argument and a specific Board should decide its merit. The DOER could establish criteria which qualifies as a hardship, deserving of consideration in an appeals process.
2. There needs to be a "controlled construction" process for large buildings whereby various design professionals are inspecting and certifying the required components of large structures. A simple reference to the controlled construction section of 780CMR would be sufficient. Municipal Inspectors are not equipped to monitor, inspect and certify all of the complex aspects of this code in large buildings. Controlled Construction is a well-established process that works and will work within this Code.
3. As a separate agency, there must be dedicated staff, much like our State Building Inspectors, available to provide guidance and assistance to municipal inspectors in the proper implementation of this code. The current trainers, provided through Mass Save, are mostly just reciting code language. There is little to no guidance on actual implementation. What guidance is provided, is not clear that it is achieving the State's intended goals. There are too many variables amongst the type of buildings constructed in the State and the ambiguities within the code cause a wide variety of opinions on their meaning or intention. Uniformity is key to achieving the intended goals of this code.[1]
4. The 1,000 square foot trigger on additions to residences is too restrictive. It becomes extremely difficult on larger homes. The trigger should be a percentage of the existing conditioned area, not 1,000 square feet regardless of the size of the home.
5. The residential alteration trigger is also very confusing and challenging. There needs to be clearer triggers within this code itself and not referred out to other codes. One of the issues is that we do not use the IEBC with one and two-family homes. We use only appendix J. The IEBC is for 3- family homes and larger as well as all other commercial buildings. This code seems to allow the use of either one or both. They are not the same. There is also a difference between renovation and alteration. For example, remodeling a bathroom or kitchen or even finished basement where we are basically just replacing what was there, is a renovation. People must have the ability to upgrade worn out portions of a home without having to worry about triggering a requirement to do work on the entire home and thereby making these projects unaffordable. A substantial alteration for example, is where someone guts an entire floor and reconfigures space such as moving a kitchen from one side of the home to another.
6. Consider changing the EV ready requirement to the installation of a 1" or 1-1/4" conduit from the space to the panel rather than the actual running of a complete 50-amp circuit. We have seen that some Teslas require a 60-amp circuit for continuous Level II charging. A 50-amp circuit is inadequate. We also (hopefully) could have owners opting for 2 chargers. A conduit would better accommodate the needs of future homeowners.

Thank you for your consideration.

Sincerely,

Joe Prondak
Needham Building Commissioner
781-455-7550 x308

Good afternoon and thank you for the opportunity to provide comments. My name is Joe Prondak. I am currently the Building Commissioner for the Town of Needham. My career as a Building Inspector spans 37 years. Over those years I have paid close attention to the need to improve energy efficiency in buildings. I firmly believe in the dire need to reduce carbon emissions and the use of fossil fuels. I will be submitting several comments in writing but today I am speaking to call attention to an extreme deficiency in our efforts to achieve our climate goals through energy codes.

Specifically, the need for training and licensing requirements for trades persons that install mechanical equipment as well as the need for qualified mechanical inspectors in every city and Town.

Currently there is no apprenticeship or licensing requirement for persons who install mechanical systems. The Code relies on the license of the Construction Supervisor as the primary party that ensures proper installation and operation of these mechanical systems, systems that have become more and more complex in recent years. These licensees typically have little to no training or experience in mechanical installations. Similarly, the majority of Building Inspectors have little to no training or experience in this critical field. A couple of 1-hour training sessions on how to read Manuals J, S and D, is grossly insufficient.

Given the importance of proper sizing, installation and operation of these critical systems to the efficient use of energy, there must be an apprenticeship, licensing and training program for these tradespersons, much like that for licensed plumbers and electricians. There must also be dedicated Mechanical Inspectors in every city and town.

Without this, we will fall short of achieving a true reduction in carbon emissions. We may achieve perception of success on paper, but the reality will be drastically different.

Thank you for your time.

Stretch Code Public Listening Session Comments

Mike Duclos – 4/3/2024

Thank you for the opportunity to provide comment.

I greatly appreciate all the time and effort DOER staff has put into the Stretch Code development process, I regard the result as an important advance necessary for the state to comply with the mandates of the Climate Act of 2021.

I attended the public listening session on 3/27/2024. I am a retired HERS PHIUS Plus Rater, Certified Passive House Consultant and have consulted on and measured the performance of newly constructed buildings, as well as existing buildings, from mild retrofits to a dozen Deep Energy Retrofits during the 2009-2012 DER pilot run by National Grid and Eversource. I have six pages of notes from this Stretch Code Listening session.

While I think there are opportunities to improve the clarity and language of the new Stretch Code, I was disappointed by the number of people (including an organization representing architects) who appeared to be less interested in constructively pointing out areas for improvement, but rather appeared to be protesting the code was too difficult.

I see the Stretch Code as but one component of a group of diverse efforts which need to be thoughtfully coordinated to address the targets of the Climate Act of 2021.

As such, I'd like to address some points that I think should be considered.

I heard from one code official that they are not yet 'up to speed' on the old Stretch Code.
If code officials have at this point not been properly educated on the old Stretch Code, I see this as a red flag for the state's ambitious climate targets.

I recommend all officials charged with enforcing building codes be required to attend training and to take tests which will clearly demonstrate their comprehension and ability to administer the code properly. This may be done on a quarterly or annual basis, and it may also be done coordinated in advance of major code changes, so they are ready to 'hit the ground running' with the substantial code changes we increasingly expect to see in the future if we are to comply with the Climate Act of 2021 mandates.

As a former HERS Rater, I recognize the importance of Quality Assurance of the work of those inspecting buildings. I am a founder of Energy Raters of Mass, a RESNET Certified Quality Assurance Provider. I helped write the Quality Assurance policy of the company at inception. One of the foundational aspects of the RESNET Quality Assurance process is that Quality Assurance be performed on a minimum number of randomly selected projects each Rater as a requirement for their continued ability to work as a Rater. This QA process includes both very detailed, random review of the necessary paperwork, images and other documentation associated with generating a Certified HERS Rating, as well as an in-person, on-site review of a

Rater's ability to inspect and test a building, at a minimum on an annual basis. Without Quality Assurance verification on randomly selected projects there is no credible threat that those not consistently following the correct process, written requirements and correctly filing the needed paperwork will have that behavior detected and corrected. This can and does result in a substantial lack of respect for the codes, as well as deficient, long-lived and difficult to remediate buildings.

I recommend that code officials be held accountable for their work by a random Quality Assurance process that provides a credible threat of both corrective and disciplinary action for blatant and serious failures to properly enforce the code, after suitable warnings to take corrective action. Without credible enforcement, the building codes have greatly diminished value. An un-audited system will deteriorate until feedback is applied.

Those acquiring building permits need to be informed of the requirements for inspections, measured performance, HERS Certificates, etc. for the certificate of occupancy. This must be clear to the applicant at the time the building permit is issued, so that all of the required intermediate steps are successfully executed, and the mandated performance is achieved in reality.

I received this inquiry on 3/24/2024:

"We have a project in Xxxxxxx completed, however, to obtain the certificate of occupancy, the city asked us for the HERS certificate.
Therefore, would they be available to help with issuing the certificate, what would be the price for issuing the certificate, and how long after we accept the proposal would the certificate be ready?"

The text of this note clearly indicates they were not informed of the steps in the process, performance requirements, and apparently they think that the HERS certificate is simply a formality. Insulation type, quantity and quality inspections cannot be done after drywall is installed. Appropriate corrective action to many defects cannot be realistically implemented. The result is buildings fail to meet mandated performance requirements. The request I cite above is not unusual I receive similar requests more frequently on the phone.

I recommend that the building code require a clear and terse form to explain both building code requirements and the HERS Certification process and all major steps therein be signed by the applicant as a condition of receiving a building permit, and this affidavit be kept on file where it is subject to review by random Quality Assurance, as should all other written documentation associated with a building permit. Just above the signature line this text should appear: "Failure to comply with all requirements will result in not issuing a Certificate of Occupancy." The name of the HERS Rater contracted for the project should be included, as should the Preliminary HERS index certificate so it is clear this critical step has been completed.

As a retired HERS Rater I continue to receive calls from residents and builders seeking HERS Rating services, apparently because the way most people find HERS Raters is via the MassSave list of participating HERS Raters. I've twice asked that my name be removed from the MassSave list since I am retired, and my contact information remains on that list to this day. This results in frustration for those seeking to comply with the Stretch Code early in their project, when the guidance of a HERS Rater who is intimately familiar with the process required to issue the required Certified HERS Rating is most important in 'setting up the project for success.'

I recommend that DOER publish an online list of HERS Raters who are currently active in Mass and maintain that list (i.e. additions or deletions) on at least a quarterly basis, so those seeking to comply with the law can more easily do so. MassSave is demonstrably not up to the simple task of properly maintaining such a list.

I recommend that when DOER receives requests for clarification of the code for situations that can reasonably be expected to be encountered multiple times, the inquiry and the corresponding reply be published in a searchable online Frequently Asked Questions - FAQ - to facilitate the shared understanding and to reduce the amount of both users and DOER staff time spent on addressing questions.
Also, the questions that are asked should cause the review of the code language so that the code language can subsequently be modified to improve clarity.

I also think that the massive problem of retrofit and electrification of existing buildings needs to be addressed immediately, and there needs to be some sort of code development process to be able to successfully carry out the envisioned 'electrification' and retrofit work necessary to meet the Climate Act of 2021 mandates. There are two major component parts to this, the mechanical systems and the thermal enclosure.

I recommend that DOER directly contact Joel Boucher, current President of the Air Conditioning Association of New England, and of Boucher Energy Systems, Inc. concerning the impediments he sees to electrification, including such concepts of a special license to address small (e.g. residential scale) HVAC systems, and current MassSave practices that impede electrification by not clearly thinking through construction sequencing. Some of the issues are voiced in this recording: https://www.youtube.com/watch?v=hQ6ABYCBCf8

It is all worth listening to, but the licensing issue start at about 10 min.

It is my opinion that reform in the way HVAC installer licensing is done is necessary to meet the goals of the Climate Act of 2021.

In general I believe we need to involve those actually doing the work more closely in code development, licensing requirements, etc. so that 'roadblocks' that are the unintended consequences of well-intentioned people 'making the rules' who simply do not have sufficient

visibility into the practical realities and consequences of their actions. Concisely, in commercial projects, work functions can be compartmentalized due to the scale of the project. In the massive electrification undertaking of homes we are faced with, a set of different skills is needed in each home electrified, the scale is much smaller than commercial, so a different approach is needed. I think this is a very substantial and important issue to resolve.

I recommend that when changes are made to the thermal enclosures of existing homes, code language be developed that requires common sense, low cost improvements be made. One example of this could be a requirement that if siding is to be replaced, a self adhering membrane used as a Water Resistive Barrier be detailed to improve air sealing.

Many people seem to regard the Passive House standards as too expensive, too exotic, too far from mainstream current practice to be widely used. I think DOER needs to counter this mindset with examples of buildings realized at a very reasonable price with demonstrated real world performance.

There are presentations, data and papers written on the both the first cost-efficacy and delivered performance of, for example, new construction Passive House certified Multi-Family housing, which Mass. currently badly needs in greater supply.

I worked on the first Certified Multi-Family Passive House in New Hampshire, Gilford Village Knowles Phase 3 near Laconia, 24 units of low income, elderly housing I'll briefly describe here:

We started with a completed, conventional building design to which we could make only minimal changes, done by an architect completely unfamiliar with Passive House. This is a very disadvantageous starting point since to be most cost effective the building should be designed from the start to deliver Passive House performance with respect to a number of crucial parameters, such as geometric layout., surface to volume ratio, orientation, roof design for PV, etc. This placed the project at a substantial cost disadvantage from the start. We also worked with a construction company which had no prior Passive House experience, but very fortunately, they were very engaged and supportive.

The result was a building constructed at a cost of $180 / sf of living space including the roof mounted PV. Using the actual utility bills for this building, and those of GVK Phase 2, a footprint identical neighbor building constructed to existing building code a comparison was made. Compared to GVK Phase 2, GVK Phase 3 has a site EUI of only 42% excluding rooftop PV energy, and including rooftop PV energy, which is fair since PV is included in the $180 / sf construction cost, GVK Phase 3 has a site EUI of 11.3% of GVK Phase 2. Simulations estimated that GVK Phase 3 could have been 'net zero energy' if the owner had been willing to install heat pump water heaters, instead of the electric resistance water heaters that were used. This all-electric building uses ASHP for heating and cooling, and a monitoring system indicates the delivered performance cited above occurred with residents setting their living space winter temperatures as high as 76F to 78F. So high quality living space, resilient against power interruptions by virtue of a superior thermal enclosure, with engineered and commissioned ventilation systems for

improved Indoor Air Quality was delivered for a very reasonable price as a Certified Passive House building.

Other studies support the contention that Passive House certified Multi-Family buildings can be realized at little to no additional cost when compared with conventional construction and deliver substantial energy use reductions.

I recommend that DOER create a list of links to reference information on high performance projects, including those built to the Passive House standard, for both new and retrofit construction, as a list of resources for those who can be educated on what has been accomplished in reality, the actual delivered performance, and the first cost. Passive House Mass. can assist with assembling a list of PH MA recorded sessions already accessible online, relevant papers, published work by a variety of PH consultants who work on multifamily and other buildings, etc. This would, in part, serve to demonstrate that seemingly impossible (to some) performance targets have been accomplished at a very reasonable price with demonstrated real world performance. Consider a 'Passive House for Code Officials' session, PH Mass may be able to assist with that.

I'd like to thank the hard working staff at DOER for their efforts in soliciting public comment during the lengthy code development process as well as ongoing listening sessions which help improve the process for all.

In summary, I think we need to go further than establishing the code, that gains need to be made in the application of the building code by code officials, reform in HVAC licensing for small residential projects is badly needed, and that a formal Quality Assurance process should be carefully considered so that all the effort in establishing the code is realized in delivered value.

Thank you for the opportunity to comment, please do not hesitate to contact me if there are any questions.

Best Regards,

Michael Duclos
Stow, MA 01775
978-793-3189
mduclos1@icloud.com

As currently written, one of the stretch code's major unintended consequences is to disincentivize responsible and carbon-smart building reuse. Until DOER develops clearer technical guidance and better pathways for existing buildings, the stretch code is pushing teams towards truly excessive carbon-intensive retrofit strategies to achieve compliance, or, even worse, pushing teams to opt for new construction instead of building reuse. To comply with the available pathways, many projects may only meet code through some combination of the following design choices:

1) Removing and recladding existing building envelopes
2) Adding excessive interior insulation that could complicate future hygrothermal performance
3) Selecting high embodied carbon insulation

These outcomes are in direct conflict with the stretch code's goals of reducing the carbon impact of the Commonwealth's building sector.

Two suggestions to address these concerns:

1) Increase the 10% allowance on area-weighted u-value for existing buildings.
2) Include EnergPHit standard as a compliance option.

Please address these challenges as soon as possible to minimize the number of reuse projects that are negatively impacted.

Elaine Hoffman AIA, CPHC, LEED AP BD+C
Director of Sustainability

420 Boylston Street, Boston, MA 02116
Direct: 617.850.6552 | Main: 617.262.2760

Goody Clancy

NEHERS
NORTHEAST HOME ENERGY RATING SYSTEM ALLIANCE

April 3, 2024

Dear Mr. Finlayson,

These comments are submitted on behalf of the Northeast Home Energy Rating System Alliance (NEHERS)'s Energy Code Committee. The NEHERS Alliance was formed in 1998 to foster, unify and promote HERS Industry in the Northeast, including the following states: CT, MA, ME, NH, NJ, NY, OH, PA, RI and VT. We represent 9 providers, over 250 rater members, plus over 50 RFI, Modeler, and HERS Rater candidates in training. The Energy Codes Committee is responsible for reviewing the Residential Energy Code with respect to HERS Raters concerns and taking actions where appropriate to attempt to improve the clarity and implementation of the Residential Energy Code.

We applaud Massachusetts' efforts to create an energy code that is ambitious and designed to meet the state's climate goals.

The demand for HERS Raters across the commonwealth is significant, and we want to make sure that there are adequate resources available to support the industry as we prepare for a significant increase in stringency for new construction on July 1,2024 when the HERS index drops to a 42. The new stretch code has also added complexity which creates gaps to enforcement, where there are specific situations that have not been directly addressed in how to enforce the code which leads to questions and confusion from both Raters and Code Officials. For example, interpretations may need to be made about unique projects that have very project-specific questions that aren't common. The technical guidance document provided by DOER is a great resource, but only goes so far to address unique situations that raters may come across.

The Municipal Opt-In Specialized Code in Section CC101.2 also removes the option for HERS compliance in R-Use buildings over 12,000 square feet and R-Use portions over 12,000 sf in mixed use buildings in favor of a passive house approach. This will have a negative impact on our industry, as not all HERS Raters are trained as passive house consultants. Passive house verifiers have also expressed concerns that hanging a certificate of occupancy on passive house certification could create problems with project scheduling. If compliance could be completed via a selection of passive house requirements (such as energy intensity, whole building leakage either PHIUS or PHI, ventilation, Energy Star MFNC) rather than full certification, that might be an easier step for builders to achieve on their way to passive house becoming more widespread, This would also allow the current HERS Rater market to have time to work towards gaining that credential and not cause a potential bottleneck.

The biggest concern that our members have expressed is about the stringency of the requirements for large existing building additions and alterations. A HERS 52 is difficult to

achieve in an existing building because the air leakage of unaltered portions of the building remains high, and a whole home blower door test is going to include both new and existing portions of the thermal envelope. Rating the whole home will also factor in equipment that may not be replaced, which can also negatively impact the energy model.

These public comments are intended to express a snapshot of the biggest concerns of the HERS industry about the Stretch Code and Municipal Opt-In Specialized Code, and we encourage our members to submit their own additional comments for clarification.

The Northeast HERS Alliance appreciates the opportunity for public comment, and we encourage the DOER to reach out to us with any questions or concerns,

Thank You!

NEHERS Energy Code Committee

MASSACHUSETTS
ASSOCIATION OF REALTORS®

STATEMENT OF THE MASSACHUSETTS ASSOCIATION OF REALTORS® ON THE RESIDENTIAL STRETCH ENERGY CODE

April 3, 2024

On behalf of the more than 26,000 licensed member professionals of the Massachusetts Association of Realtors® (MAR), we continue to be concerned about costs associated with the swift adoption of the Residential Stretch Energy Code and municipal opt-in Specialized Stretch Energy Code. Our members recognize the benefits of energy efficiency and climate resiliency, both for our environment as well as the value of high-performing properties. However, advancing too quickly with mandates in this area will decrease or prevent development and further increase our state's runaway housing costs.

Last session the state Legislature passed the Next Generation Climate Roadmap bill (Climate Act of 2021[1]) subjecting development to some of the strictest and most expensive guidelines in the country and setting an aggressive timeline for the state to reach net zero energy status, including through development of a net zero stretch building code. As a result of that law, the new Stretch Building Energy Code was created, taking effect for all 299 Green Communities on January 1, 2023. The new code creates aggressive energy rating requirements. The same law also mandated the creation of a Municipal Opt-in Specialized Stretch Energy Code which has slightly more demanding (and certainly more expensive[2]) requirements including solar and electric mandate for many units.

Shortly after Green Community adoption, we started hearing from members who work in development or are involved in local government with concerns over impacts. They noted costs and delays that the new specialized code would cause for housing.

While the stretch code wisely builds in an 18-month phase-in period for new construction, the timeline is still detrimentally aggressive. This delay was designed to give industry time to adjust and order parts as needed. It was also advised by the state with the Department of Energy Resources (DOER) recommending that municipalities build in a minimum of 6-months for regulations to take effect following their vote.[3] As DOER explains, "[t]his phase-in period, also utilized by new Stretch Code municipalities, allows an orderly transition for developers, designers and builders as well as additional training time for municipal code officials." Rushing to the specialized code creates significant additional challenges for little additional benefit – the HERS rating requirements of the stretch code are actually lower than the specialized code, it just does not go as far towards passive house or net-zero requirements. However, we have seen

[1] Chapter 8 of the Acts of 2021, https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8

[2] "…the specialized stretch energy code is likely to increase the cost of home construction by roughly 1.8% to 3.8% – adding approximately $10,000 to $23,000 to the median cost of a single-family home and putting homeownership out of reach for between 15,000 and 33,000 households." https://hbrama.com/2023/06/hbrama-releases-landmark-study-on-net-zero-energy-code-and-housing-affordability/

[3] https://www.mass.gov/doc/summary-document-explaining-stretch-energy-code-and-specialized-opt-in-code-language/download

dozens of communities do just that. Their zeal to "lead" in energy efficiency will have the consequence (perhaps intended) of preventing or delaying housing development.

Moving too quickly into these codes has real consequences. It could slow or stop development and is likely to increase costs, which will be passed along to residents. A recent study conducted by the Massachusetts Institute of Technology and Wentworth Institute of Technology found that net-zero building will add 1.8% to 3.8% ($10,000 to $23,000) to the cost of single-family homes and 2.4% to the cost of multifamily development.[4] Those costs will be passed along to renters and homebuyers. For every $1,000 in increased costs, 1,727 people are priced out of housing in Massachusetts.[5]

We encourage DOER to consider giving communities further options to increase energy efficiency in development on timelines that will not act as a block on housing. Please contact MAR General Counsel Justin Davidson, jdavidson@marealtor.com if you would like to discuss further.

[4] https://hbrama.com/2023/06/hbrama-releases-landmark-study-on-net-zero-energy-code-and-housing-affordability/

[5] https://www.nahb.org/-/media/NAHB/news-and-economics/docs/housing-economics-plus/special-studies/2023/special-study-nahb-priced-out-estimates-for-2023-march-2023.pdf

2023/04/03

To: Ian Finlayson, Deputy Director, Energy Efficiency Division, MA DOER

Re: Written Comments of RenewAire pursuant to DOER's "Stretch and Energy Code Listening Session"

Dear Mr. Finlayson,

Thank you for the opportunity to submit written and specific proposals for modifications to the 2023 Massachusetts Stretch Code for Commercial Buildings. We sincerely hope that these will be helpful in advancing the goals of the Code and your stakeholders.

Sincerely,

Matthew Friedlander
VP Codes and Standards
RenewAire LLC

RenewAire's Proposal for Adjustments to the 2023 Massachusetts Stretch Code for Commercial Buildings

Executive Summary

RenewAire proposes that:

1. Section C403.7.4.2 be modified to compromise between the provisions of the DOER draft of 2022-06-24 and those of the current Code. Section C403.7.4.2 addresses minimum performance standards for ERVs.

2. Language be added, where relevant, that would require third-party certification of the minimum performance requirements.

3. A compliance path for HVI-certified HERVs be provided in the Nontransient dwelling units, as is proposed in draft IECC 2024 and in a continuous-maintenance proposal for ASHRAE 90.1. This would provide the option to use individual en-suite HERV in Nontransient dwelling units.

Summary Table of HERV MEPS in the MA COMMERCIAL STRETCH CODE[1]				
VERSION	Non-transient Dwelling Units		All Other	
	Heating	Cooling	Heating	Cooling
Draft 6/22/2022	ERR ≥ 75%	No requirements	SERR ≥ 75% ERR ≥ 50%	ERR ≥ 50%
Final Code	ERR ≥ 75%	ERR ≥ 50%	ERR ≥ 70%	ERR ≥ 70%
Proposal (for AHRI-certified units)	SERR ≥ 75% ERR ≥ 60%	ERR ≥ 60%	SERR ≥ 75% ERR ≥ 60%	ERR ≥ 60%
Proposal (for HVI-certified units)	(SRE) ≤65% at 32°F	TRE ≤ 50% at 95°	Not proposed[2]	Not proposed

[1] This table represents our understanding of the requirements. However, an ambiguity is introduced by the sentence in C403.7.4.1: "The building weighted average *sensible energy recovery effectiveness* must meet the requirements of C403.7.4.2." We believe this is an unintentional inclusion and the above Table is based on the deletion of that sentence.

[2] It might be desirable to include HVI-certified ERVs in the provisions for "All Other spaces", but uses of these units in other than Nontransient is unusual. Perhaps special cases in which these units are appropriated could be allowed at the inspector level.

MODIFICATION PROPOSAL

The following text is a best-effort attempt to show the Massachusetts amendments integrated into the IECC 2021. The proposed modifications are shown in underline and ~~strike-through~~ format.

SECTION C402
GENERAL DEFINITIONS

SECTION C403
BUILDING MECHANICAL SYSTEMS

C403.7.4 Energy Recovery Systems. Energy recovery ventilation systems shall be provided as specified in either Section C403.7.4.1~~, as applicable~~, ~~and~~ or C403.7.4.2, as applicable.[3]

C403.7.4.1 Nontransient dwelling units. Nontransient dwelling units shall be provided with outdoor air energy recovery ventilation systems ~~with an *enthalpy recovery ratio* of not less than 50 percent at cooling design condition and not less than 75 percent at heating design condition.~~ Outdoor air must be delivered directly to the dwelling unit. The energy recovery system shall result in either 1 or 2, as applicable[4]. ~~The building weighted average *sensible energy recovery effectiveness* must meet the requirements of C403.7.4.2~~.[5]

1. The system shall have an *enthalpy recovery ratio* of not less than 60 percent at cooling design condition and a sensible energy recovery ratio of not less than 75 percent at heating design condition. Outdoor air must be delivered directly to the dwelling unit. Exhaust Air Transfer Ratio[6] at the highest airflow operating point shall not exceed 5%. Compliance to the *sensible energy recovery ratio*, *enthalpy recovery ratio* and *exhaust air transfer ratio* requirements shall be demonstrated by ratings generated at design conditions and airflows by software or catalogs certified by AHRI.

2. The system, at the design outdoor airflow, shall have a *sensible recovery efficiency* (SRE) that is not less than 65%[7] at 32°F (0°C), and a *total recovery efficiency* (TRE) that is not less than 50%[8] AT 95°F (35°C). Exhaust Air Transfer Ratio at a pressure differential of 100 Pa (EATR100) shall not exceed 5.0%[9]. SRE, TRE and EATR100 shall be determined in accordance with CAN/CSA-C439[10] and shall be listed. Linear interpolation of listed values

[3] CHANGE RATIONALE: The original text in IECC 2021 makes it clear that there is one set of requirements for Nontransient dwelling units, and a different set for all other spaces. We believe this is also the intent of the Stretch Code. Note also that the 2023 Massachusetts Stretch Energy Codes Technical Guidance document (page 38) makes clear that C403.7.4.1 applies only to floor area in the dwelling units, and that C403.7.4.2 applies to all other areas.

[4] CHANGE RATIONALE: This provides for two third-party certified rating systems, HVI and AHRI.

[5] CHANGE RATIONALE: See footnote 3.

[6] ADDITION RATIONALE: Control of exhaust air recirculation is important for IAQ and energy reasons and is current codes do not make use of the available certified metrics to do this.

[7] METRIC RATIONALE: The Residential Stretch Code also calls for a minimum 65% SRE, but has no cooling condition requirement. SRE includes penalties for fan power, case gains, etc., so a unit with a 65% SRE has a somewhat higher sensible energy recovery ratio (SERR).

[8] METRIC RATIONALE: The TRE metric, like SRE, includes penalties for fan power, case gains, etc., so a unit with a 50% TRE has a somewhat higher enthalpy recovery ratio (ERR).

[9] ADDITION RATIONALE: See footnote 6.

[10] COMMENT: the use of the phrase "in accordance with CAN/CSA-C439" may obviate the need to add definitions of SRE and TRE. If not, we can assist in drafting definitions/

for SRE and TRE shall be permitted.

C403.7.4.2 Spaces other than nontransient dwelling units. Where the supply airflow rate of a fan system serving a space other than a nontransient dwelling unit exceeds the values specified in Tables C403.7.4.2(1) and C403.7.4.2(2), the system shall include an energy recovery system. The energy recovery system shall result in either 1 or 2, as applicable. Where an air economizer is required, the energy recovery system shall include a bypass or controls that permit operation of the economizer as required by Section C403.5. Compliance to the *sensible energy recovery ratio* and *enthalpy recovery ratio* requirements shall be demonstrated by ratings generated at design conditions and airflows by software or catalogs certified by AHRI.

1. A *sensible energy recovery ratio* of at least 50% at heating design conditions for systems that provide makeup for *Class 3 or 4 exhaust*. The requirement can be satisfied either for each fan system individually or based on a weighted average of the ventilation air flow for all applicable fan systems in the entire building per Equation C403.7.4.2(1).

   Equation C403.7.4.2(1):

   Weighted average *sensible energy recovery ratio* = [*sensible energy recovery ratio* for fan system 1 x outside air flow for system 1 + *sensible energy recovery ratio* for fan system 2 x outside air flow for system 2 + …]/[outside air flow for system 1 + outside air flow for system 2 + …]

2. For all other systems A~~n~~ ~~*enthalpy*~~ *sensible energy recovery ratio* of not less than ~~70%~~ 75% at heating ~~and cooling~~ conditions, and *enthalpy recovery ratio* of not less than 60% at heating and cooling design conditions and airflows ~~for all other systems~~. The requirement can be satisfied either for each fan system individually or based on a weighted average of the ventilation air flow for all applicable fan systems in the entire building per Equation C403.7.4.2(1) for *sensible energy recovery ratio* and Equation C403.7.4.2(2) for *enthalpy recovery ratio.* Exhaust Air Transfer Ratio[11] at the highest airflow operating point shall not exceed 5% for any fan system[12].

   Equation C403.7.4.2(2):

   Weighted average *enthalpy energy recovery ratio* = [*enthalpy recovery ratio* for fan system 1 x outside air flow for system 1 + *enthalpy recovery ratio* for fan system 2 x outside air flow for system 2 + …]/[outside air flow for system 1 + outside air flow for system 2 + …]

[11] ADDITION RATIONALE: Control of exhaust air recirculation is important for IAQ and energy reasons and is current codes do not make use of the available certified metrics to do this.
[12] A 5% limit for all fan systems is recommended for IAQ purposes.

RATIONALE

Rationale for adding the heating condition minimum performance metric from of 75% SERR.

1. Sensible energy recovery ratio (SERR) is the preferred metric for heating season performance since heat recovery contributes to the primary Stretch Code goal of dramatic reduction in heating loads.

2. A 75% SEER heating minimum will move the market more than a 70% ERR heating minimum.

3. A 75% SEER heating minimum allows for competition on the merits between rotary exchangers and plate exchangers.

Rationale for changing the heating and cooling condition minimum ERR from 70% to 60%.

1. With respect to heating conditions, a 60% ERR is sufficient to provide the benefits of frost-point depression that allows energy recovery ventilators to operate at lower outside air conditions than is possible with heat-only recovery.

2. A heating minimum ERR of 60% also helps maintain a comfortable indoor relative humidity during cold dry weather, so that energy-expensive humidification may not be needed. Humidity balance is a complex subject, but it has been suggested to us by a competitor that the higher levels of latent recovery in cold weather, as required by the current code, can lead to excessive indoor humidity and IAQ problems.

3. With respect to cooling, the goal of the Stretch Code is to dramatically reduce heating loads without increasing cooling loads. The move from 50% ERR in the DOER draft of 2022-06-24 to a 70% cooling ERR in the final draft was a giant leap. A relaxation to 60% cooling ERR will reduce cooling season savings somewhat, but this is more than offset by the heating increase to 75% SERR. We provide an example calculation in Estimate of Energy Saving Impact of Proposed Change, below.

4. From the DOER draft of 2022-06-24 to the final draft, no public comment was received suggesting or rationalizing the drastic increase in the cooling season ERR from 50% to 70%.

5. 70% ERR is much higher than in any stretch model code in the country. The nearest minimum ERR requirement is 60%, in ASHRAE 189 (LEED). NEAA's Very High Efficiency DOAS incentive program calls does not call for a minimum cooling ERR at all. PHIUS does not set any ERR minimum in climate zone 5A.

Commentaries

Third-party Certification

Language requiring HVI or AHRI certification should be added to the Code.

This is generally consistent with the 2023-09-22 MA Stretch Energy Codes Technical Guidance document, which states on p.79, that "[systems]… must comply using an enthalpy recovery ratio determined in accordance with AHRI. Other HRVs or ERVs must comply using an SRE determined in accordance with CAN/CSA C439. The installed equipment also must be HVI certified (or equivalent)." This is in reference to section R403.6, pertaining to residential. Presumably it is an oversight that AHRI is not identified in the discussion of SERR and ERR in reference to section C403.7.4.

The Guidance document requires HVI certification (or equivalent), or "ERR determined in accordance with AHRI" (this should be "AHRI 1060"). This typically means that the standard writer wants to require full third-party certification, but also wants to allow some flexibility for early market entrants. Today's market is fairly mature, with (37) brands in the HVI Certified Product Directory, and (26) in the AHRI Packaged Unit Energy Recovery Ventilator Directory, and the industry is innovating. It is appropriate to require third-party certification.

However, it might be possible to add flexibility to allow for alternate demonstration of compliance through "through means acceptable to the AHJ", whether in Code language or the Technical Guidance document.

Ratings At Design Points

ERR, SERR, SRE and TRE ratings should be obtained at the airflows and outside air conditions applicable to the building design conditions, within the capacity of the relevant rating system.

This is consistent with the Technical Guidance Document; on page 39 it states "The recovery ratio used in compliance calculations is the value at the design airflow rate.

The AHRI-1060 certified rating software can provide rating at any reasonable indoor and outdoor psychrometric condition, heating or cooling, and the range of airflows supported by the manufacturer. These ratings include SERR, ERR and EATR, all at the design conditions.

The HVI-certified ratings per C439 provides ratings at standard heating and cooling conditions, so they can't be tuned to different psychrometric conditions. But thermal performance at these conditions (32°F and 95°F) are good representations of winter and summer performance. Another limitation is that the ratings are generated at manufacturer-selected airflow, as distinct from the specific required airflow rate. In other codes (e.g. Title 24), this is addressed by allowing for interpolation of SRE and TRE from ratings at airflows greater than and less than the design airflow, or from a rating at a airflow greater than the design airflow. RenewAire thinks this is a reasonable approach and includes it in our proposed text changes. HVI ratings also include EATR.

Exhaust Air Transfer Ratings

"Exhaust Air Transfer Ratio" is a metric provided by HVI and AHRI ratings. It is referenced in ASHRAE 61.1, Section 5.13.3 Recirculation Limitations, in which an EATR ≤ 10% is required for ERVs exhausting Class 2 air and supplying Class 1 spaces, or ≤ 5 % when exhausting Class 3 air.

This limitation is important for air quality purposes. It is also important for energy savings purposes. When EATR is not included in the energy saving metric, an exchanger with high EATR appears to have a higher energy recovery rate than it truly does. Another way to put it is that high EATR means the net supply airflow is lower than the measured gross.

The HVI certification based on C439 does rate EATR and includes it in the SRE, TRE and Net Supply Airflow. So a very leaky ERV will have higher EATR, and lower SRE, TRE and Net Supply.

AHRI-certified rating software rates EATR at the actual operating condition of the exchanger. EATR reduces "Net Supply Airflow", a certified rating. It is not included in the ERR or SERR metrics[13].

Unless we missed it, EATR is not mentioned in any of the Massachusetts Building Codes. The MA amendments to the 2015 IMC does mention that in certain spaces no recirculation is allowed, while for other spaces roughly corresponding to Class 2 spaces, 10% "recirculation" is allowed with wheel-type energy recovery. (403.2.1.4 by reference to Note g to Table 403.3.1.1).

The 2023 Stretch Code Technical Guide speaks to recirculation on page 37: "The enthalpy recovery ratio also must not take credit for any air leakage from exhaust to supply air streams."

In this proposal, RenewAire has recommended a 5% EATR limit, whether by HVI or AHRI rating. This should be feasible for most Plate ERVs and also for high-quality wheel-type ERVs, and represents a solid balance between IAQ, energy savings, and availability. While recirculation is more often addressed in mechanical codes, the MA Stretch Code, for many designers, code officials and contractors, is a first introduction to ERV technology; consequently, including EATR here will group the requirement with the relevant code.

Positive market impact of this proposal

The RenewAire proposals give designers the ability to choose from a wider range of product types and manufacturers to fit specific applications (i.e. spaces with less capable maintenance crews may lean towards fixed plate ERVs. This will lead to better product availability as more manufacturers can be used resulting in a less constricted supply chain.

Current code calls for oversizing ERV units that are larger and more expensive than int the previous code or any other stretch code. Compared to current code, the RenewAire proposal will generate space and cost savings while also requiring recovery ratios that still exceed other stretch codes.

Finally, the RenewAire proposal requiring AHRI third-party certified ratings, ensures that every manufacturer is on a level playing field, supported by reliable performance ratings, leading to a robust market for the benefit of the Commonwealth.

[13] For reasons that go back to the ASHRAE scope limits: 90.1 , in which ERR and SERR are defined, focuses on energy savings, 62.1 on air quality.

OTHER STRETCH CODES

With RenewAire's proposal, the Massachusetts Commercial Stretch Code would remain the most stringent in the nation, as detailed below.

The International Green Construction Code is based on ASHRAE 189.1-2023 Standard for the Design of High-Performance Green Buildings. In Climate Zone 5A, it requires 60% minimum heating and cooling ERR. With RenewAire's proposed addition of a 75% SERR, the Massachusetts Commercial Stretch Code would be more stringent.

NEEA's Very High Efficiency DOAS incentive program calls for minimum 82% sensible effectiveness according to AHRI 1060-2018 certified software when selected winter conditions of 35°F DBT, 35°F WBT (OA); 70°F DBT, 58°F WBT (RA), at 75% of nominal airflow. This is a very stringent requirement, generally requiring units be operated at very low airflows. This program provides financial incentives and RenewAire products are in the process of being listed. Note that there is no requirement for latent recovery in this program. Since this program's metric is sensible effectiveness only, with no latent component, it is not as stringent RenewAire's proposed requirements for the Massachusetts Commercial Stretch Code.

Phius effectively requires sensible ERR sufficient to provide supply at heating design conditions no less than 60°F. No latent recovery is required in Climate Zone 5A. No performance minimum for cooling conditions is set. In Massachusetts, the required Sensible Energy Recovery Ratio would be 75% to 79%. This is comparable to RenewAire's proposed addition of a 75% SEER, but with the 60% ERR requirement, , the Massachusetts Commercial Stretch Code would be more stringent.

The current New York State 2020 Stretch Code calls for 50% ERR at heating and cooling design conditions. With RenewAire's proposal, the Massachusetts Commercial Stretch Code would remain far more stringent.

Draft 2023 New York State Residential Stretch Code calls for 70% Sensible Recovery Efficiency (SRE) per C439 at 32°F. This is applicable to CSA-439 certified units, and therefore is not directly comparable to our proposal for the Massachusetts Commercial Stretch Code. However, note that SRE is approximately comparable to SERR; thus, since the New York Stretch Code has no requirement for latent recovery, it is not as stringent as RenewAire's proposed requirements for the Massachusetts Commercial Stretch Code.

Draft 2023 Vermont Residential Building Standard calls for 75% Sensible recovery efficiency per C439 at 32°F. Again, this is applicable to CSA-439 certified units, and therefore is not directly comparable to our proposal for the Massachusetts Commercial Stretch Code; but with no requirement for latent recovery, it is not as stringent RenewAire's proposed requirements for the Massachusetts Commercial Stretch Code.

Maine's Stretch Code currently is the 2021 IECC, which requires 50% heating and cooling ERR in most commercial applications, and 60% heating ERR for nontransient dwelling units.

ASHRAE and IECC Base Codes

90.1-2022 and IECC-2021, for Massachusetts Climate Zone 5A, call for:
Minimum 60% heating ERR in nontransient dwelling units.
Minimum 50% heating and cooling ERR in all other commercial applications (with some exemptions).
90.1 substitutes Sensible Energy Recovery Ratio for heating when active humidification is not provided.

Estimate of Energy Saving Impact of Proposed Change

Summary

Based on analysis of the energy modelling for the Small Office Optimized Electric Case, RenewAire estimates that its proposed changes to the Stretch Code would in this case result in 10.0 [MBTU/yr] additional savings in the heating season, exceeding the 6.4 [MBTU/yr] decrease in savings in the summer.

It is important to understand that the energy modelling in all of the cases overstates heating savings, because it accounts for latent energy recovery which, in the absence of active mechanical humidification, does not reduce energy use. RenewAire accounts for that in the estimates. Latent recovery does help with indoor IAQ and frost-free operation, however.

Heating Season

In short, RenewAire proposes to change the heating season requirement from minimum ERR = 70% to minimum 75% SERR and minimum 60% ERR. This will significantly increase heating load savings.

Assumptions:
1) Active humidification equipment is not included in any of the building case models or energy modelling. This is critical to the following argument, based on the presumption that the only building energy saved in heating season exhaust air energy recovery is sensible.

2) energy modelling did include both total and latent recovery, with sensible and latent effectiveness equal at all design points. This is not typical of most energy recovery equipment; in many or most cases, latent effectiveness is lower than sensible.

3) the modelling sets exhaust and supply mass flows equal to each other. Under this assumption the term SERR is equivalent to "sensible effectiveness" and the term ERR is equivalent to "total" or "enthalpic" effectiveness.

4) the exhaust air from which energy is recovered is at the room design conditions.

5) at occupied room setpoint of 70°F, the wet bulb is 58°F, about 50% RH.

Looking at the Small Office Optimized Electric Case, the energy modelling shows:

A peak ventilation rate of 213,126 cubic feet per hour, rounded to 213,000 cubic feet per hour;

A peak value for heat recovery of 262,605 BTU/h, with the heating ERR of 75%.

The peak gross load without energy recovery is calculated to be:
262,605 [BTU/h] / 75% = 350,140, rounding to 350,000 [BTU/h].

The enthalpy difference between outside and inside air in the modelling can be calculated as:

Eq. 1 $$\Delta h \left[\frac{BTU}{lb_{da}}\right] = \frac{350{,}000\left[\frac{BTU}{hr}\right]}{213{,}000\left[\frac{ft^3}{hr}\right]\cdot 0.075\left[\frac{lb_{da}}{ft^3}\right]} = 21.9\left[\frac{BTU}{lb_{da}}\right]$$

To validate that this is realistic, enthalpy at the assumed conditions is calculated.

In the "Schedule and Loads Guidelines Supplement R1 v2.xls" the winter occupied temperature set point is 70°F, and the summer occupied temperature set point is 75°F.

In the energy model report the outside temperature at Logan in winter of 8.06°F drybulb and wetbulb, and in summer 90.50 °F drybulb and 72.68°F wetbulb. We take the room RH as 40% in the heating season.

Under these assumptions, and using commercially available software to determine, at sea level, the absolute humidity ratio W, and ASHRAE Fundamentals Ch. 1 equations 29, 30 and 30 to determine enthalpies, results in:

	Tdb [°F]	T_{wb} [°F]	W [lb_w/lb_{da}]	[14]Sensible enthalpy [BTU/lb_{da}]	[15]Latent enthalpy [BTU/lb_{da}]	[16]Total enthalpy [BTU/lb_{da}]
Outside Air	8.06	8.06	0.001194	1.93	1.29	3.21
Room Air	70.0	58.0	0.007558	16.8	8.25	25.05
Enthalpy differences between Outside Air and Room Air				14.87	6.95	21.85

This calculated enthalpy difference between these inside and outside conditions of 21.85 [BTU/lb] is very consistent with the difference estimated in Eq. 1 from the modelling report 21.9 [BTU/lb].

From this RenewAire concludes that the modelling of energy loads and energy recovery did include both sensible and latent loads.

The *sensible* component of the enthalpy difference rounds to is 14.9[BTU/lb] and the *latent* component rounds tos 7.0 [BTU/lb].

Assuming that there is no active humidification of the space, it can be argued that the true peak heating load is comprised only of the sensible component:

$$Eq.\ 2 \quad Peak\ Sensible\ Load = 213{,}000\left[\frac{ft^3}{hr}\right] \times 0.075\left[\frac{lb_{da}}{ft^3}\right] \times 14.9\left[\frac{BTU}{lb_{da}}\right] = 238{,}027\left[\frac{BTU}{hr}\right]$$

Or, rounding, 238,000 BTU/h at peak.

Note: 0.075 [lb_{da}/ft^3] is the density of standard air.

This proposal seeks to increase the requirement from what is effectively a 70% SEER to a 75% SEER. Peak heating load savings thus increases from:

[14] T_{dp} [°F] X specific heat c_p = 0.24 [BTU/lb·°F]
[15] W [lbw/lbda] X {1061[BTU/lb_w] + 0.444[BTU/lb·°F] X T_{dp} [°F]}
[16] Sum of sensible and latent enthalpies

238,000 X 70% = 166,600 [BTU/h]

To:

238,000 X 75% = 180,800 [BTU/h]

Thus under the RenewAire proposal the peak outside air heating load is reduced by 14,200 [BTU/h].

On an annual basis, the calculations in a simplified form are as follows:

Annual Heat Recovery for Heating is stated in the modelling report as 293,526,000 [BTU/yr].

Multiplying that by the ratio of sensible enthalpy load to total enthalpy load yields the sensible load:

293,526,000 [BTU/yr].X 14.9/21.9 = 199,700,000 [BTU/yr]

Sensible savings under the current ERR minimum of 70% is then:

199,700,000 X 70% = 139,800,000,

Sensible savings under the proposed SERR of 75% is

199,700,000 X 75% 149,800,000 [BTU/h] **an improvement of 10.0 [MBTU/yr].**

Cooling Season

In short, Renewaire's proposal would lower the Cooling Season ERR from 70% to 60%. This will reduce the cooling season savings by an amount that is exceeded by the enhanced heating season savings.

Looking again at modelling for the Small Office Optimized Electric Case:

The Peak load under current code is estimated as 185,300 [BTU/hr] (rounded) by the following calculation:

modelled recovery of 139,000 BTU/hr divided by ERR of 75% = 185,333 [BTU/hr]

The Total annual load under current code is estimated as 63,900 [kBTU/yr] (rounded):

modelled recovery of 47,936 kBTU/yr divided by ERR of 75% = 63,915 [kBTU/yr]

Because both sensible and latent loads in outside air require mechanical conditioning to offset, we do not separate out the sensible and latent loads in the following comparison of savings under the current code and our proposal.

Savings under current and proposed Stretch Code (Small Office Electric Optimized)		
	Peak Savings [BTU/hr]	Annual Savings [kBTU/hr]
Current Code	185,300 X (1 - 70%) = 55,590	63,900 X (1-70%) = 19,170
Proposal	185,300 X (1 – 60%) = 74,120	63,900 X (1-60%) = 25,560
Increase (Decrease)	(18,500 BTU/hr) or (0.018 MBTU/hr)	(6,390 kBTU/yr) or 6.4 [MBTU/yr]

In the MEPs Pricing Backup for this case, a DOAS unit of unspecified tonnage, and (5) "VRF/Outdoor cond. unit/heat & cool - 144 mbh". A nominal 144 mbh unit would have a AHRI-1230 Cooling Capacity of 138 MBTU/hr. All five would have a capacity of 690 MBTU/hr. It seems unlikely that an additional load of 0.018 would require upsizing of the equipment.

Snip of loads used in above calculations

Annual and Peak Values - Other

	Annual Value [kBtu]	Minimum Value [Btu/h]	Timestamp of Minimum {TIMESTAMP}	Maximum Value [Btu/h]	Timestamp of Maximum {TIMESTAMP}
~~EnergyTransfer:Plant~~	~~9411.89~~	0.00	01-JAN-00:10	24896.22	03-FEB-08:50
HeatRecovery:EnergyTransfer	4785.37	0.00	01-JAN-00:10	23664.49	03-FEB-08:50
General:HeatRecovery:EnergyTransfer	4785.37	0.00	01-JAN-00:10	23664.49	03-FEB-08:50
HeatRecoveryForHeating:EnergyTransfer	293525.89	0.00	01-JAN-00:10	262605.00	01-MAR-06:10
HeatRecoveryForCooling:EnergyTransfer	47936.85	0.00	01-JAN-00:10	138983.73	10-JUL-12:10
WaterSystems:EnergyTransfer	4626.52	0.00	01-JAN-00:10	2239.51	02-JAN-12:10
General:WaterSystems:EnergyTransfer	4626.52	0.00	01-JAN-00:10	2239.51	02-JAN-12:10
PlantLoopHeatingDemand:Facility	4626.52	0.00	01-JAN-00:10	2239.51	02-JAN-12:10
PlantLoopHeatingDemand:Plant	4626.52	0.00	01-JAN-00:10	2239.51	02-JAN-12:10
WaterSystems:PlantLoopHeatingDemand	4626.52	0.00	01-JAN-00:10	2239.51	02-JAN-12:10
General:WaterSystems:PlantLoopHeatingDemand	4626.52	0.00	01-JAN-00:10	2239.51	02-JAN-12:10
Service Hot Water Heating:WaterSystems:PlantLoopHeatingDemand	0.00	0.00	01-JAN-00:10	0.00	01-JAN-00:10

Report: **Sensible Heat Gain Summary** Table of Contents

For: **Entire Facility**

Timestamp: **2021-04-29 23:38:06**

Annual Building Sensible Heat Gain Components

CONCLUSION

In light of the information presented above, DOER should amend the Commercial Stretch Energy Code as suggested by RenewAire.

To: Ian Finlayson
Deputy Director, Energy Efficiency Division
Massachusetts Department of Energy Resources (DOER)
stretchcode@mass.gov

Re: Code Comments (re Stretch Code and Specialized Code for new buildings)

We are a group of physicians, including experts in internal medicine, environmental health, psychiatry, infectious disease, pediatrics, air pollution, and emergency medicine. We all live in the greater Boston area and many of us provide care to people in and around greater Boston. Our focus is health justice in the midst of the climate crisis.

We are writing in support of the Stretch Code and Specialized Code for new buildings.

It is well recognized that rapid reduction in greenhouse gas emissions is needed to avoid the most devastating consequences of climate change, and that reducing emissions requires a prompt transition from fossil fuels to renewable energy sources.

Improving the efficiency of our buildings and preparing them for electrification are critical to mitigating the serious health harms posed by climate change and air pollution. We are already seeing climate related health harms in our patients—including more heat-related illnesses, respiratory and cardiovascular disease, allergies, insect borne diseases, and mental health conditions -- and these harms are expected to increase markedly if we do not rapidly decrease our fossil fuel - driven emissions. Moreover, air pollution from burning fossil fuels causes respiratory disease and cardiovascular disease, and is also linked to increased risks of multiple other health problems, including (but not limited to) neurodegenerative diseases, pregnancy complications, and diabetes. Air pollution is linked to about 2780 premature deaths in Massachusetts a year.

In Massachusetts, buildings are a major source of air-pollution-related premature deaths and a major generator of greenhouse gas emissions. Preparing new buildings that are not already electrified for a rapid transition to electricity is critical, as a transition to

electric buildings will reduce both indoor air pollution (including pollutants such as benzene, nitrogen dioxide, and carbon monoxide) and outdoor air pollution (including nitrogen dioxide and particulate matter pollution.) Nitrogen dioxide has been deemed by the EPA to be a likely cause of asthma, and studies have indicated reductions in asthma incidence and symptoms when these levels are reduced. In 2021, 13.1% of Boston adults, and a striking 30% of Boston public high school students, reported having asthma. (https://www.boston.gov/sites/default/files/file/2023/05/HOB_Asthma_2023_FINAL_May 11.pdf)

Building codes that substantially reduce emissions through increased efficiency and a transition to electrification are critical to protect the health of Massachusetts residents. As physicians, we strongly support stricter codes that require full electrification of new buildings, as is needed to meet Massachusetts greenhouse gas reduction mandates.

Thank you for your consideration.

Sincerely

Jim Recht, MD
Lecturer on Psychiatry, Harvard Medical School

Caren Solomon, MD, MPH
Associate Professor of Medicine, Harvard Medical School

for Climate Code Blue

AIA Massachusetts

a chapter of The American Institute of Architects

April 3, 2024

Ian Finlayson
Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

Re: DOER Listening Session - Stretch and Specialized Energy Codes – Code Comments

Dear Mr. Finlayson:

This letter follows up on DOER's March 27, 2024, public listening session on the Stretch and Specialized Energy Codes. During that session, Katherine Bubriski AIA, a board member of the Massachusetts Chapter of the American Institute of Architects (AIA MA), offered verbal testimony.

Established in 1941, AIA Massachusetts represents over 5,000 architects, design professionals, and allied members statewide. We are the state chapter of our national organization, the American Institute of Architects, with over 98,000 members representing more than 200,000 U.S. jobs. We have been actively involved with developing the Commonwealth's response to climate issues and aligning with the policy positions of our national organization. We support the role of the energy codes in achieving Massachusetts decarbonization goals.

Attached is an overview of the results of the AIA MA-sponsored survey of its membership. The survey ran for approximately one month, from late November 2023 through early January 2024, and was sent to all members of AIA MA, soliciting feedback from both individuals and firms. The survey intended to best understand the implementation of the requirements contained in the 225 CMR 22.00 and 23.00 to ascertain if there were challenges to implementation and identify resources to alleviate any challenges.

The survey identified various areas for DOER to address, such as Resources, Code Language Clarifications, and Training and Education Topics. A few of the highlights include:

- Resources
    - Compiled code document – one document with M.A. amendments and Technical Guidance blended into the base IECC language.
    - Need for a DOER on-call response/helpline and compiled public FAQ resulting from the helpline
- Code Language Clarifications
    - Alterations – especially low-rise residential
    - Change of Use – how to benchmark and define an increase in energy use
    - District energy systems

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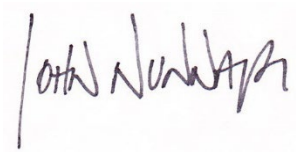
- Training & Education Topics
    - TEDI modeling: best practices, lessons learned, project examples
    - Envelope derating and component performance calculations: best practices, lessons learned, examples

We want to thank DOER for their leadership and effort in implementing the changes needed to our energy codes, and for holding the March listening session. We would appreciate the opportunity to review these results in more detail and request a meeting with you and your team at your earliest convenience. To schedule a meeting, please do not hesitate to contact me at 617-901-4685 or via email at jnunnari@architects.org

Thank you;



John Nunnari
Executive Director
AIA Massachusetts

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Boston, MA 02210 www.aiama.org

2023 AIA MA ENERGY CODES SURVEY

SURVEY RESULTS OVERVIEW

21 MARCH 2024

PREPARED FOR

AIA MASSACHUSETTS

PREPARED BY

KATE BUBRISKI

83 Responses

69

BSA

6

CENTRAL MASS

7

WESTERN MASS

One response did not specify

PROJECT EXPERIENCE

Level of Code Understanding

67%

CAN NOT EFFECTIVELY DESIGN TO CODE

14%

CAN DESIGN ENVELOPE/MEP TO MEET CODE

15%

CAN EFFECTIVELY DESIGN FULLY TO CODE

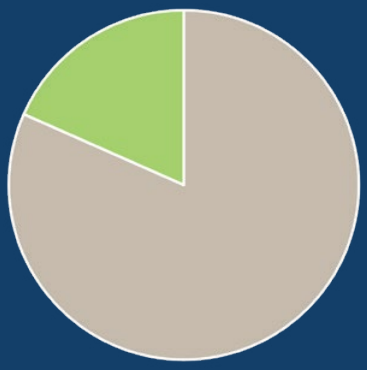
Building Types

Straightforward	Somewhat Challenging	Moderately Challenging	Very Challenging
	RETAIL	LOW-RISE RESIDENTIAL	PK-12 SCHOOL
	HIGHER EDUCATION	MID-RISE MULTIFAMILY	LAB
		HIGH-RISE MULTIFAMILY	
		OFFICE	

Building types not listed were represented by less than 20% of respondents

Compliance Paths - Residential

WHAT PATH ARE NON-PRESCRIPTIVE PROJECTS CHOOSING



Compliance Paths - Residential

Straightforward	Somewhat Challenging	Moderately Challenging	Very Challenging
PRESCRIPTIVE	ENERGY RATING INDEX	PRESCRIPTIVE	PASSIVE HOUSE CERTIFIED
	SPECIALIZED CODE	PASSIVE HOUSE CERTIFIED	SPECIALIZED CODE

Paths that are listed in two columns received the same response rate for both levels of difficulty.

Residential Stretch

STRAIGHTFORWARD OR SOMEWHAT CHALLENGING

- Selecting the compliance pathway

MODERATELY TO VERY CHALLENGING

- Understanding the compliance pathway
- Documenting code compliance
- Explaining code requirements to owners
- Explaining additional scope, fees, or construction costs to owners
- Explaining requirements to contractors
- Determining appropriate assemblies and designs to meet requirements

SEEMS VERY CHALLENGING - BUT NOT A LOT OF RESPONDENTS HAVE GOTTEN TO THIS PHASE YET

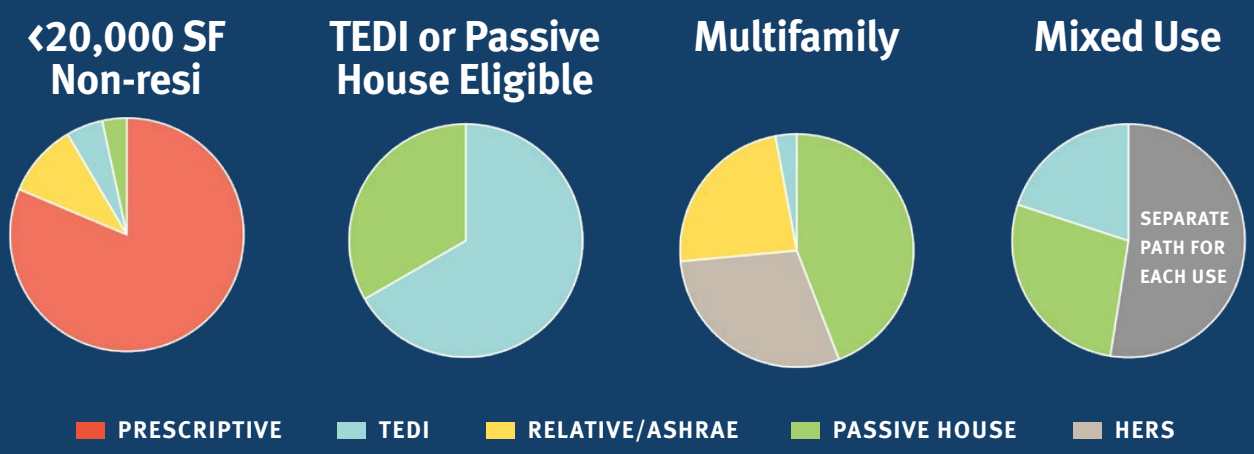
- Verifying that construction meets design goals
- Resolving issues after construction

SPECIALIZED CODE

- Not a lot of respondents have had project experience yet. Those with experience found it very challenging.

Compliance Paths - Commercial

WHAT PATH ARE PROJECTS CHOOSING



Compliance Paths - Commercial

Straightforward	Somewhat Challenging	Moderately Challenging	Very Challenging
	PRESCRIPTIVE <20,000	RELATIVE (ASHRAE 90.1)	TARGETED (TEDI)
	SPECIALIZED CODE	CERTIFIED PASSIVE HOUSE	EXISTING ALTERATION
		CERTIFIED HERS	EXISTING CHANGE OF USE

Commercial Stretch

STRAIGHTFORWARD OR SOMEWHAT CHALLENGING

- Selecting the compliance pathway

MODERATELY TO VERY CHALLENGING

- Understanding the compliance pathway
- Documenting code compliance
- Explaining code requirements to owners
- Explaining additional scope, fees, or construction costs to owners
- Explaining requirements to contractors
- Determining appropriate assemblies and designs to meet requirements

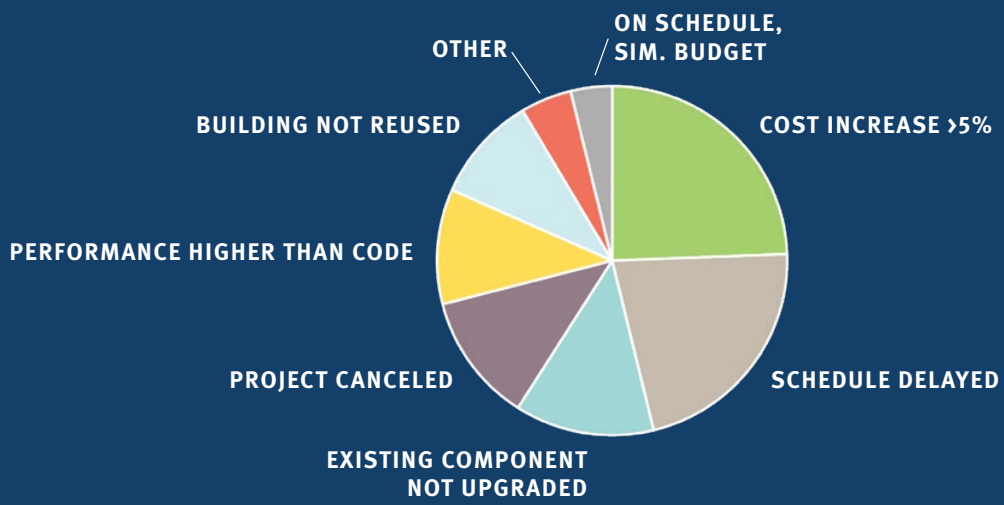
SEEMS VERY CHALLENGING - BUT NOT A LOT OF RESPONDENTS HAVE GOTTEN TO THIS PHASE YET

- Verifying that construction meets design goals
- Resolving issues after construction

SPECIALIZED CODE

- Not a lot of respondents have had project experience yet. Those with experience found it equally somewhat, moderately, and very challenging.

Direct Outcomes on Projects



OTHER:

- Change of Use avoided
- Multiple small projects to avoid low-rise triggers

Priorities to Address Outcomes

1. ADDITIONAL INCENTIVES/FUNDING
2. ADDITIONAL DOER SUPPORT TO ARCHITECTS/ENGINEERS
3. ADDITIONAL INCENTIVES FOR EXISTING BUILDING REUSE
4. VARIANCE PROCESS
5. ADDITIONAL MODELING & CERTIFICATION WORKFORCE

CODE LANGUAGE & RESOURCES

Resources Desired

TOP RESOURCES THAT WOULD AID IMPLEMENTATION, LISTED IN ORDER

1. **CLEARER CODE DOCUMENTS**
2. **TRAINING AND EDUCATION FOR ARCHITECTS**
3. **CASE STUDIES**
4. **RESOURCES FOR CLIENTS TO EXPLAIN CODES & IMPACTS**
5. **DOER STAFF AVAILABLE TO ANSWER QUESTIONS**
6. **MORE PUBLIC AWARENESS OF CODES**

Recommendations to Specific Challenges

1. **Continually update Technical Guides**
2. **Meet with Technical Advisory Committee**
3. **Ensure that we aren't creating harmful indoor environments in existing buildings**
4. **Detailed "real world" calculation examples**
5. **Rewrite sections instead of trying to add/delete from IECC model language**
6. **Provide guidance on industrial sector**

Mr. Finlayson

This email and attachment follows up on DOER's March 27, 2024, public listening session on the Stretch and Specialized Energy Codes. During that session, Katherine Bubriski AIA, a board member of the Massachusetts Chapter of the American Institute of Architects (AIA MA), offered verbal testimony.

Attached is cover letter and overview of the results of the AIA MA-sponsored survey of its membership. The survey ran for approximately one month, from late November 2023 through early January 2024, and was sent to all members of AIA MA, soliciting feedback from both individuals and firms. The survey intended to best understand the implementation of the requirements contained in the 225 CMR 22.00 and 23.00 to ascertain if there were challenges to implementation and identify resources to alleviate any challenges.

We want to thank DOER for their leadership and effort in implementing the changes needed to our energy codes, and for holding the March listening session. We would appreciate the opportunity to review these results in more detail **and request a meeting with you and your team at your earliest convenience**. To schedule a meeting, please do not hesitate to contact me at 617-901-4685 or via email at jnunnari@architects.org

Thank you,

John

John Nunnari
Executive Director, AIA MA
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617-951-0845 (fax)

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Ian Finlayson
Deputy Director, Energy Efficiency Division
Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

April 3rd, 2024

RE: A Better City's Comments on the Stretch Energy Code and Specialized Stretch Code

Deputy Director Finlayson:

On behalf of A Better City's nearly 130 member businesses and institutions, thank you for your efforts to understand the impact to users of the recently updated Stretch Energy Code and Specialized Stretch Code through a public listening session and a public comment period. We appreciate your effort to improve the codes based on feedback received and are grateful to be part of this Stretch Energy Code and Specialized Stretch Code review process.

A Better City's comments begin with members' general experience using the codes, including: on-site solar; building project locations; building improvement setbacks; industrial buildings' inability to procure heating-only equipment for all-electric buildings; and existing building facades. These are followed by three recommendations to: convene practicing professionals to improve the codes; onboard additional staff at the Department of Energy Resources (DOER) to keep pace with the bottleneck of questions from code users; and develop a State-managed relief pathway for the Stretch Energy Code and Specialized Stretch Code.

Thank you for your consideration, for your leadership, and for your commitment to code improvement to ensure that they are implementable, while also moving us towards our shared climate goals. Please reach out to Yve Torrie (ytorrie@abettercity.org) with any comments or questions.

Thank you,

Y. L. Torrie

Yve Torrie
Director of Climate, Energy & Resilience
A Better City

Cc: Elizabeth Mahony, Commissioner, DOER
Paul Ormond, Energy Engineer, DOER

A Better City Members' Experience as Users of the Stretch Energy Code and Specialized Stretch Code

- ***On-Site Solar***: A Better City members expressed concern with the on-site solar "where feasible" requirement in the Specialized Stretch Energy Code. They said there can be building and/or utility issues that can prevent on-site solar from being implemented. In Boston, on-site solar installation usually means PV roof panels rather than use of ground level open space, which cannot be used in most cases. PV panel products exist in glass for facades, but it is mostly not feasible today (i.e. 90-degree vertical, limited sun exposure, and expensive installation costs). Roof space generally doesn't have enough space for a quantity of solar panels that result in energy potential or value with current efficiencies and costs. Mechanical space, elevator and stair overheads, and window washing clearances all reduce available space, as does equipment relocation for resiliency/adaptation. Roof decks are also amenities that make buildings more competitive to potential tenants and can impact the success of leasing contracts.
- ***Building Project Locations***: The inconsistency in adoption of the updated Stretch Energy Code, and particularly the Specialized Stretch Code, is impacting the location of building development and the choices made by owners and tenants alike. Owners are looking at which municipalities have adopted each of the codes, and which have not, as a strong determinant of where they buy and update buildings. Tenants are choosing their tenant space locations in the same way, as the increased cost of new and retrofitted buildings can be passed on to tenants. We also heard some owners and tenants are moving to Southern NH to avoid the new code requirements, which directly impacts municipalities in Massachusetts that rely on real estate taxes.
- ***Building Improvement Setbacks***: As owners look to make energy efficiency upgrades to their buildings, they are required to bring the buildings up to the current code if more than 30% of the asset's value is spent on improvements. Industrial buildings, built more than 20 years ago, were built cheaply, and require upgrades. The 30% threshold, however, is limiting these renovations. Some A Better City members have discussed whether that threshold could be adjusted to ensure the renovations can be made and climate goals fulfilled.
- ***Industrial Buildings' Inability to Procure Equipment for All-Electric Buildings:*** Many industrial buildings and warehouses require minimal heat in winter and no air conditioning in summer. However, some A Better City members are unable to find equipment for an all-electric building that just provides heat. Most of today's equipment involves heat pumps that provide both heating and cooling, the latter of which is unnecessary in many cases. These types of buildings are being sought after by the climate tech and bio manufacturing industries that also have a lot of mechanical equipment on the roof in conflict with solar arrays.
- ***Existing Building Facades:*** The way the code is currently written does a lot of derating of existing facades that cannot always be overcome simply by slapping insulation on the inside of the facades. As buildings age, they will need renovations, which may become impossible if they cannot meet code without stripping the facades from existing buildings. This outcome does not seem to meet the intent of the code; new facades will be expensive and costly in their impact on embodied carbon.

A Better City's Recommendations

1) ***Convening Practicing Professionals to Improve Codes***: We have heard from members, practicing professionals, and inspectors alike, that working with DOER on code language clarification, technical guidance, compliance documentation, and a clear process for DOER support will be very useful to improve the Stretch Energy Code and Specialized Stretch Code's implementation. They also suggest training for design contractors and owners to help overcome challenges experienced in the last year.

   A Better City recommends DOER improve the codes by convening practicing professionals to clarify code language, technical guidance, compliance documentation, a clear process for DOER support, as well as training for design contractors and owners.

2) ***Onboard Additional Staff to Keep Pace with the Bottleneck of Questions from Code Users:*** A Better City members and their teams said they have encountered bottlenecks in getting answers from DOER on code questions. However, everyone is asking similar questions. They have suggested onboarding more staff to keep pace with the questions received, providing answers through a dedicated hotline, similar to California, so that building projects are not delayed.

A Better City recommends additional staff be onboarded and a dedicated hotline developed to answer questions from users on the new codes.

3) ***Develop a State-Managed Relief Pathway for the Stretch Energy Code and Specialized Stretch Code***: For the base building code, project proponents have an opportunity to seek relief from its provisions (780 CMR) in the form of a variance or interpretation of the applicability of a particular code section. Appeals Board members are not allowed to waive code requirements in their entirety but may consider alternative methods of complying with the intent of the code. However, there is no such relief pathway for the stretch and specialized energy codes. By allowing for additional flexibility for project proponents to comply with the updated stretch and specialized stretch energy codes, projects can move forward that increase project construction and renovation, and still meet critical climate goals.

A Better City recommends a State-managed relief pathway be developed for the Stretch Energy Code and Specialized Stretch Code.

Hi Ian –

Here are my 2 cents comments/feedback related to the new Stretch / Specialized code:

1. **HERS Rating for Partial Renovation projects is <u>not</u> an option**
    a. HERS Rating has originally been designed for New construction projects, where a HERS Rater is able to inspect all exterior walls (and the rest of thermal envelope) with naked eyes and grade them accordingly.
    b. If any dwelling unit (or a single family home) involves partial renovation (e.g. some of the sheetrocks are not removed from the exterior walls), the house cannot be rated. Under these circumstances, there is no way for a Rater to verify that every sqft of the thermal envelope has insulation, so a Rater <u>cannot</u> technically even grade them as Grade III.
    c. Partial Renovation should comply with the code prescriptively.
    d. However, full Gut Rehab projects <u>can</u> be rated as new construction.
2. **Cavity Insulation for 2x4 structure & minimum 2015 IECC**
    a. Current code is mandating 2X4 structure to comply with at least 2015 IECC even if they go with performance path – That is, minimum R-20 in exterior walls .. The only way to do that for a 2X4 walls would be to use Closed Cell Spray Foam, which is greatly damaging the environment… Based on our experience, increasing a cavity insulation R-value from R-15 (which can be achieved easily with alternative environmentally-friendly insulation materials) to R-20 does not add much value in terms of energy efficiency; depending on the size of the project, it can only lower the HERS index by 1-2 points in most cases. So, in general, the consequence of this code requirement for renovation projects, can have an overall negative impact on the environment.
    b. Whereas, if possible, to add continuous insulation to the exterior walls that can greatly add value in terms of energy efficiency (i.e. R-5 cavity insulation has a lot less value than R-5 continuous).
    c. As the old stretch code used to say, I think that as long as they fill in the cavity of a 2X4 structure with insulation material of R-3.7 per inch or higher that would be sufficient enough and as long as they perform a good air-sealing in terms of whole house infiltration.
3. **Application Date or Building Permit Date**
    a. Code needs to be clear whether stretch code and/or specialized code shall be enforced based on the Application Date or Building Permit Date.

Thanks,
Bijan KHosraviani
Principal

www.A9Green.com
Save Energy, Save the Earth!
(LEED, HERS, Passive House, AeroBarrier)
781-778-7054 (Main)
408-891-2759 (C)

Please:
1- Always send (or cc:) all emails/inquiries to info@A9Green.com
2- Start the subject line of your email with the property address
3- Check our Google Review to see what people say about us!

From: Massachusetts Department of Energy Resources <stretchcode@mass.gov>
Sent: Friday, March 15, 2024 4:55 PM
To: Briggs, Derek <Derek.Briggs@icf.com>
Subject: DOER Listening Session – Stretch and Specialized Energy codes –March 27 at 2 pm

DOER Listening Session – Stretch and Specialized Energy codes – March 27 at 2 pm

Dear Stretch Code Stakeholders,

The Massachusetts Department of Energy Resources (DOER) is seeking public input on its Stretch Energy Code and Specialized Municipal Opt-in Code.

The most recent version of the Residential Stretch Energy code has been in place for over a year (since Jan. 1, 2023) and the Commercial Stretch Energy code has been in place since July 1, 2023. The Specialized energy code has been available for local adoption since December 2022, and to date has been adopted by 33 cities and towns. Accordingly, DOER would like to hear feedback from users of these building energy codes.

1. We invite you to attend a Zoom listening session on Wednesday March 27, 2024 beginning at 2 pm. Anyone who wishes to speak will be allotted 3 minutes for their comments. DOER will not be answering questions during this session. The listening session will remain open until all comments are heard, or until 5 pm, whichever is earlier. The listening session will be recorded and posted publicly. Please register in advance for the webinar using the following link: https://zoom.us/webinar/register/WN_jCxgLHwqQguouISgtCw1xw.
2. Written comments are encouraged via email to stretchcode@mass.gov with the words "CODE COMMENTS" in the subject line. Alternatively, comments can be submitted via mail to Ian Finlayson, Department of Energy Resources, 100 Cambridge Street, Suite 1020, Boston, MA 02114. The deadline for written comments is Wednesday April 3, 2024 at 5 pm. All comments received will be posted publicly.

If you require language interpretation, please fill out the question provided in the registration link above. Please make requests for interpretation by March 20, 2024. If you have any questions or need further assistance, please don't hesitate to reach out.

Many thanks in advance for your time and attention to help improve the building energy codes in Massachusetts.

Regards,
Ian Finlayson
Deputy Director, Energy Efficiency Division

To Whom It May Concern,

I am submitting the following comments on the Stretch Code of Massachusetts.

- The R406 Energy Rating Index (ERI) Compliance Alternative should remove the proprietary "HERS" Index.

The HERS Index is a proprietary variant of the American National Standards Institute (ANSI) standard, ANSI 301 Energy Rating Index. Residential Energy Services Network, Inc. (RESNET) is the ANSI Standards Development Organization responsible for producing the ANSI 301 Energy Rating Index standard. They own the proprietary variant HERS Index, which they produce to compete against the national standard they developed. The proprietary HERS Index is solely allowed to be calculated by software tools accredited by RESNET, and these tools can only be licensed by RESNET-accredited QA Provider, which creates a walled garden of participants.

Instead, the Commonwealth of Massachusetts should only accept the ANSI 301 Energy Rating Index (ERI). This change would simply be striking the acronym "HERS" and leave Energy Rating Index in its place. **No additional change to the code itself would be necessary**.

- Reasons to Accept the ANSI 301 Energy Rating Index in lieu of the RESNET-proprietary HERS Index

First, it is the standard calculation referenced by both the ENERGY STAR New Homes and Apartment program and the Department of Energy's Zero Energy Ready Home program. These programs are recognized by federal legislation for federal tax credits for energy efficient new construction.

Second, the National Renewable Energy Laboratory (NREL) has produced and maintains a module for EnergyPlus that will calculate the ANSI 301 ERI, as well as the national IECC ERIs. This module is accessible by API or by being downloaded.

Third, restricting the R406 path to RESNET-proprietary HERS Index restrains trade in the free market. Specifically, other national home energy rating systems have been approved by the Department of Energy and ENERGY STAR programs. These organizations cannot provide services to companies in the Commonwealth of Massachusetts due to this compliance path requiring RESNET-proprietary HERS Index. If the HERS Index continues to be included, the Commonwealth of Massachusetts becomes a willing participant in a monopoly.

Fourth, by requiring the RESNET-proprietary HERS Index, the Commonwealth of Massachusetts is implicitly supporting a monopoly which national production builders leverage to help make energy codes less stringent. For example, in the State of Texas, RESNET's representatives and the Texas Association of Builders lobbied for a state law that has an ERI target with the 2018 IECC UA backstops (HB3215). Instead of advancing the State energy code to the 2021 IECC, they partnered together to keep the energy code stagnant. I don't see how requiring projects to

be rated and receive a RESNET-proprietary HERS Index can comply with the intent of the Commonwealth of Massachusetts' Clean Energy and Climate Plan for 2050. The Commonwealth is partnering with an organization that has shown interest in promoting itself over the common good of reducing energy consumption, instead of doing everything in their power to make an impact on climate change.

Fifth, RESNET's system of oversight relies on RESNET-accredited QA Providers to perform oversight on the ratings completed in a calendar year. Unfortunately, these QA Providers are often vertically integrated, and offer rating services that they then are required to perform oversight on. This system has led to serious issues. Most recently the U.S. Department of Justice received a settlement with SMC Systems, the owner of several RESNET-accredited QA Providers. But going further back, a public report on the variability of the RESNET-proprietary HERS Index notes massive inconsistencies with training, rating, and oversight in RESNET's home energy rating system.

- But the software developers say they can't produce an ANSI 301 Energy Rating Index

REM/Rate uses a downloaded version of EnergyPlus OS-ERI. EnergyGauge is not heavily used in the Commonwealth of Massachusetts.

Ekotrope has the ability to connect to the EnergyPlus OS-ERI engine through an API or do what REM/Rate has done and incorporate it into their tool. Ekotrope also is better staffed with more resources to perform the development work to incorporate the EnergyPlus OS-ERI engine.

Alternatively, as a reminder, the HERS Index calculation is a RESNET-proprietary variant of the ANSI 301 ERI. Ekotrope could strip out the changes RESNET has mandated, and would produce an ANSI 301 ERI without adopting a different calculation engine. They have shown the capability of doing this with regional and national variants of the ANSI 301 ERI calculation.

Thank you,
Connor Dillon
Quality Manager, Building Science Institute
Frequently Asked Questions about BSI
Office: (830) 308-8505
Cell: (423) 838-5171
connor@buildingscienceinstitute.org

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March 13, 2024

The Honorable Rep. Jeffrey Roy
Joint Committee on the T,U,E
Massachusetts State House
24 Beacon St. Room 473B
Boston, MA 02133

The Honorable Sen. Michael Barrett
Joint Committee on the T,U,E
Massachusetts State House
24 Beacon St. Room 473B
Boston, MA 02133

Rebecca Tepper, Secretary
Executive Office of Energy and Environ. Affairs
100 Cambridge St., Suite 1020
Boston, MA 02114

Michael Judge, Undersecretary of Energy
Executive Office of Energy and Environ. Affairs
100 Cambridge St., Suite 1020
Boston, MA 02114

Elizabeth Mahony, Commissioner
Department of Energy Resources
100 Cambridge Street, Suite 900
Boston, MA 02114

James Van Nostrand, Chair
Department of Public Utilities
One South Station
Boston, MA 02110

Re: Design Professionals' Grid Modernization Concerns

Dear Rep. Roy, Sen. Barrett, Ms. Tepper, Mr. Judge, Ms. Mahony, and Mr. Van Nostrand:

The Massachusetts Chapter of the American Institute of Architects (AIA MA) understands that the Legislature and the Healey Administration are deeply interested in improving the Commonwealth's electrical grid and, in general, facilitating the development of clean energy infrastructure.

As designers of net zero and all-electric building projects, Massachusetts architects and engineers have observed increasing barriers to and even denial of proposed distributed generation projects by electric utilities. These problems may interfere with efforts to meet state climate goals if unaddressed.

In the attached memorandum we identify specific instances of delays, seemingly unnecessary charges, and connectivity denial due to utility review and permitting processes, and questionable technical design requirements. Specifically, we observe:

- Utilities are requiring applicants to make a substantial initial investment in detailed electrification design without assurance of a timely review or project approval.
- Utilities can assign projects to unimproved distribution networks when already-improved networks are available, apparently to leverage investment in the unimproved networks.
- Utilities can reject projects without appeal regardless of whether applicants have met their design requirements and paid the required impact fees.
- The timetables for grid and substation expansion can render projects of every scale infeasible.

The net effect of these and other issues detailed in the attached memorandum has been that owners who

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AIA Massachusetts

a chapter of The American Institute of Architects

hoped to construct all-electric projects have been forced to invest in fossil fuel systems instead. Those who persevere are forced to endure unnecessary delays and substantial additional costs.

Utility policies regarding account anonymity make it difficult to explore their review and approval process fully. As legislators and regulators, we hope you can undertake further study and facilitate focused conversations among stakeholders – ones that lead to solutions that promote the electrification of our built environment.

Established in 1941, AIA Massachusetts represents over 5,000 architects, design professionals, and allied members statewide. We are the state chapter of the American Institute of Architects, the national organization with over 96,000 members representing more than 200,000 U.S. jobs. We have been actively involved with developing the Commonwealth's response to climate issues and always seek alignment through our national organization on climate-positive legislative positions related to the built environment.

Thank you for your attention and leadership. If our organization can provide any additional information, please do not hesitate to contact our Executive Director, John Nunnari, at 617-901-4685 or via email at jnunnari@architects.org.

Respectfully;

Russel Feldman, AIA, NCARB
Co-chair, AIA Massachusetts Government Affairs Committee

Lawrence Spang, AIA
Co-chair, AIA Massachusetts Government Affairs Committee

cc. Joseph R. Nolan, Jr., President and CEO, EVERSOURCE
John Pettigrew CEO, President and CEO, National Grid

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AIA Massachusetts

a chapter of The American Institute of Architects

MEMORANDUM

From: Russel Feldman
Date: March 13, 2024
Re: Design Professionals' Grid Modernization Concerns

What follows is a summary of some issues architects and engineers have observed surrounding building electrification. These problems exist throughout the state, most seriously in Western Massachusetts. Most of this information came through several architects whose clients intended to construct all-electric and net-zero facilities. They put us in touch with their electrical engineers, who provided most of this detail.

We've attempted to characterize the patterns reflected in the experience of individual projects. We can be specific about individual sources, but we felt summarizing what we've heard would be more helpful at this time.

The electric distribution grid was initially developed and financed decades ago. It was organized to receive energy from large central producers and distribute it to energy consumers. Difficulties arise when loads are generated from individual properties and fed back into a system that was designed only to deliver power. Prior to 2018, this caused relatively few problems. However, problems started in 2019 and have multiplied every year since then. Utilities (such as Eversource and National Grid) are structuring their project approval processes to get project proponents to pay for these improvements, making it increasingly difficult and expensive for projects that have on-site photovoltaic and geothermal systems to be authorized. In other words, the problems may go beyond permitting and approval, but that process is employed to frustrate widely distributed generation.

One first observation: information-gathering on this topic is complicated by electrical utilities' policy of account anonymity, preventing them from releasing project specifics or utility-client discussions. What follows is not intended to be a definitive or even comprehensive description of the state of affairs. Instead, it is meant to suggest further lines of inquiry and possible directions for process reform. It is organized around two issue areas: Review and Permitting, and Engineering.

Review and Permitting

Staffing: Utilities are understaffed so permitting and approval processes are very slow.

Review process changes: Up to 2019, general contractors typically applied for electrical permits. By 2019, utilities established Distributed Generation (DG) Groups[1]. This (appropriately) moved review earlier in the process to focus on concerns that distribution networks would be damaged by site-generated overload. However, this created a chicken-and-egg dilemma: depending on the condition of the local distribution system, the redesign could involve substantial time and expense to bring it up to capacity standards. The scope of this redesign requires knowing the scope of both on-site power consumption and generation. Determining this involves detailed electrical design that traditionally takes place later in the planning process and can be expensive. Many owners and designers will hesitate to undertake this effort, given that the project could be derailed based on the potential expense for distribution upgrades.

[1] https://gridforce.my.site.com/servlet/servlet.FileDownload?file=0156T000000FLVLb. This is for the National Grid DG process. Other utilities have similar requirements and reference sites.

Licensing: Utilities now require owners of on-site generation projects that exceed 25kW to file a Standard Interconnection Application. This threshold had previously been 75kW. The Standard Application[2] is a lengthy and expensive process involving the completion of 23 forms and documents. Projects that fall below the threshold have a Simplified Application process. This lowered threshold also results in assignment to a DG Group.

Selection of distribution routes: Utilities employ DG Groups to combine regional projects. Regions are large enough that individual projects can have different distribution networks. For example, one group working with National Grid included a local bookseller that planned to install a 45kW PV array, several businesses that intended to produce and sell solar power back into the grid, and a net-zero high school project in Worcester, which was to include a 795kW array. The high school project design engineer informed us that the utility assigned their project to the Great Brook Valley distribution route, which required substantial upgrades. This was despite having a viable alternative route along Chandler Street that had already been upgraded. The utility eventually reassigned the project to a second DG group and accepted the Chandler Street distribution, but only after years of study, redundant permit fees charged, and serious political pressure was applied.

Cost sharing: Different projects in any study review group must share the cost of distribution system upgrades *pro rata* to their demand. This can result in projects that might be approved pulling out rather than carrying the costs of other projects assigned to the group that require more upgrade work. In the Worcester DG group example, the costs of Interconnection Application and their share of the upgrades reportedly pushed the bookseller's estimated payback period from 1.5 years to 12 years. They, therefore, withdrew from the process.

Changing requirements: Projects moving through the design process often don't receive adequate engineering analysis by the utilities, which are free to demand changes even after approvals are issued. The Worcester high school project mentioned above "ground to a halt" in 2021. Design modifications during construction included specialized equipment, such as grounding transformers and systems for power cutouts, resulting in additional expense and delays. The design engineer believes that the utilities are so risk-averse that they will not authorize feasible projects, resulting in a loss of distributed generation. After two years of internal utility review, the high school project was finally approved in early Nov 2023.

Process Delays: The Distributed Group Study process, which is entirely structured by the utilities themselves, means that even small projects with limited power generation can be considered in light of what is being planned in their regions before they can be approved. This can result in significant delays, linking smaller projects to larger projects' timetables. Electrical utilities often operate on a timetable that is incompatible with municipal and project needs. For example, in 2014 National Grid notified the City of Worcester that their street and sidewalk improvement plan required 14 electrical vault upgrades. The utility indicated they could only upgrade one vault per year and took no action for several years until upgrading nine vaults in 2019-20. Because this work involved excavation of streets and sidewalks, the city could not provide the planned transportation improvements, to the significant detriment of local businesses.

[2] https://gridforce.my.site.com/s/article/MA-Interconnection-Documents

Engineering

Insufficient Capacity: Distribution routes can be decades old, and many cannot carry large loads from on-site generation. This is particularly true in Western Massachusetts and rural areas throughout the Commonwealth. In some instances, utilities rejected projects out of hand due to the engineering difficulty of distribution upgrades. For example, the Worcester DCU Center (previously the Centrum) proposed a rooftop PV array, which was rejected by National Grid reportedly because the distribution network could not handle the power supplied. In Brockton, the Mass Department of Unemployment offices were designed to install a 56 kW array to achieve net-zero performance. The utility received and approved engineering documents but the final connection was denied upon construction completion. Despite state agency pressure, National Grid refused to connect to the system. Their rationale was that the distribution system wouldn't support the project. They took this position despite project designers having complied with all required design modifications and making payments required by the utility for grid capacity upgrades.

Impact of Electric Vehicles (EVs): The load demand represented by EV chargers for commercial and multifamily parking lots, as required by the building code, requires a significant investment. Fast charging stations in particular have exceedingly high amperage requirements. The Quincy Public Safety building sought the capacity to fast-charge 200 EV police cars. The utility responded that the infrastructure upgrades required would take years to build. Also, utilities differentiate between a project's "Connected Load" versus its "Realistic Load" to assess transformer size. Utilities can reduce the transformer size based on their long experience with the actual demand from buildings: total demand is less than the sum of individual circuits and equipment needs. The relatively new service requirements of EVs require new Realistic Load calculations. Utilities' conservative treatment of Realistic Load demands leads to significant and expensive transformer requirements.

Supply Chain Limitations: Certain equipment provided by the utilities, such as transformers, is not widely available. There is a severe shortage throughout the state, so supply (as of this writing) can take 60 weeks or more. Any project with PVs is going to require a transformer. Project engineers now must size total electrical demand and inform the utility companies of what they need at the beginning of the project (before the electrical parameters are fully designed) to ensure that a transformer will be available when the project is completed.

Onsite Storage: Large on-site battery compositions can be dangerous, and regulators sometimes reject on-site electrical storage. The City of Worcester, for example, won't accept any on-site battery storage due to the local fire department's concern that they lack the technology to address fires.

One additional matter came up in our discussions that doesn't relate to utility oversight but could be relevant to policy design: companies and designers are generally aware of Boston's Building Emissions Reduction and Disclosure Ordinance (BERDO). They are also aware that other municipalities may follow suit. Boston's BERDO has established a multi-year program to increase fines and lower energy consumption performance thresholds. Concerns about eventual failure to comply with future requirements and the uncertainty of utility review charges and approval outcomes are prompting designers to install fossil fuel systems that are scheduled for near-term replacement, potentially in only five years. Thus, Owners will decommission equipment designed for and capable of service for 25+ years after only five years. Estimates vary based on building use, but

HVAC systems range from 15% to 36% of the total embodied carbon of a new building[3]. This increases the construction cost and a project's emissions impact due to the additional embodied carbon required to manufacture, deliver and install duplicative mechanical systems.

[3] https://projekter.aau.dk/projekter/files/460172117/Assessment_of_embodied_carbon_of_ventilation_systems_and_their_components_in_educational_and_office_building_BED4_Group_2_Journal_article.pdf

Hello Ian, Paul, and the rest of the DOER code team!
I am an energy efficiency consultant primarily supporting the Mass Save Large Commercial & Industrial programs (primarily new construction) as well as owners and design teams. I follow developments in the commercial code very closely and have been using the 2023 update on a regular basis for about a year now. My comments are as follows:

1. Structure
    a. I understand that Massachusetts' reliance on IECC 2021 pins the code edits to the structure of IECC, and that is why it is so difficult to follow the twists and turns of added sections, deletions, etc. Would it be possible to work with ICC to develop a Massachusetts version of IECC for the 2024 release?
2. TEDI Modeling
    a. I am glad that DOER is allowing energy models developed using the actual zoning layouts to be used in TEDI modeling. Geometry input remains the most time-intensive component of model development whereas reassignment of loads, schedules, and systems is much faster.
    b. Infiltration impacts on large commercial buildings is very difficult to model accurately, and my sense is that the methodology required for TEDI modeling is overstating energy loss and therefore energy savings associated with reducing uncontrolled air exchange.

        To my knowledge, there is no way to translate a blower door test result to an accurate load on a particular zone. Blower door tests provide an equivalent total airflow out of all air barrier penetrations at a uniform pressure differential. Natural infiltration is impacted by a wide variety of factors including ventilation/exhaust fan balancing and activity, buoyancy, wind direction and intensity, thermal differential, the location of the air barrier penetrations, the internal porosity of a building, and whether a particular air path moves through a thermostatically controlled space. To have infiltration, you need two holes in separate places, and air is either coming in or leaving any one gap; with blower door testing, all air is either coming in all the holes or going out depending on fan direction. I have read that natural infiltration rates are typically 10% of what is quantified in blower door tests.

        While Energy Plus has the capability to do airflow network calculations, energy modelers capable of accurately performing this analysis are few and far between. It is VERY time intensive for anything other than a very simple building. Even if the airflow network is set up, there is the issue to accurate boundary conditions which are likely to require wind tunnel testing to get right. I suggest that DOER do a deep dive into the infiltration modeling methodology used by SWA in the original TEDI modeling and determine if it is technically accurate. My sense is that it is not and that the TEDI analysis targets are skewed.
3. Existing Buildings Change of Use (IECC 2021 Section C505)
    a. I have written a code interpretation memo recently for a project that adapting a building to a different use, and ran across this issue. C505.1 indicates that if a change of use results in an "increase in demand for either fossil fuel or electrical energy" shall comply with specific sections listed in a Massachusetts amendment that would require the envelope, HVAC, lighting, and water heating systems to be brought up to code. There are several issues to unpack.

C505 does not provide any basis for normalizing the comparison between current and future energy use. TNZ suggests requiring some process that is already in place for new construction (e.g. IECC C407 methodology) with building use schedules and load intensities tied to something published (e.g. TEDI analysis assumptions, ASHRAE 90.1 User's Guide).

C505 creates a significant challenge to electrify existing buildings since elimination of fossil fuel heat will certainly result in an electricity use increase. Is this really DOER's intention? I agree that it would be ideal for all envelopes to be fantastic, but I wonder if adding envelope compliance to project costs is going to keep adaptive re-use projects on fossil fuels.

4. Terminology
    a. In my opinion, the word 'demand' should be reserved for items associated with capacity or peak energy input for a defined time period. Conversely, there are many words that can be used for annual consumption or energy use. Sloppy use of the word 'demand' makes DOER look like they do not know what they are talking about. "TEDI" is cute but it should be "TEUI".
5. Massachusetts Amendment C406.2.3
    a. This option for C406 calls for "All space heating shall be provided with" air-source heat pumps with 1.75 COP at 5°F or ground source heat pumps.
    b. TNZ suggests replacing the current language with the following: "All space heating systems shall be electrified, and the building-wide capacity-weighted heating COP at 5°F db shall be >1.75 COP. Electric resistance heat sources shall use 1.0 COP. Backup heat sources intended for emergency use only shall not be included in the calculation."
    c. Background logic:

        The word "All" is problematic. What about support spaces where electric resistance heaters are typically used?

        There are ways to electrify a building beyond cold-climate air-source heat pumps and ground loops (e.g. exhaust air-source). Is the existing language expansive enough.

        The 5°F condition is not a standard AHRI rating condition for air-source heat pumps.

Thanks again!
Eric

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Testimony MA Strech and Specialized Opt-in code

Scott R Greenbaum, PE, CPHC, CEM, GBE, CBCP.

Date: 2 April 2023

I would like to complement the Code writers. This version of the code is significantly more stringent than the 2022 presentation during the PHIUS Conference in Tarrytown NY. I specifically like the idea that thermal bridges are now being accounted for in evaluating the overall assembly performance. A talked to a few friends at PHIUS at BE24. They were surprised that both 2- and 3-dimensional modeling was required. PHIUS does not require 3D evaluations due to the complexity of the evaluation and the minimal improvement in the results. I would encourage a re-evaluation of this requirement. During testimony last week several professionals complained about the difficulty of thermal bridge modeling and the expense. I would recommend that they contact PHIUS or Passive House for a list of modelers. These organizations have been doing this modeling for 10 to 15 years.

A general observation about how the code was developed based on 8760 hour building modeling software. I have been modeling, supervising modeling, applied for rebates from state and federal energy efficiency programs, evaluating the results compared to actual results of buildings built or incentivized by Public Utilities, and been hired to determine and correct building not performing as modeled since 1978. My correction has never been able to meet the modeled value. During my vast experience I have seen few buildings perform at or below EUI modeled performance. All models have a standard deviation due to unevaluated variable, simplification of the algorithms, and variance between final use verses modeled. Some of the common variables not accounted for are:

1. Ratio of male to female occupants
2. The fact that all models assume the average male is 159 LBS. A far cry from today's situation.
3. Acceptable comfort of occupants based on ANSI/ASHRAE Standard 55 (Thermal Environmental Conditions for Human Occupancy). The 10% that are uncomfortable dictate the operation which lead to inefficient operation. Most comfort research was performed in Europe during the 1970's. Europe did not typically installed dehumidification but not A/C in commercial building until this century. My experience is people expect a higher level of comfort than Standard 55 says are acceptable.
4. Mechanical equipment over sizing resulting in equipment not following the performance curves in the model.
5. Quality of construction.
6. Window convection current
7. The models assume that the return air is thermostat temperature. Actually, it is 2-5 °F higher than thermostat setting due to heat rising.
8. ETC.

I would not be surprised that the standard deviation in energy modeling exceeds ± 20-25%. A study done of the schools financed by the Massachusetts School Building Authority performed by The Green Engineer, Inc. for the NESEA BE 2021 conference session (Comparing the Operating Performance of High-Performance Public Buildings to their Design) illustrates the deviation. By memory they studied over 50

school buildings and the best building operated at 25% higher EUI. The average deviation was 50 to75% above modeled. I do not remember the worst building, but it was over 100% greater.

Due to the standard deviation of modeling and the fact building seldomly to never exceed projections I would recommend that the energy code error on the conservative side to ensure that adequate electricity exists to power these building in 2050. My opinion the current code is not strict enough for both TEDI and air tightness resulting in the buildings built today being renovated before 2050 to comply with a City of Boston BERDO type ordinance. It should be noted that the performance of the shell depreciates with time. I performed a study of an 80-story all glass office building in NYC. We were looking at changing out the double glazing with triple glazing to reduce shell loads. The structural engineer would not certify that the building would be structurally sound with the increased weight. We must get it correct ASAP, or we will have to many energy hogs to match the available renewable energy available in 2050.

R404.4 – 1 & 2 Family dwelling 50 AMP circuit for car charging. This could be an expensive requirement since it could result in installing a 400AMP building service vs 200 AMP. Cost of typical building electric services increase by the square of the size difference for both residential and commercial buildings. If every dwelling unit has a 50AMP car charging service, this could exasperate the Duck Curve. In California they are reducing this requirement to 20 or 30 AMP and going to a slower charging regiment.

IMA 2023 Commercial Strech code and Specialized Opt-in code

C402.1.5.1 – Low Glazed wall system – Area-weighted U proposed <= 0.1285
C402.1.5.2 – High Glazing Wall System - Area-weighted U proposal <= 0.1600

I do not believe you can have a high performing building based on these Area-weighted U or any building with 50% of greater window to wall ratio. An R 6.25 building wall will not perform as a high-performance building.

I currently have a client with a new office building meeting the High Glazing Wall System TEDI. This net zero high performance buildings top two floor south exterior wall is 95% glazed with solar tinting. I have witnessed how weather conditions affect the comfort and inside conditions. On a 25-30°F partly cloudy day the space temperature near the window will vary from 60°F to 90°F as the clouds move past. This creates comfort issues that the VRF HVAC system can not react to. The result is simultaneous heating and cooling. During the summer you can fill the solar radiation heat flowing off the wall. The building bottom two floors with 2015 code walls and 25% punch out window systems triple glazed windows the issue disappears. Since National Grid connected the Solar PV system March 21st I can not confirm if it is net zero. The Solar PV system is oversized with parking lot canopies.

Last month I obtained a new LEEDS silver multifamily luxury condo client in the Seaport. The building has all the bells and whistles such as condensing boilers, heat recovery DOAS system, etc. The building is approximately 90% glazing with a small opaque stone trim. I estimate the wall system would meet a TEDI of 0.3 to 0.35. This multifamily building uses approximately twice the heating energy per dwelling unit compared to my 1953 wood frame cape with two poorly built additions that has been partially

weatherized over the last 25 years. Reducing the TEDI in half will not result in a new multifamily of the same design using less energy than my house with six sides exposed to exterior conditions compared to one wall on average for the Condos. I am not sure you want to codify building new buildings that perform worst than a 1953 cape.

I recommend you completely scrape the High Glazing Wall System from the code and greatly increase the TEDI for Low Glazing Wall Systems Area weighted U value so that the building constructed today can be part of the 2050 emission limited instead of having to be remodeled to meet City of Boston BERDO type regulations and emission goals. This is an example of how building energy modeling does not represent real world.

I have been working in C & I buildings around New England. I have notice that many new buildings perform poorly because the HVAC equipment is grossly oversized from the central boilers, chillers, distribution systems, and terminal units in buildings built to the 2007 energy code. The results are poorly performing buildings and high EUIs. The equipment just cannot operate with turn down ratios to match average load conditions resulting simultaneous heating and cooling. They do not trust the modeled load calculations and size based on rule of thumbs we used in the 1970's and 80's. The oversizing has only gotten worse with each new version of the code. You never get sued for performance, but you can be if the building is cold on the windy -10 °F Day. I am not sure how you add to the code some mechanical equipment sizing language. But until mechanical equipment is properly sized performance will suffer. During the testimony the other day one building was complaining that the new code cost him $50 a square foot. The new code is a tradeoff of mechanical equipment for better shell performance. My intuition is the mechanical systems was not downsized to represent the change in Heating and Cooling load. That is why the total construction cost is so much greater.

Respectfully

Scott R Greenbaum, PE, CPHC, CEM, GBE, CBCP

781 405 2780

sgreenbaum@greeneenergyconsultants.com

Dear DOER,
Two comments on the Residential Code:

1. The requirement that a fireplace is not considered clean Biomass means for an all-electric house >4000 sf requires a lower HERS 42, beyond the HERS 45, and is a pain point that people will miss and is a loss.

2. For Table RC 102.2 Max ERI of 0 including OPP for the Specialized Opt-In Code for sites that do not have the solar exposure to offset from HERS 42 to HERS 0, there is lack of clarity on the shading exception. If there is not enough solar access, does the municipality's building department accept a higher HERS rating?

Thank you,
Amy

Amy Sheehan Latva-Kokko, AIA, CPHD, LEED BD+C
Sustainability Leader | Senior Project Manager

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2023 Best Places to Work
Boston Business Journal

Subject: Addressing the 'Silver Tsunami' and the Need for Trades Industry Education and Verification

Dear [Recipient's Name],

I hope this letter finds you well. I am writing to highlight an emerging issue known as the 'Silver Tsunami' and the need for increased trades industry education and verification in relation to municipal building officials and Home Energy Rating System (HERs) Raters as International Energy Conservation Code (IECC) verifiers.

The 'Silver Tsunami' refers to the impending retirement of a significant portion of the skilled workforce in various industries, including the trades industry. As experienced professionals retire, there is a growing concern about the shortage of skilled workers to fill these positions, leading to potential gaps in expertise and knowledge transfer.

To address this issue, it is crucial to invest in trades industry education and training programs that can equip the younger generation with the necessary skills and knowledge to fill the impending void. By providing comprehensive and accessible education and training opportunities, we can ensure a smooth transition and maintain the high standards of quality and safety in the trades industry.

Furthermore, municipal building officials play a vital role in ensuring compliance with building codes and regulations. As the IECC continues to evolve and become more stringent in its energy efficiency requirements, it is essential to equip building officials with the necessary knowledge and skills to effectively enforce these codes. This includes being able to verify and assess compliance with energy efficiency standards, which can be facilitated through appropriate training and education programs.

Similarly, HERs Raters play a crucial role in assessing the energy efficiency of residential buildings. As verifiers of the IECC requirements, they contribute to ensuring that homes meet the necessary energy efficiency standards. Therefore, it is essential to provide HERs Raters with the appropriate education and training to accurately assess and verify compliance with energy efficiency guidelines.

To address these issues, I propose the following actions:

1. Increase Funding for Trades Industry Education: Advocate for increased funding for trades industry education programs, including apprenticeships, vocational schools, and technical training centers. This will help attract and train the next generation of skilled workers to fill the impending gaps in the workforce.

2. Develop Continuing Education Programs for Municipal Building Officials: Establish continuing education programs for municipal building officials to enhance their knowledge and understanding of the latest energy efficiency codes and standards. This will enable them to effectively enforce these regulations and ensure compliance.

3. Enhance Training for HERs Raters: Develop comprehensive training programs for HERs Raters to ensure they have the necessary expertise to accurately assess and verify compliance with energy efficiency guidelines. This will contribute to the overall energy efficiency efforts in the residential sector.

By implementing these actions, we can proactively address the challenges posed by the 'Silver Tsunami' and ensure a smooth transition in the trades industry. Additionally, it will strengthen the enforcement of energy efficiency regulations and contribute to the overall sustainability goals of our communities.

I kindly request your support and collaboration in advocating for these necessary initiatives. Together, we can create a more resilient and sustainable future for our industry and communities.

Thank you for your attention to this matter. I look forward to the opportunity to discuss this further and explore potential solutions.

Sincerely,

Director of Energy Resources
[Department of Energy Resources]
[Address]
[City, State, ZIP]

Subject: Collaboration for Decarbonization in Massachusetts

Dear Director of Energy Resources,

I hope this letter finds you well. I am writing to discuss the potential for collaboration between various groups and organizations in Massachusetts that are all working towards the common goal of decarbonization. As we all strive to achieve a sustainable and carbon-neutral future, it is essential to collaborate and leverage each other's expertise and resources effectively.

I would like to propose a collaborative effort between the following groups and organizations:

1. NEHERs (New England Home Energy Rating System Alliance)
2. Chris Magwood's team at RMI (Rocky Mountain Institute)
3.5 Builders for the Climate Action - the Parent Co. of the BEAM Tool
3. Jacob Racuson at Build Natural
4. Andy Bacchino at Stevens and Co
5. mass utility providers lead by National Grid
6. Mass Save
6.5 Mass Clen Energy Center

Each of these entities has made significant contributions towards decarbonization efforts in Massachusetts. By coming together, we can further enhance our collective impact and accelerate the transition to a low-carbon economy.

Our proposed collaboration aims to achieve the following objectives:

1. Knowledge Sharing: Facilitate the exchange of best practices, research findings, and innovative ideas related to decarbonization strategies. This will help us learn from each other's experiences and leverage the collective wisdom of the group.

2. Joint Research and Development: Foster collaborative research initiatives to develop new technologies, materials, and solutions that can drive decarbonization efforts in Massachusetts. By pooling our resources and expertise, we can undertake ambitious projects that would be challenging for individual organizations to pursue.

3. Policy Advocacy: Collaborate on advocating for supportive policies and regulations that promote decarbonization. By presenting a unified voice, we can effectively engage with policymakers and influence the development of legislation and incentives that align with our shared objectives.

4. Public Outreach and Education: Implement joint initiatives to raise public awareness about the importance of decarbonization and the available resources and incentives for individuals and businesses to participate in this transition. By working together, we can amplify our outreach efforts and reach a broader audience.

I believe that by joining forces, we can create a powerful network of organizations dedicated to decarbonization in Massachusetts. This collaboration will not only enhance our individual efforts but also provide a platform for collective problem-solving and collaboration.

I would be grateful if you could consider this proposal and initiate discussions among the relevant stakeholders. I am confident that by working together, we can make significant progress toward achieving our shared vision of a sustainable and decarbonized Massachusetts.

Thank you for your attention to this matter. I look forward to the opportunity to discuss this proposal further and explore the possibilities of collaboration.

Sincerely,

Hello,

Thank you for the listening session. I didn't speak but did hear others including building officials, other HERS Raters and architects also make comments about the renovations and additions portion of the code. My colleague Kevin Ring also recently sent in comments on this section too. I think it needs a big overhaul and it needs to be heavily vetted with multiple HERS Rating companies.

I think R502.1.1 and R503.1.5 need to be rewritten completely and expanded extensively. This has by far been the biggest pain point with the new code. There are thousands of variations of renovations that may occur on a home and the code needs to address as many as possible - not in a technical guidance document.

My understanding in speaking with Ian previously is that the intent of these sections of code is not how DOER wrote it and also not how building inspectors are interpreting it.

I can tell you that we've turned away many many projects due to a scope of renovation between 51% and 80% or so that aren't doing enough to pass code and we don't want to take the risk. This is entirely due to the risk of a terrible blower door test. They can put in the best systems, windows and insulate the areas they are touching, but still won't be able to get to 5 ACH, let alone a HERS 52 with 5 ACH.

My suggestions for language:
- R502.1.1 Additions to a dwelling unit exceeding 1,000 square feet shall require the dwelling unit to comply with the maximum HERS Rating for alterations, additions and change of use shown in table R406.5 when any of the following criteria are met:
1. Addition is over 1,000 sq ft of conditioned floor area AND more than 50% of the existing CFA of the home. *(i.e. a 1,200 sq ft addition to a 4,000 sq ft home is only 30% and does not require a HERS Rating)*
2. Addition is over 1,000 sq ft of conditioned floor area AND renovations of the existing structure exceed 50% of CFA. (*i.e. adding 1,500 sq ft and also gutting 2,000 sq ft out of a 3,000 sq ft home)*
3. Addition is under 1,000 sq ft of conditioned floor area AND renovations of the existing structure exceed 50% of CFA (*i.e. adding 600 sq ft and also gutting 2,000 sq ft out of a 3,000 sq ft home)*

- R503.1.5 Level 3 Alterations, or Change of Use. Alterations that meet the IEBC definition for Level 3 Alteration (*i.e. over 50%*) or the IRC definition for Extensive Alteration *(i.e. over 50%)*, shall require the dwelling unit to comply with the maximum HERS ratings for alterations, additions or change of use shown in Table R406.5 when any of the following criteria are met:

See 1,2,3 above. To me they overlap a lot. There are probably other items that could be added to the list to further define the scope in the code, but this is all I could think of at this moment.

Chris Zimmel

Sustainable Energy Analytics Inc.

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To the Department of Energy Resources,

I am writing to raise to general comments and concerns with the Stretch Code released on July 1, 2023:

- 225 CMR 23 Chapter 5 Existing Buildings lacks the nuance appropriate for renovating an existing building, particularly the older but not historic structures typical in Massachusetts. In the worst case scenario, this Chapter incentivizes Owners to tear down existing buildings because a Change of Use would trigger upgrades so extensive that they are impractical and unaffordable. This approach fails to take into account the time value of up front carbon emissions. In the best case scenario, it is difficult to understand and apply to certain scenarios, for example where air infiltration requirements apply to a small portion of one existing wall.
- On the whole, the cost impacts of 225 CMR 23 are quite steep, and are exacerbating ongoing supply chain issues. We are seeing some community health center clients delay projects that would benefit environmental justice populations because the new code in combination with inflation is putting badly needed projects out of reach. This seems to be the opposite result of what the revised code in intended to do.

Thank you,

Nicole Voss

Nicole Voss, AIA, LEED AP, WELL AP
Associate Principal & Director of Sustainability

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Northeast Hearth, Patio, and Barbecue Association
PO Box 28, Sudbury, MA 01776 . 978-440-0344 . nehpba.org

March 25, 2024

Department of Energy Resources
100 Cambridge Street
Suite 1020
Boston, MA 02114

Dear DOER,

My name is Karen Arpino and I am writing on behalf of The Northeast Hearth, Patio & Barbecue Association. The Northeast Hearth, Patio & Barbecue Association (NEHPBA) is a trade association representing more than 300 individual member hearth and fireplace retail and related companies throughout the Northeast. Specifically, in the Commonwealth of Massachusetts, we have over 60 member companies supporting 350 families. The vast majority of our members are independent "mom and pop" small businesses that play a large role in the communities and markets they serve across the Commonwealth.

We must promote access to diverse sources of fuel for our residents, not only to bolster affordable alternatives for powering our homes and businesses but to avoid overreliance on our electric grid. Increased dependency on electricity risks monopolizing energy control within one industry, which would burden the ratepayers of our state by limiting the choices they have available.

As the DOER deliberates Stretch Energy Code and Specialized Municipal Opt-in Code. We ask that you take our comments below into consideration:

The results of Insufficient housing production to meet demand over many years.
Massachusetts is experiencing a housing crisis of historic proportions due to limited housing production putting pressure on a market that is becoming less affordable by the day.

- The median home price in Massachusetts is over $600,000 (the US avg. is $430,000).
- Massachusetts has the 5th highest median monthly rent in the US.
- Massachusetts has had a net negative migration for several consecutive years - losing population (often young and educated) to other states, often NH and southern states, where housing is more affordable.

Adoption of the Specialized Stretch Energy Code will exacerbate the affordability crisis in Massachusetts.

Researchers at MIT and Wentworth recently released a study that analyzed the effects of the Specialized Stretch Energy Code on the building costs and affordability. A few of the conclusions are below.

- The report estimates that that the Specialized Stretch Energy Code will increase the cost of each housing unit from between 1.8% to 3.8%.
- This would add about $10,000 to $23,000 to the median cost of a single-family home – putting homeownership out of reach for as much as 33,000 households beyond the many thousands of families already priced-out of owning a home in Massachusetts.
- The estimated average monthly energy savings for a home built under this code is $48 for a typical single-family home. Weighing that against the increased costs puts the average payback at 43 years.

The Specialized Stretch Energy Code also effects the affordability of renovating existing homes.

Existing homes undergoing large additions or significant renovations are required to bring the entire building up to the standards of the new code. This effectively converts that project into a full gut-renovation, adding massive costs, often making the project unaffordable for the homeowner. The code will also often require the removal of all gas-fired appliances (HVAC and hot water equipment, cooking appliances, clothes-dryers, and even gas fireplaces) and replacing them with all-electric equipment. Energy efficiency improvements do not happen if the project is financially unfeasible.

We must be prudent in our efforts and allow time for technology to catch up before we make such hasty prohibitions on gas infrastructure in new construction. While unintended, these policies would result in a drastic increase in electric rates and the cost of living, along with the possibility of inhibiting access to more affordable sources of fuel and power. These changes would have a major impact on the most vulnerable among us.

Thank you for your consideration of our comments. Please do not hesitate to contact me at (978) 440-0344 or via email at Karen@NEHPBA.org with any questions.

Sincerely,

Karen Arpino
Executive Director
Northeast HPBA

Regarding feedback regarding new Stretch energy code:

We are running into problems while designing enclosure restoration work at various existing buildings, particularly at old buildings with mass (solid) masonry exterior walls.

At restoration projects, the exterior masonry walls are normally salvaged, therefore insulation can really only be applied from the interior. This interior insulation is naturally interrupted by floor slabs and other structural elements. It is our experience with multiple projects that the de-rating analysis required often impacts the overall U-value metric dramatically, such that it is simply not feasible to meet the code-required target U-value metric even when a large amount of insulation is applied along the interior side of the walls. (example: 12 or more inches of ccSPF)

This seems overly harsh and may encourage project teams to abandon or avoid doing important projects that would dramatically improve the real-life thermal and energy performance and air infiltration resistance of old buildings that currently perform very poorly (and currently burn lots of energy)… this may also encourage teams to demolish old masonry walls or even entire buildings, thereby putting many tons of functional building materials in landfills, which seems misaligned with common-sense sustainability and carbon-cutting initiatives.

Some of the projects we are involved in intend to provide very commendable provisions such as elimination of use of fossil fuels, using alternative sources of energy (wind & solar), etc. The idea that good projects like this could be prevented from proceeding based on overly harsh Stretch Code requirements seems counterproductive.

So I would like to suggest a couple of options for relaxing requirements, and/or providing other compliance options.

- Do not require de-rating for building Alterations.
- Rather than de-rating, consider requiring a modest reduction (improvement) in Prescriptive U-values for existing building systems that will not be de-rated as compared to Prescriptive values (say 10% to 20% +/-).
- If de-rating will be required for existing buildings, consider a more significant (and realistic) increase in overall U-value (say 50% to 75% +/- vs. current 10%)
- Consider requiring a minimum improvement of thermal performance and/or energy efficiency as compared to existing building conditions (such as reducing overall U-value by min. 50%, and/or reducing overall energy use by min. 50%)
- Consider alternative compliance options or flexibility related to commendable provisions such electric heating & cooling systems, use of alternative energy sources (such as wind and solar), as elimination of use of fossil fuels, further reduction of air infiltration (and verification testing), etc.

Thank you for your time and your consideration of my comments.

Respectfully,

Derek B. McCowan, P.E.
Principal
D: 781.907.9226 C: 781.424.2727
SIMPSON GUMPERTZ & HEGER
sgh.com

[I am hoping to speak on the listening session this afternoon, but I need to leave before the end and want to also submit my comments in writing.]

I am pleased to see the quick uptake of the new energy code, and am especially heartened that so many cities and towns have already adopted the opt-in code. But after working with the new code for the last nine months, I feel the code provisions for existing buildings need some immediate updates and clarifications, as well as some longer term reconsideration and improvement. While it is important for us to renovate, improve and electrify our existing buildings, we must also recognize how important it is to preserve the embodied carbon associated with our existing buildings. We don't want to have a code that results in owners never touching their building for fear of triggering a requirement for additional upgrades, or alternatively having no choice but to tear down and build new.

Specific requests for clarification in current code:

1) What constitutes a change of use that increases energy consumption? C505.1 requires that "a change in occupancy that would result in a increase in demand for either fossil fuel use or electrical energy shall comply" with all the envelope requirements as though it is a new building. What does that actually mean? Some specifics to consider:
a - is it "demand" or consumption? Every interpretation I've seen says consumption, but a plain reading says demand. Can I increase consumption so long as the peak load doesn't increase?
b - do I look at each energy source individually? Does switching fuels then automatically trigger full envelope compliance? (assuming that my electrical demand is increased)
c - what sources can I use for energy info? Can I compare historical energy data against modeled data? If I am using historical data is there a specific year I have to use? Can I pick a year before COVID? If the building is currently sitting empty do I have to compare against that?
d - or is it based strictly on use type? I'll note that CBECS data shows the average multi-family EUI is 59.6 while the average office EUI is 52.9. Is every office to residential conversion going to trigger a requirement for envelope upgrades? Considering the housing crisis, and the number of vacant office buildings is that the result Massachusetts wants?

2) We need better guidance on partial renovations. What is required, for example, when windows are being replaced? Is air testing required? How is the testing for partial improvements conducted? If I'm improving parts of the wall assembly, can I leave other parts untouched? How do I deal with thermal bridging in this situation? (I'm happy to share some very specific examples, if there is interest.)

3) What about changes of use that occur in only part of a building? If a law firm is replaced by an IT company with higher plug loads, on one floor of a downtown high-rise, does that trigger envelope improvements for that floor only?

Things to consider in longer term changes:

1) The requirement to fully upgrade any envelope areas being modified, while well intentioned, has a number of unintended consequences. I'm seeing already projects that choose to do nothing at all, to avoid triggering requirements that they are unable to meet. We need a code that provides some flexibility for existing buildings being modified. It should require all practical improvements but not be so onerous that owners chose to avoid improvements, or abandon/demolish buildings rather than renovate.

2) Embodied carbon should be specifically addressed in future versions of the code, and significant credit should be given for existing buildings being reused.

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534 Old Marlboro Rd
Concord, MA 01742

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Chris Schaffner, PE, LEED Fellow, WELL AP, LFA
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Hello,

I have a conflict during today's DOER listening session, but wanted to submit a comment regarding MA Stretch Code C407.3.2.1.2:

We are highly interested in the Passive House pathway for many of our projects, but have major concerns about the requirement for the CPHC demonstrate compliance with the PHIUS blower door results prior to issuance of a certificate of occupancy. This presents a massive risk to a project schedule, that is impossible to completely eliminate due to the stringent nature of PHIUS requirements and the inherent difficulty of blower door testing in large buildings (which frequently require multiple tests). Due to this schedule risk, it is difficult to recommend this pathway until alternative compliance pathways exist. Potential examples of alternate compliance pathways could include:

- Allow blower door results in excess of the PHIUS air tightness limit, on the condition that the project can still pass the WUFI Passive model with the tested infiltration rate. This is very similar to how PHIUS allows non-threatening leakage to be taped for the blower door test, as long as the non-taped result is used in the WUFI Passive model, under PHIUS Certification Guidebook v3.2 Appendix F-2.
- Allow some form of conditional certificate of occupancy, to allow the contractor time to remediate the issues and pass the PHIUS limit.
- Allow some combination of additional Energy Efficiency Credits to be used (per C406.1), such as additional EV spaces, PV Panels, more efficient appliances, etc, if the blower door test is close to PHIUS levels (for instance, between 0.08 and 0.15 cfm/sf @ 75 Pa) but not quite complying.

I want to emphasize that we fully support the push for energy efficiency, and acknowledge that infiltration is an important aspect of this. Allowing a little more flexibility on the certificate of occupancy timing will allow us to push all relevant projects to pursue the Passive House pathway, and will likely help improve overall project efficiency.

Please don't hesitate to contact me if you have any questions.

Thanks,
Ryan

Ryan Dirks, AIA, LEED AP, CPHC
Associate | Senior Sustainability Specialist

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I hope this message finds you well. I wanted to reach out ahead of tomorrow's listening session to share some of the comments and concerns that our building commissioner and I have compiled regarding the energy code. In light of the comments provided by Peter, I wanted to provide this information to you in advance so that you're aware of the specific issues that Westborough aims to address regarding the code. I've selected the option for public comments, indicating our willingness to address these questions during the session however hope that by providing these prior some of them may be addressed.

1. **Administration of Energy Codes**: The Department of Energy Resources (DOER) oversees the administration of the three energy codes in Massachusetts, primarily through issuing guidance rather than directly amending the codes. This raises concerns about the clarity and legal status of the guidance

provided. Additionally, while the DOER provides general oversight, appeals specific to the energy code are handled by the Building Board of Regulations and Standards (BBRS), leading to inconsistencies in governance and enforcement.
    - **Questions:**
        - How is the guidance provided by the DOER disseminated, and what is its legal standing in relation to the energy code?
            1. Are these “guidance’s” legally bidding with respect to the energy code?
        - Why are appeals specific to the energy code handled by the BBRS instead of the DOER?
            1. How does this affect consistency in enforcement?
2. **Inconsistency in Enforcement:** Inconsistencies in energy code enforcement practices across towns in Massachusetts undermine the effectiveness of the codes and create confusion among stakeholders.
    - **Questions:**
        - What measures are being taken to address the lack of consistency in enforcement practices?
        - How can uniform enforcement be achieved to ensure compliance with energy efficiency goals?
        - For Example: Some communities found a workaround to the code, a practice of issuing multiple permits to split up additions, deemed acceptable by the DOER?
            1. How does this affect consistency and enforcement of the energy code?
3. **Support for Towns:** It's essential to evaluate the adequacy of support provided to towns in administering and enforcing the energy code.
    - **Questions**:
        - What support programs are available to assist towns in effectively implementing and enforcing the energy code?
        - Is the DOER actively soliciting feedback directly from communities to address their needs and challenges?
4. **Implementation of Net Zero Energy Code:** Deviating from plans to make the Net Zero Energy Code the single code for all construction in Massachusetts by 2028 raises concerns about consistency and alignment with state emissions goals.
    - **Questions:**
        - What led to the decision to backtrack on making the Net Zero Energy Code the single code by 2028, and what are the implications of this decision?
        - How will maintaining multiple energy codes affect contractor and developer confidence and alignment with state emissions goals?
5. **Concerns in Commercial Sector:** Concerns have been raised about the practicality and effectiveness of Thermal Energy Demand Intensity (TEDI) modeling in the commercial sector.
    - **Questions:**
        - How will the concerns regarding TEDI modeling in the commercial sector be addressed to improve its effectiveness?
        - What additional training and guidance will be provided to ensure accurate implementation of energy efficiency measures in commercial buildings?
6. **Lack of Collaboration Between DOER and BBRS:** The lack of collaboration between the DOER and BBRS in addressing challenges associated with the energy code exacerbates confusion and inconsistency.
    - **Questions:**
        - How will collaboration between the DOER and BBRS be improved to ensure alignment in governance and enforcement of the energy code?
        - What steps will be taken to involve key individuals from the BBRS, such as Richard Baldacci, in DOER meetings to facilitate coordination and alignment?

Looking forward to discussing these matters further.

Benjamin Bowers

My input:

When the Net Zero Energy Code was being debated in the public comments period for the Interim CECP 2030, the plan for the state's energy code as published by DOER included the following statement on page 30.

> Using a phased approach—one that allows Green Communities to opt-in to a new, high-performance stretch energy code requiring passive-house level building envelope efficiency starting in 2022, and that is effective as the statewide energy code no later than 2028—will allow the building design and construction industry to transition while capturing up to 50% or more of all square feet built between 2022 and 2030.

This declaration was made before Governor Baker declared the Net Zero by 2050 goal in the State of the State address in Jan 2021 and before the legislature and Baker encoded this sticker 2050 emissions target and stricter interim emission goals in March of 2021. During the Q&A for the signing ceremony for this legislation Governor Baker stated "I think the biggest issue with the Stretch Code ... is not so much about having the right code, it's about not having 351 codes." He goes on to describe how critical it is to be predictable for everyone: builders, owners and local officials and that this predictability will allow us to deal with the affordability issue. He also states that the newly signed law gives **the administration the authority** to deal with these issues.

In spite of these stricter emissions goals and new authority, DOER back pedaled on the plan to make the Net Zero Energy Code the single energy code for all construction in Massachusetts by 2028. This was a serious mistake in my opinion. The benefits of the single energy code include:

- Contractors and Developers will more quickly gain experience and confidence in both the interpretation of the code as well as the implementation of the preferred HVAC and building envelope technologies.
- Towns are not pitted in competition for new economic development with an incentive to select an energy code that creates higher emissions which impede the state's efforts to achieve Net Zero in 2050.
- The state is undercutting their claims that the new Energy Code is the most cost effective by allowing municipalities to stay on the Base Energy Code even though it has a higher lifecycle cost to the detriment of all.
- DOER and BBRS will have a much simpler task in establishing implementation guidelines with only one code to evaluate. Building Inspectors will likewise have a simpler task because all training and industry programs will be focused on one solution.
- Until there is a single code, the problems and shortfalls will continue for each new Energy Code update.

I would appreciate your feedback on this. Also, please clarify if DOER and BBRS believe that DOER has or does NOT have the regulatory authority to make this change. Should we be focusing this feedback on our representatives in the Legislature?

I appreciate the opportunity to provide this input.

Best Regards,
Pete Dunbeck
Chair of Sustainable Westborough
781-856-8962
Peter.Dunbeck@gmail.com

Kelly and Joanne,

I know that Ben and Fred are preparing some comments for the Webinar tomorrow. I also plan to make some comments that are complementary to those points but take the topic in a different direction.

My input:

When the Net Zero Energy Code was being debated in the public comments period for the Interim CECP 2030, the plan for the state's energy code as published by DOER included the following statement on page 30.

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I would appreciate your feedback on this. Also, please clarify if DOER and BBRS believe that DOER has or does NOT have the regulatory authority to make this change. Should we be focusing this feedback on our representatives in the Legislature?

I appreciate the opportunity to provide this input.

Best Regards,

Pete Dunbeck
Chair of Sustainable Westborough
781-856-8962
Peter.Dunbeck@gmail.com

Hello,
It would be great to see the code start to address embodied carbon. As an initial step, please consider requiring the collection of Environmental Product Declarations for a few key product categories, like concrete mixes, cement, CMU, and other structural components. My suggestion is not that the code requires a specific reduction, but simply requires the paperwork that identifies the embodied carbon required to produce the product.
Thank you,
Matt

From: John H Borger

1. In light of some of the concerns expressed during the 3/27/2424 listening webinar, what latitude does the DOER have to make modifications or adjustments to the Stretch Code, especially regarding its application to additions over 1,000 sq. ft or alterations over 50% of existing building ? If DOER has sufficient latitude, what would be a plausible timetable for these changes?

2. To what extent can the DOER extend authority to Building Inspectors, at least on an interim basis, to apply the codes or portions thereof flexibly using their own judgement of reasonableness relative to feasibility and cost-effectiveness?

3. Town administration has articulated the need for the Town to have a long-term capital expenditures plan to ensure optimal investment in replacing/refurbishing municipal plant and equipment. The decarbonization roadmap as defined in the Climate Leaders literature to date seems to be a key component of such a plan, perhaps even the nucleus. We would be interested in your perspective on this.

4. DOER Technical guidance for development of a municipality's Decarbonization Roadmap is being made available on a prioritized basis, with those municipalities that have opted in to the Specialized Code going first. Assuming Hingham opts in at the April 2025 Town Meeting, when would you estimate that DOER technical guidance would be available to Hingham?

5. Brianna Bennett, Sustainability Coordinator for the Hingham Municipal Lighting Plant is working closely with Hingham Net Zero and the Hingham Climate Action Commission . HMLP has requested that the Town give HMLP staff access to the Massachusetts Energy Insight (MEI) database. Pending approval, we are wondering whether you have a sense of how up to date that database is relative to a complete inventory of Hingham municipal buildings/facilities and their respective energy use.

6. Do you have a rough sense of the scope of work that would be involved for Town Administration, with DOER support, to 1) update MEI with more complete information and 2) build its decarbonization roadmap using the data in the MEI as a starting point?

7. I understand that DOER "technical guidance" for developing the municipal decarbonization roadmap required for Climate Leaders is not just "how to" consulting but actual hands-on development (presumably in conjunction with assigned Town Administration staff). Is this correct? If so, how much professional staff resource would you estimate Town Administration would have to provide in conjunction with DOER technical support? E.g., One half FTE for 2 months?

8. Relatedly, asking our Town Administrator Tom Mayo to submit an application for Hingham to qualify for the Climate Leaders program requires him to make commitments that will require an as yet undetermined allocation of Town Administration resources, some on an annual or ongoing basis (e.g., reporting) in a post-override era of tight fiscal constraints. Has this been an issue in other towns and if so, how have they dealt with this uncertainty?

The administration and enforcement of energy codes within Massachusetts present a multifaceted challenge that encompasses a broad spectrum of issues, ranging from the clarity and dissemination of guidance issued by the Department of Energy Resources (DOER) to the actual enforcement practices across different towns. The DOER's approach of issuing guidance, rather than formally amending the energy codes, raises critical questions about how this guidance is communicated to stakeholders, its legal authority, and its impact on the uniform application and interpretation of the energy codes. This situation is further complicated by the delineation of responsibilities between the DOER and the Building Board of Regulations and Standards (BBRS), especially concerning the handling of appeals specific to the energy code, which falls under the purview of the BBRS and not the DOER. This division leads to inconsistencies in the governance and oversight of the energy codes, contributing to a lack of uniformity in enforcement practices across municipalities.

The issue of inconsistent enforcement is a significant concern that undermines the effectiveness of Massachusetts' energy codes. Stakeholders repeatedly report variations in how energy codes are applied from one town to another, creating confusion and potentially compromising the state's energy efficiency and sustainability objectives. This inconsistency raises pressing questions about the strategies and measures the state intends to implement to ensure a standardized approach to enforcement across all jurisdictions. It is essential to identify mechanisms that can facilitate uniform enforcement practices that align with the overarching goals of energy conservation and emissions reduction.

In addition to enforcement challenges, there is a critical need to evaluate and enhance the support provided to municipalities in administering and enforcing these codes. This support is crucial for empowering towns to effectively implement energy codes, which in turn ensures compliance with the state's energy efficiency goals. Questions arise regarding the nature and extent of support programs available to assist towns and whether the DOER is actively engaging with communities to understand their needs, challenges, and feedback outside of formal listening sessions.

Further complicating the landscape is the state's approach to implementing the Net Zero Energy Code. Recent deviations from the plan to make this code the sole standard for all construction by 2028 have sparked concerns about consistency in energy policy and its alignment with Massachusetts' long-term emissions goals. This shift raises important questions about the reasons behind the decision, its implications for the future of energy codes in the state, and how it will impact stakeholder confidence in the regulatory environment.

The commercial sector presents its own set of challenges, particularly regarding the adoption and effectiveness of Thermal Energy Demand Intensity (TEDI) modeling. The practicality of these models and their implementation in commercial buildings are areas of concern that require careful consideration, additional training, and guidance to ensure that energy efficiency measures are accurately and effectively applied.

A notable gap in the administration of energy codes is the apparent lack of collaboration between the DOER and the BBRS. This lack of synergy between the two bodies exacerbates the issues of confusion and inconsistency in the governance and enforcement of the codes. Improving collaboration is essential for aligning efforts, ensuring that governance structures support the consistent application and enforcement of energy codes, and involving key stakeholders in the process to foster a more coordinated approach.

In summary, addressing the comprehensive challenges associated with the administration and enforcement of energy codes in Massachusetts requires a multifaceted strategy. This strategy must include clarifying the legal status and dissemination of DOER guidance, enhancing collaboration between the DOER and BBRS, ensuring uniform enforcement practices across towns, providing robust support to municipalities, reevaluating the approach to the Net Zero Energy Code, and addressing sector-specific concerns such as TEDI modeling in commercial buildings.

Best,

Benjamin Bowers
Sustainability Coordinator / Community Development Assistant
Town of Westborough, MA

Hello,

I am an HVAC design engineer and I have a comment regarding the new Stretch Code, specifically referring to the new enthalpy recovery ratio.

From the materials I've read to date, I have not seen anything that lists what types of air may be excluded from the ERR calculation. However, while reviewing the 2023 Technical Guidance issued by DOER, I saw an example problem where the ERR was calculated for (4) air handling units that were serving spaces as well as providing makeup air for a kitchen exhaust hood. The example calculation clearly states that kitchen makeup air is exempt from the ERR calculation. Screenshot is below. This is extremely important information that has a significant impact on the ERR calculation that should be clearly stated in the ERR section of the stretch code, along with any other types of air that may be exempt.

Scenario 3: School Building with HVAC and Kitchen Systems

A school building has four identical HVAC supply units, each with a ventilation airflow of 1,000 cfm and a general exhaust airflow of 500 cfm. The school also contains a kitchen exhaust system with an exhaust rate of 2,000 cfm. The makeup air for the kitchen exhaust is provided by the four HVAC supply units. The winter design heating condition is 10F dry-bulb temperature, with a heating set point of 70F. The HVAC units have an enthalpy recovery ratio of 35%, and the commercial kitchen hood exhaust system has no heat recovery. Does the project meet the recovery requirements of the Stretch code?

Solution

The commercial kitchen hood exhaust is exempt. Therefore, the ratio of the makeup air volume not exhausted by the kitchen hoods, divided by the total makeup air volume is used to adjust the required enthalpy recovery ratio.

In addition, since the four HVAC supply units are identical, the proposed enthalpy recovery ratio can be calculated for a single HVAC supply unit and used to demonstrate compliance for all four HVAC supply units.

$ENTHALPY.RATIO_{REQUIRED}$ = 75% x (2,000 CFM / 4,000 CFM) = 37.5%

$ENTHALPY.RATIO_{PROPOSED}$ = 35%

$ENTHALPY\ REATIO_{REQUIRED}$ (37.5%) > ENTHALPY RATIO PROPOSED (35%)

Therefore, the enthalpy recovery ratio requirement is not met, and the building does not comply. The enthalpy recovery ratio must be increased to at least 37.5% to achieve compliance.

I'm assuming that this exemption stems from the Exceptions section of the 2021 IECC, which states energy recovery ventilation systems shall not be required for commercial kitchen hoods. However are there other scenarios where air is allowed to be exempt from the ERR calc? For example, art classrooms have an exhaust requirement of 0.7 CFM per square foot. Per IMC, I am not allowed to recirculate this air if the resulting supply airstream contains more than 10% of the recirculated art room air. So I am forced to use a dedicated exhaust fan. But by doing so I am compromising the performance of the enthalpy recovery section. Since Art Classroom air is considered only Class 2 exhaust air, this unit would have to meet the very stringent 70% ERR. Am I allowed to subtract the art classroom makeup air from the ERR calculation in this scenario?

Any input or clarification would be greatly appreciated.

Thanks,

Rob Polleys
Mechanical Engineer

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Dear DOER

I am writing in anticipation of the upcoming Listening Session to call attention to concerns that we have encountered at Sustainable Energy Analytics over the last year in supporting Stretch Code / HERS Rating projects.

First is the difficulty in achieving a passing HERS Rating for 1,000 sf additions and renovations. In the typical "worst case scenario", which we see *often*, a project triggers the HERS requirement, but the scope of work does not include improvements to the existing building. In our experience, because the HERS Rating must be performed on the whole house, the *only* way an existing home can achieve a passing HERS Rating is if it is a full gut renovation. There is no level of efficiency that one can implement in an addition or alteration which would compensate for the "weight" of unimproved existing work. An example would be a 1,000 sf ranch house with a new 1,100 sf second floor, where the homeowner cannot afford to change the existing home or its systems. The same happens when a homeowner wishes to change the use of an unconditioned basement or attic, and the HERS requirement is triggered. We have begun advising these clients to abandon the project or to undertake it in phases under 1,000 sf., which is also a fraught approach with any Building Department.

Second is the ambiguity in the definition of what triggers the HERS requirement. Several specific questions come from this:

Is a Change of Use an Addition or an Alteration, or something unique in and of itself? This is important because *any Addition* over 1,000 sf triggers the HERS Rating, while not all Alterations over 1,000 sf do so, and Change of Use is not defined. (Change of Occupancy is defined)

Is it a Change of Use to convert an unfinished, unconditioned basement or attic to finished conditioned space? R502.2 states: "Any unconditioned or low-energy space that is altered to become conditioned space shall be required to be brought into full compliance with this code." What does this mean? What is This Code? Do the 1,000 sf exceptions not apply to this situation?

In the case of a 1,800 sf basement or attic, can one insulate all of the building envelope, but finish and directly condition only 990 sf of the space and not trigger the HERS requirement? The definition of Conditioned Space includes both directly and indirectly conditioned areas inside the building envelope - "finished" is not part of the definition.

If a homeowner wishes to undertake a substantial reconfiguration and upgrade of interior partitions and finishes, but does not intend to open any building envelope cavities, is this a Level 2 Alteration as it relates to energy code? How does one quantify the square footage (Level 2 or Level 3) of the alteration if the building envelope is not changed but interior partitions are? For example If one 10 foot interior partition is removed between two 500 sf rooms, is this a 1,000 sf Alteration?

An undated FAQ issued by DOER on Stretch Code last year at Question R5 indicates that it may be possible to produce a HERS Rating for only an addition in certain cases. Can you offer any guidance on how one would perform a blower door infiltration test on only a portion of the home? What portion of the total infiltration would the Rater assign to the addition?

Sincerely

Kevin Ring

HERS Rater

Sustainable Energy Analytics Inc.

Quality Information Driving Energy Conservation Decisions

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781-790-5718 (office)

Hello,

I will be unable to attend the session on March 27th & therefore here are my comments below.

- Standalone chapter for existing buildings, which does not point back to Chapter 4.
- Provide more flexibility in the energy code for existing buildings (e.g., if energy use is increased by x%, then change of use is triggered).
- Provide clarity in the existing building energy codes when the addition of insulation could be harmful (e.g., increase freeze/thaw cycles, condensation risk). Some language is already within the alterations section, but not change of use. Clarification on procedure (e.g., AHJ).
- Thermal bridge derating requirements can result in a lot of insulation for existing buildings, particularly if maintaining the existing façade. Significant insulation also has embodied carbon impacts.
- Making it more consistent between existing low-rise residential buildings and commercial buildings (e.g., providing clarity on the UA for existing low-rise residential buildings, UA is allowed for existing commercial buildings)
- Clarification on low-ventilation use definitions and clarifying the duplication of Group R-2 (which pertains to dormitories) and dormitory under the low ventilation pathway.
- Add roof & soffits to thermal bridge derating requirements.
- Close-out documentation: provide similar checklists for commercial buildings (e.g., which pertain to C401.3).
- Provide clarification on EV Ready where requirements would apply, such as if the parking lot is regraded and new paving is added, then this triggers the requirements.

I also wanted to say a big thank you to Ian & Paul & for all the DOER has done with the new energy codes. It's momentous!
Best,
Lauren

DIMELLA SHAFFER

Lauren Günther AIA, CPHC, LEED AP, CDT *(she / her / hers)*
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From: Khalil Pirani

It is good that there is a large focus now on Operational Energy reduction. There is equally more attention needed to reduce embodied carbon in buildings and facilities and also to reduce **demolition and construction waste away from landfills**. It would be good if DOER could put some attention to this matter.

Thanks

Khalil

Here are some comments:
Project with change of use and an addition: The code is not clear regarding having to do 1 or 2 backstop calculations. One for the change of use portion, and one for the addition. Or if only 1 backstop is required, which U value should be the target, U-0.1285 or U-0.1414 (adding 10%)?

Whole building air leakage testing for alterations: If I need to replace the cladding system in a few walls, do I need to do a whole building air leakage testing?

Alterations: What level of alteration triggers the compliance with C402? is replacing the cladding system on a wall considered alteration or repair?

For solid masonry walls: For existing solid masonry walls, sometimes adding too much insulation can be detrimental to the wall as the interior heat would barely reach the wall, so freeze and thaw could be an issue. This can be analyzed with WUFI. How can we meet the code without harming the existing condition?

Comcheck: Needs clarifications on when Comcheck is required.

Andrea Sonan, AIA, CPHC, REWC, NCARB

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I am writing in support of the Specialized Code, which I submitted to Council in 2023. We adopted the code 1/25/24 11-0.

The code encourages electrification and, in certain circumstances, Passive House Design and solar PV. In Salem, the built environment accounts for about 55% of our greenhouse gas emissions and, even though only for new construction, will change the future development in our City.

It's imperative that more communities opt in and I've offered my support to those who have expressed interest. Time is running out and let's all rally to pass this code and much more.

Jeff

Jeff Cohen
Salem Ward 5 Councillor
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I support the updates that will be going into effect for the Stretch Energy Code, and I support the new Specialized Municipal Opt-in Code. It is important to increase the energy efficiency of new homes and buildings and to not use fossil fuels in these buildings if we are to advance toward making the Commonwealth net zero by 2050. I support these updates for now, but the next version of these codes should not allow fossil fuels in new construction, since we will have to essentially phase out fossil fuels by 2050.

Gary Martin
Boxford