



August 12, 2022

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Commissioner Patrick Woodcock
Massachusetts Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

Dear Commissioner Woodcock:

On behalf of A Better City’s membership representing 130 of Greater Boston’s business leaders across multiple sectors of the economy, thank you for the opportunity to comment on the Department of Energy Resources (DOER) draft language for the Massachusetts Stretch Energy Code and the Municipal Opt-In Specialized Stretch Energy Code. We are grateful for the Commonwealth’s continued climate leadership and for your engagement with business leaders.

Over the past two years, A Better City has engaged member businesses and institutions from A Better City and the Boston Green Ribbon Commission’s Commercial Real Estate Working Group through an Efficient and Resilient Buildings Coalition to help drive building policy development in Boston and across the Commonwealth. Based on feedback from A Better City and Coalition members, A Better City respectfully offers the enclosed recommendations to address a variety of critical technical concerns impacting multiple sectors, building types, and the regional economy as a whole. These include comments on Thermal Energy Demand Intensity (TEDI) limits, building electrification, curtain wall requirements, air leakage, building envelope, economizers, ventilation, reheating, energy recovery systems, additions, alterations, change of use or occupancy, and the mixed fuel building pathway. Addressing these concerns will be critical to the successful implementation of these stretch codes. We also offer some broader comments that relate to grid reliability, capacity, resiliency, and affordability, site vs source energy, central plant energy, and health care building modeling and code compliance

A Better City remains committed to continuing to work with you to find implementable design and construction strategies that ensure the next generation of buildings align with the Commonwealth’s commitment to achieve net zero emissions by 2050.

Sincerely,

Rick Dimino
President & CEO
A Better City

Enclosures: 1

cc: Maggie McCarey, Director of Energy Efficiency, DOER
Ian Finlayson, Deputy Director, Energy Efficiency Division, DOER
Paul Ormond, Efficiency Engineer, DOER

DETAILED COMMENTS ON THE DEPARTMENT OF ENERGY RESOURCES (DOER) DRAFT CODE LANGUAGE FOR THE STRETCH ENERGY CODE AND MUNICIPAL OPT-IN SPECIALIZED STRETCH ENERGY CODE

A Better City and its members support the Commonwealth's goal of achieving net zero emissions by 2050 and recognize the urgent and important role that the building sector, in particular new construction, plays in achieving that. We appreciate that as the Commonwealth seeks to implement building codes that align with this goal, DOER has selected consultants and sought stakeholder feedback on the Stretch Energy Code. It is critical that DOER solicit and consider input from the commercial and industrial real estate community, including developers of office space, large residential, retail, manufacturing, banking, data centers, biotech, hospitals, labs, and higher education. A Better City's Coalition members are eager to ensure that reasonable, consistent, effective, and achievable standards are set so that building developers can plan for and meet them once implemented. Below are detailed member comments and recommendations.

A. TECHNICAL CONCERNS AND RECOMMENDATIONS

1. Thermal Energy Demand Intensity (TEDI) Limits (C401.2)

- A Better City members believe the TEDI limits have been set very low and will be difficult to achieve.
- Based on over 200 benchmarked records from Boston's BERDO requirements, newer energy efficient buildings (built after 2005), typically have fuel use intensities between 18 and 42 kBtu/SF. That level of fuel use implies thermal energy demands much higher than the TEDI limits, which range from 1.5 kBtu/SF-yr for the heating and 23 kBtu/SF-yr for the cooling of offices, to 3.2 kBtu/SF-yr for the heating and 15 kBtu/SF-yr for the cooling of residential multifamily and dormitories under 100,000 SF.
- A Better City would like to understand how these technical specifications were determined.

Recommendation: A Better City recommends heating and cooling data from existing energy efficient and best in practice sustainable buildings in the region be analyzed to determine achievable TEDI limits.

No substantive change – the EUI ranges are the same, but the committee added a middle category—medium buildings (between 75,000 and 125,000 SF). So EUI's are a function of building size – the bigger the buildings, the lower its EUI limit. In general, the limits are higher for smaller buildings and lower for larger buildings.

2. Building Electrification (C401.4)

- With 100% electrification requirements for curtain wall buildings, 100% of peak heating demand will need to be met by heat pumps. For many commercial buildings, installing enough heat pumps to keep the building warm on the coldest days may not be cost-effective. Some of the equipment could sit idle except for a few days each year, or buildings may choose to use electric resistance heat instead.
- This section is too prescriptive and will not achieve the desired emission reductions.
- Some building roofs may not be able to accommodate all the heat pumps needed.
- The performance target for air-source heat pumps (COP of 2.93 or 10 HSPF) is somewhat aggressive. The equipment manufacturers may promise that level of performance, but the systems may not achieve it in the field.

Recommendation: A Better City recommends some flexibility on the electrification requirements that could allow large commercial buildings to determine the most cost-effective and lowest emission path to comply with the code. We also recommend a required reduction in fuel use could be used as an alternative. For example, a

percentage fossil fuel reduction could be proposed, like 90%, to be consistent with Boston and what DOER has asked through the MEPA process.

No change – New commercial buildings must be fully electric unless they have high ventilation requirements (more than 0.5 CFM/SF of outdoor air).

3. Partial Space Heating Electrification (C401.4.1)

- Include water-to-water heat pumps as an option in this section or keep the specification general (e.g., an electric heat pump). Water-to-water heat pumps recover internal energy from the building. If enough waste heat is available to meet this requirement, the water-to-water solution will be both more efficient and less expensive than other solutions.
- Another option could also permit the use of the exhaust heat pumps with the provision of separating the heating capacity gained by these heat pumps from C403.7.5 Energy Recovery Systems.

Recommendation: A Better City recommends that section C401.4.1 permit 25% of the peak heating load in energy intensive building types (healthcare, laboratories, etc.) to be provided by water-to-water heat pumps that recover internal energy from the building. We also recommend that another option be permitted to allow buildings to use the exhaust heat pumps with appropriate provisions.

This was changed – Electric space heating was reduced to 25% for Highly Ventilated Buildings (Section C407.2.1) such as hospitals and labs. The committee also included a provision to allow heat to be extracted from exhaust flows throughout section C401.4.

4. Curtain Wall and Envelope Backstop Requirements (402.1.5.2)

- Equation 4-2 used in the UA (U-factor x Area) calculation is proposing to supersede the International Energy Conservation Code calculation by using derating values, including different figures in the calculation for non-curtain wall and curtain wall buildings.
- Achieving backstop requirements can, in some cases, contradict the goals of reducing building energy consumption. The current methodology used in Massachusetts to calculate envelope backstop has limited flexibility and does not consider orientation, shading, or advanced technologies.
- In the latest stretch code proposal, steps are being taken to improve the calculation method, but the changes do not go far enough.

Recommendation: A Better City recommends DOER provide the basis for the derating factors. We also recommend that a greater emphasis be made on modifying the methodology to promote an integrated design process that allows for increased flexibility under the performance energy modeling pathway to achieve the goals of the envelope backstop, continue the use of high-performance fenestration systems, and encourage new technologies and methods to reduce building energy consumption.

This was partially changed – Buildings using Relative performance pathway with ventilation above 0.5 cfm/sf have had language added to modify the methodology to promote and integrate high-performance design, but other buildings have not.

5. Air Leakage Measurement (C402.5)

- The stretch code requires air leakage testing that is not feasible or practical in large buildings. For example, the testing for a large building or major medical center would be complex and impractical to perform.
- A Better City supports the UA provision and thermal bridge accounting and thinks an addition of envelope commissioning should be a sufficient package of envelope regulations.

Recommendation: A Better City recommends DOER consider envelope commissioning, or air leakage testing on a smaller scale, on a single floor for example, instead of the current air leakage measurement requirements.

This was changed – Building air barriers must be evaluated by a test that adheres to ASTM E1186. The construction team has a few flexible options, and the third party can use their judgement on when the envelope has been sealed.

6. Air Leakage Compliance (C402.5.2)

- Members have expressed concern around the inclusion of the following sentence in the stretch code, “air leakage shall be tested by an *approved third party*.” Members typically rely on the contractor and glass manufacturer to do field mockups and testing to attain the ASTM (American Society for Testing and Materials) Standard.
- Members have also asked if the testing scope is increasing and if so, wonder how big, and how many conditions need to be tested.

Recommendation: A Better City is seeking additional clarity on the air leakage testing scope and what constitutes an approved third party for air leakage testing.

No change – Leakage rates have been reduced and there is no clarity around what constitutes a third party.

7. Building Envelope Verification (C402.5.2.3)

- Members have expressed concern around the inclusion of the following sentence in the stretch code, “*The installation of the continuous air barrier shall be verified by the code official, a registered design professional or approved agency.*” It is not practical to get agency and code officials out to the site as quickly and as frequently as this would require. Envelope work is installed in many sections with a cadence that is continuous. It would hurt schedules to wait for third party inspectors to come out for each section that is ready for review

Recommendation: A Better City would like DOER to clarify that the project’s architect (a registered design professional) is sufficient for continuous air barrier verification.

No change –The code still states a *registered design professional*, which typically includes the project architect and engineer of record.

8. Economizers (C403.5)

- Regarding Section C403.5, there is no Economizer mode for a dedicated outside air system. A Dedicated Outdoor Air System is essentially always in Economizer mode.

Recommendation: A Better City recommends removing this item from the list.

No change – Dedicated outside air systems (DOAS) are still on this list. However, DOER is explicitly stating that a DOAS must be able to run without mechanical cooling when outside air conditions are optimal for airside or water-side economizers. DOAS configurations paired with VRF systems are exempt from this requirement.

9. Ventilation Requirements (C403.7)

- The TEDI limits mean envelope tightness will need to be greatly improved—the code is limiting envelope tightness and ventilation air to 135% of ASHRAE 62.1 unless exemptions are met. Many buildings rely on natural ventilation through leakage to bring in outdoor air, so they would lose that fresh air intake. One unintended consequence of the TEDI requirement will be new construction with reduced outdoor air intake which can lead to poor air quality and health issues for occupants. This is particularly important given the post-COVID world we live in.
- Healthcare buildings must supply air in accordance with ASHRAE 170 (Ventilation of Health Care Facilities). ASHRAE 62.1 (Ventilation for Acceptable Indoor Air Quality) only applies in some settings.
- Leading public health authorities are urging commercial buildings to go beyond the ASHRAE requirements for building ventilation, recommending 30-50 CFM of outside air per person. Harvard School of Public Health, for example, offers recommendations¹ and explores the relationship between ventilation and performance in office settings². Currently, however, there is no indication that the code will improve ventilation.

Recommendation: A Better City recommends that DOER consult public health officials on the code and that the Stretch Code include ventilation requirements to ensure TEDI limits do not inadvertently worsen indoor air quality. For healthcare buildings governed by 170.62.1, we suggest the limit be 100% of ventilation rates or at least allow for greater ventilation rates in the event of public health needs.

This was changed – The ventilation limit (135% of ASHRAE 62.1 recommendations) has been removed. DOER also added an exception in 402.5.10 (HVAC system interlocks) for operable openings included in designed natural ventilation systems.

¹ https://static1.squarespace.com/static/5ef3652ab722df11fcb2ba5d/t/62c87da27d568623d2b6ce0e/1657306531592/HPH-18706_LancetLessons_HealthyBuildings_HighRes-2.pdf

² https://9foundations.forhealth.org/wp-content/uploads/2020/02/9_Foundations_of_a_Healthy_Building_February_2017_R1.8.pdf

10. Minimize Reheat (C403.7.1)

- Exception 2 does not work for laboratories. Generally, in laboratories, make-up systems serve Class 2, 3, and 4 air requirements, as well as spaces with general exhaust. As written, this section will require two systems, which is highly problematic for buildings whose uses change frequently.

Recommendation: A Better City recommends revising this section to exempt systems where at least 25% of the makeup air is supplied to Class 3 and 4 exhaust systems, as well as exhaust exempt from heat recovery requirements as defined in C403.7.5.

This was changed – Most of this section has been deleted.

11. Energy Recovery Systems (C403.7.5)

- Exhaust classification for energy recovery should not preclude combining exhaust sources with corresponding designation as required by ASHRAE 62.1.

Recommendation: A Better City recommends clarifying that exhaust classification for energy recovery does not preclude combining exhaust sources with corresponding designation.

This was changed – This section was rewritten to “Energy recovery ventilation systems shall be provided as

specified in Section C403.7.1, as applicable. DOER also added an exception in 402.5.10 (HVAC system interlocks) for operable openings included in designed natural ventilation systems.

12. Alterations (C503.1)

- Members are seeking clarity on alterations that include the replacement of basic systems that result in the reduction of carbon emissions. They would like to know if full compliance with the new requirements would still be necessary in this situation.

Recommendation: A Better City would like clarity on alterations that include the replacement of basic systems that result in a carbon emissions reduction.

No change.

13. Change of Use or Occupancy (C505.1)

- Embodied energy is increasingly being recognized as a more important source of emissions than operational energy. We can achieve a significant reduction in embodied emissions by re-purposing existing buildings. This section requires envelope upgrades to existing buildings that will be difficult and expensive, so demolition and rebuilding will be the cheaper solution, resulting in significant emissions from embodied carbon.

Recommendation: A Better City recommends that this section allow more lenient envelope upgrades.

No change.

14. Mixed Fuel Building Pathway (CC105.2)

- The Specialized Code requires mitigation of emissions from mixed fuel buildings with on-site renewable energy in CC105.2. Meeting the rated capacity requirements or the Potential Solar Zone Area may still not be possible given the need for equipment on the roof of buildings. Regarding solar development of available on-site solar potential the code states, “*not less than 75% of solar area.*” However, roof circulation, mechanical equipment, stair and elevator overrides, window washing equipment, vents, roof decks, etc. can use up much more than 25%. More electrification of heating also means more mechanical equipment on roofs in the future.
- Energy intensive buildings (e.g., healthcare, data centers, etc.) typically have scattered equipment and required equipment access pathways on the roof to exhaust various clinical spaces inside the building, so rooftop area available for solar is limited. The ratio of roof area to building area for an energy intensive building is small, making compliance with a PV requirement based on floor area problematic.

Recommendation: A Better City recommends that rather than set a percentage minimum, more flexibility should be allowed starting with a potential solar area that deducts actual areas for circulation, MEP equipment, overrides, etc. A Better City also recommends that actual rooftop space studies be performed. For healthcare buildings, A Better City recommends following the language of ASHRAE 189.3 for solar readiness for healthcare buildings.

No change.

B. BROADER CONCERNS AND RECOMMENDATIONS

15. Grid Reliability, Capacity, Resiliency, and Affordability

- Members have expressed concern about the impact that the updated Stretch Energy Code and new Municipal Opt-In Specialized Stretch Energy Code could have on electrical grid reliability, capacity, resiliency,

and affordability once adopted. As the Commonwealth decarbonizes the building sector (and considers the parallel decarbonization of the transportation sector), we recommend the Commonwealth couple this work with expanded efforts in clean energy reliability, clean energy resilience, and grid capacity expansion as we promote electrification of buildings throughout the Commonwealth.

Recommendation: A Better City recommends DOER commission and publish a study on the impact that the incremental electrification of the building (and transportation) sectors may have on grid reliability, capacity, resiliency, and affordability, and the steps that the state and utilities must take to keep up with increasing demands for an affordable and reliable clean energy supply within buildings.

No change.

16. Site vs. Source Energy for Building Performance Calculations

- While developing the new commercial code compliance pathway, TEDI, DOER used site energy usage intensity (EUI) as the key metric for developing the pathway and informing data conclusions of subsequent grid impacts. Members have noted that source energy usage intensity would be a better indicator of total GHG emitted by a new building, as it measures both site energy as well as the energy from the generation process, including inefficiencies and the sizeable emission impacts from source energy generation.

Recommendation: A Better City recommends DOER consider the use of source energy intensity for building performance calculations.

No change – Site energy is still the basis for EUI calculations.

17. Central Plant Energy

- The Code does not seem to consider buildings supplied by utilities from a central plant where products such as electricity, steam, and chilled water can be procured regardless of the generation source.

Recommendation: A Better City recommends DOER consider buildings supplied by a central plant for the production of electricity, steam and chilled water.

No change – No accommodation for central plant has been defined.

18. Health Care Building Modeling and Code Compliance

- A healthcare building has not been modelled for these requirements. To obtain reimbursements, hospitals must comply with other codes, especially NFPA99-2012 (which does not permit fuel cells or microgrids for emergency sources) and ASHRAE 170. The latter includes ventilation requirements that can be difficult to meet simultaneously with the changes being suggested.

Recommendation: A Better City recommends DOER model the changes required for hospitals before requiring compliance by this unique building type.

No change.

Recommendation: A Better City requests that DOER confirm that healthcare buildings, following 401.2.1 (3) do NOT need to comply with TEDI. A Better City recommends that for laboratory buildings, the Appendix G baseline must use 50% air flow turndown, and that lab buildings are not required to include energy recovery.

Partial change – Some flexibility around energy recovery has been added for labs and hospitals.

19. Definitions

Recommendation: A Better City recommends: 1) Changing the definition of all-electric building to the following: “A Building with no on-site combustion for fossil fuel use;” and 2) Defining “peak heating load” as this terminology can be defined in different ways.

No change – No changes on all-electric building and no insertion of peak heating load.