



August 12, 2022

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

**Re: NAIOP Comments on DRAFT *Commercial and Other Stretch Energy Code and Specialized Opt-In Language***

Dear Commissioner Woodcock:

NAIOP Massachusetts, The Commercial Real Estate Development Association, **appreciates the opportunity to provide feedback on the recently released draft, *Commercial and Other Stretch Energy Code and Specialized Opt-In Language***. NAIOP is also grateful that the Department of Energy Resources (DOER) has convened an Advisory Group of technical experts to discuss the analyses, proposals and proposed code language to ensure the regulated community is able to properly implement the codes and practically achieve the Commonwealth's climate goals, as requested in our February comments.

The proposals will undoubtedly have a significant impact on new development in the Commonwealth. While NAIOP supports Massachusetts' goals of net-zero carbon emissions by 2050, it is crucial that our pathways to carbon neutrality are grounded in achievable, practical policy and allow critical economic development and housing projects to move forward.

In our comments below, NAIOP has endeavored to provide grounded, practical feedback and real-world examples to illustrate the impact of the proposed language, where appropriate. NAIOP is concerned that several sections of the draft language may have a negative impact on our lab and life sciences sector; dissuade building upgrades altogether; and increase, rather than decrease, our carbon footprint in the Commonwealth.

NAIOP hopes that DOER, the Board of Building Regulations and Standards, and the regulated community can come together to implement practical, technologically possible codes to achieve our goals of carbon neutrality and economic stability.

**I. General Comments**

- i. Broadly, NAIOP is concerned that projects currently being planned and designed will have to seriously consider moving forward without knowing what requirements may be in place by the time the project is ready for permitting. Several of the proposed amendments (e.g., TEDI, energy recovery, space heating electrification, etc.) have a significant impact on building design and construction practices when compared to the current Massachusetts

Energy Code. While concurrency periods have always been part of the code adoption process, **NAIOP strongly recommends an extended concurrency period of one year with the currently implemented base and stretch energy codes to ensure that critical economic development and housing projects being planned right now can move forward.**

- ii. **NAIOP continues to be concerned that electric-ready and fully electrified buildings cannot be implemented due to shortcomings in grid capacity and grid modernization** and would like clarity as to how committed the electrical utilities are to ensuring the success of an electric-intensive policy. While NAIOP understands that several parallel processes examining the decarbonization of the building sector, the modernization of the grid and renewable energy expansion are occurring, it is unlikely that these policies will be finalized or in place ahead of the stretch and specialized stretch codes' implementation. This creates doubt as to whether the existing grid can support increased demand, despite what may be offset by photovoltaic, wind, and hydro-generation.

This capacity and modernization gap is concerning and may have a chilling effect on economic investment in the Commonwealth. **NAIOP recommends that the stretch and specialized stretch codes be aligned as much as possible with the concurrent policy processes to ensure thoughtful, achievable, and practical implementation. NAIOP also recommends that the electric utilities be required to commit to making short- and long-term investments – without punishing ratepayers – to ensure the final specialized and stretch code language can be implemented.**

- iii. **NAIOP continues to be concerned that while there have been significant improvements in the technology and equipment required to achieve space heating electrification, these systems still have notable drawbacks related to performance and operation in low temperature conditions—especially air to water heat pump systems best suited for urban environments.**

There are currently only a limited number of manufacturers on the market manufacturing the air source heat pumps (ASHP's) required to serve large commercial buildings. These ASHP's cannot operate when ambient temperatures reach between 0°-7°F (specific temperature varies by manufacturer). To be prepared for extreme weather events, many buildings install gas fired or electric resistance boilers sized for the peak heating load.

Furthermore, at ambient temperatures below 20°F, air to water heat pumps can still operate; however, they suffer from reduced heating output and in some cases reduced hot water supply temperature—requiring significantly more air source heat pumps to electrify 100% of a building's peak heating load. In addition to the added cost and roof space, these additional heat pumps

contain refrigerants with global warming potential and have their own embodied carbon emissions.

The requirement for 100% space heating electrification, sized for a building's peak heating load, results in increased equipment, excessive cost, and increased embodied carbon. Given the minimal number of hours per year where a building requires peak heating, **NAIOP strongly recommends reducing this sizing requirement based on a holistic analysis. In cases where a backup heating system is also electric, consideration should be given to a reduced sizing requirement.**

- iv. **NAIOP strongly recommends the adoption of incentives beyond the MassSave program to implement the proposals.** There is no question that these proposals, if implemented, will increase the cost of development. In order to offset these requirements, NAIOP would support the creation of a grant program specifically designed to help make commercial development and large-scale multifamily housing economically feasible in the pursuit of carbon reductions.

## **II. General Methodology**

- i. The complicated nature of the code language could result in inconsistencies in adoption and implementation. There will continue to need to be specialized energy-code consultants to provide documentation on behalf of the project, as well as knowledgeable building code inspectors to adopt and enforce the new codes.

NAIOP is concerned that if a municipality is responsible for certifying compliance, then this will strain local town resources which will add uncertainty and additional time to the review and entitlement process. Given that most municipalities may not be able to add a full-time energy code position to evaluate compliance with the new codes for a variety of reasons, many municipalities will likely assign an existing staff member to take on the responsibility. This may result in the person that is assigned to review/certify the project not being an expert in the field of sustainable design.

**To alleviate this concern, NAIOP recommends that the code allow project proponents to certify compliance with the applicable energy code via review by a licensed energy professional** – similar to how the Massachusetts Department of Environmental Protection (MassDEP) allows Licensed Site Professionals (LSPs) to certify a site's remediation to MassDEP standards. After certification, DOER could retain the right to audit the project for a period of time. NAIOP believes that, if adopted, this certification pathway would uphold the integrity of the code and mitigate strain on municipal officials.

- ii. The energy code compliance pathway for existing buildings/major renovations is unclear to NAIOP's members. While chapter five of the International Energy Conservation Code (IECC) does reference many sections of chapter four for compliance, it would be beneficial to have language that specifically clarifies when prescriptive requirements outlined in the proposed amendments are required.

### III. Specific Comments Related to Draft Commercial Stretch Code

- i. While there is clarity of certain building types offered for each performance type (for example TEDI Performance or Relative Performance), it is not clear how mixed-use buildings are to be considered. Several of NAIOP's members are confused as to how mixed-use projects that include program areas required to follow TEDI as well as life-science components that are required to follow ASHRAE 90.1 Appendix G would be handled. At face value, one would expect all such buildings move into Relative Performance, but it is unclear how DOER would like the development community to model and consider these typical building types. **Given that mixed-use development is a critical component of the Commonwealth's Main Streets revitalization and our strategy to address the housing crisis, NAIOP strongly recommends a simple, clear pathway to demonstrating code compliance for mixed-use buildings.**

- ii. **Thermal Energy Demand Intensity (TEDI)**

- a. NAIOP would like to understand the analysis used to determine the TEDI targets, and how large commercial buildings designed under the current energy code compare to the proposed TEDI limits. As drafted, the targets appear unrealistically low and would significantly impact the design of new buildings. For example, a current development of a Boston office tower that includes triple pane glazing and high ventilation heat recovery would not conform to the proposed TEDI target. The TEDI of this building is approximately 4.5 kBtu/sf-yr, which is approximately three times the limit in the draft language. A comparative Passive House TEDI is 4.8 kBtu/sf/yr.

Additionally, the difference in limits for an office building <100k SF vs. one >=100k SF seems significant and points to a need to further review these values. It does not seem reasonable that the difference between 105k SF office building and a 95k SF office building would result in the larger building have 37.5% less heating demand.

Looking to other markets with similar climates, the Canada Green Building Council has published a Zero Carbon Building Standard, which defines the Maximum TEDI Values for their projects. For Climate Zone 5,

the TEDI maximums range from 7.0 kBTU/SF to 10.1 kBTU/SF for all building types.

**NAIOP urges DOER to revise these targets.**

- b. NAIOP is concerned that TEDI is an entirely new metric, never used before in Massachusetts energy code for commercial buildings. As such, **NAIOP recommends that these targets are not mandatory for office buildings and schools.** Instead, the TEDI targets could be an optional compliance pathway, allowing projects within these building types to also choose the more familiar ASHRAE 90.1-2019 Appendix G methodology. If Targeted Performance (TEDI) is not selected as the compliance pathway for a specific building, the permit submission could still consider requiring reporting of TEDI performance.

As recommended, allowing optional compliance pathways for office buildings and schools would allow DOER to gather more data before defining a progressive yet achievable TEDI value and ensure future discussions are grounded in data gathered here in the Commonwealth.

iii. **C401.4.2 Electrification**

Sizing heat pumps for 100% of peak load is cost and space intensive, and also increases the capacity of the all-electric systems by 50-100%, while only running for 2% or less of the time. **NAIOP recommends DOER instead size for the 98<sup>th</sup> percentile of building heating to limit the quantity of low runtime equipment.**

iv. **C402.1.5 Curtain Wall and Envelope Backstop**

- a. The benefit of Massachusetts's Envelope Backstop requirement is that it limits the ability to value engineer the exterior envelope which in turn promotes the development and use of high-performance fenestration systems offering the benefit of greater thermal comfort. However, the means to achieve the backstop requirements can, in some cases, contradict the goals of reducing building energy consumption. The current methodology used in Massachusetts to calculate the envelope backstop has limited flexibility and does not consider the following: orientation; shading; or advanced technologies. In the latest proposed version of the Stretch Code, steps are being taken to improve the calculation method, but the changes do not go far enough. **NAIOP believes a greater emphasis should be made on modifying the methodology in order to promote an integrated design process that allows increased flexibility under the performance energy modeling path 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.**

- b. As drafted, the envelope backstop uses a fixed glazing U-value of 0.30. This seems to trigger triple glazing, regardless of window to wall ratio (WWR). At lower WWRs (i.e. <35%), there are marginal energy and load savings by going from double to triple glazing as glazing is a much smaller portion of the thermal envelope, but **there is a significant embodied carbon impact**, both from the increase in glass, as well as the increase in structural materials to carry the increased weight of the facade. **NAIOP urges DOER to revise the fixed glazing U-value so that triple glazing is not automatically required regardless of WWR.**
- c. Additionally, the current edition of envelope backstop uses a default baseline WWR of 30%, but can be increased to 40% if the project meets the requirements of C402.4.1.1. There have been inconsistencies across the Commonwealth in how this section is being enforced. **NAIOP strongly recommends that DOER include a clarification for all buildings including Core and Shell projects explicitly.** NAIOP also recommends eliminating the 30-40% confusion altogether by simply using 40%, which we believe is DOER's intent.

v. **C402.7 Thermal Bridges**

The section including a prescriptive requirement for Thermal Bridges seems redundant because the U-value ratings mandated in C402.1 through C402.4 are assembly U-values, which include the thermal bridges of an exterior envelope construction. Additionally, the language found in C402.7 adds a layer of complexity that could make documentation difficult on a widespread basis because of the lack of expectations for documenting compliance found within the draft language. **NAIOP recommends striking C402.7 in its entirety given the goals of the section are achieved in sections C402.1 through C402.4.**

vi. **C403.7.1 Minimize Reheat**

- a. This MA amendment limits ventilation rates to a maximum of 135% of the values prescribed by ASHRAE 62.1-2019. Given recent studies on the cognitive effects of insufficient ventilation and considering the risks associated with ongoing and potential future pandemics, this limitation is not in the best interest of health and safety. In addition, ASHRAE 90.1 limits the energy model baseline ventilation rates to the ASHRAE 62.1 minimum, so there is already a mechanism to incentivize avoiding over-ventilation. NAIOP requests that no maximum ventilation rate be set in the Massachusetts amendments, allowing owners and health, safety, and engineering professionals to determine the degree to which ventilation

rates should exceed the minimum values prescribed by ASHRAE 62.1-2019.

- b. Exception 2 states “Systems installed for the sole purpose of provide makeup air for systems exhausting Class 4 exhaust or Class 3 exhaust that is exempt from heat recovery requirements, as defined by C403.7.5”. This appears to be an error in the text. Class 4 and Class 3 exhaust are not exempt from the heat recovery requirements, as defined by C403.7.5. We believe the intent is for this exception from C403.7.1 to apply to systems providing make-up air to systems exhausting Class 4, Class 3 and exhaust that is exempt from heat recovery requirements, as defined by C403.7.5. In addition, there is rarely a make-up air system that provides makeup air solely for the purpose of providing makeup air for Class 4, 3 and exempt exhaust.
- c. For example, general laboratory exhaust is Class 2 air. It is standard practice for laboratory makeup air systems to provide makeup air to spaces with both Class 2 general exhaust and Class 4 fume hood exhaust. Also, there are often office spaces located adjacent to laboratory spaces that have Class 1 general exhaust, which receive makeup air from the same makeup air system. Given the many permutations of program layout in laboratory buildings and the many renovations and changes that occur over time, it is not reasonable to provide separate makeup air systems for these different exhaust types. Therefore, NAIOP asks that DOER expand this exception by adopting the following language:

*Systems where at least an appropriate percentage (such as 10%) of the makeup air is supplied for the purpose of providing makeup air for systems exhausting Class 4, Class 3 and exhaust that is exempt from heat recovery requirements, as defined by C403.7.5.*

- d. Exception 4 states: “*air-to-air heat recovery devices shall be in addition to exhaust heat recovery required per C403.7.5. Therefore, air-to-air heat recovery devices used for compliance with C403.7.1 shall not contribute to compliance with the exhaust heat recovery effectiveness requirement per C403.7.5.*” This exception is confusing and should be clarified as it appears the intent is for this text to be a qualification to Exception #3, and therefore should be part of Exception #3 and **not be listed as Exception #4.**

vii. **C502.1 Additions**

*This requirement currently states “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.”*

As an example, consider a 10,000 square foot addition to a 100,000 square foot building. A typical solution would be to connect the addition to the mechanical and electrical systems in the existing building. Section C406 is the Additional Energy Efficiency Credit Requirements – meaning that if enacted as written, it will be exceedingly difficult and will have limited benefit for small additions to fully comply with Section C406. NAIOP asks that DOER consider eliminating or reducing the number of “credits” required to be achieved under C406 for small additions.

viii. **C503.1 Alterations**

*As drafted the requirement states “Alterations to any building or structure shall comply with the requirements of Section C503, and Sections C402, C403, C404, C405 of the code for new construction. Alterations shall be such that the existing building or structure is not less conforming to the provisions of this code than the existing building or structure was prior to the alteration. Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as those provisions relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code.”*

Consider the case of a floor in an existing multi-tenanted building where some portion of the building is renovated but where other spaces will continue to have operating tenants that cannot be interrupted. Only the configuration of the zones and terminal devices, such as VAV boxes may be replaced. **NAIOP urges DOER to clarify that systems that are part of a larger building system can be replaced in-kind, without full compliance of the replaced systems with new construction energy code requirements.**

ix. **C505.1 Change of Use or Occupancy**

*This requirement states: “Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code Sections C401.3, C402 through C406, and Section C408. Where the use in a space changes from one use in Table C405.3.2(1) or C405.3.2(2) to another use in Table C405.3.2(1) or C405.3.2(2), the installed lighting wattage shall comply with Section C405.3. Where the space undergoing a change in occupancy or use in a building with*



*a fenestration area that exceeds the limits of Section C402.4.1, the space is exempt from Section C402.4.1 provided that there is not an increase in fenestration area.”*

This requires compliance with the envelope, mechanical, plumbing, electrical and additional efficiency measures sections of the code. **The most significant concern in this set of requirements is the requirement to comply with Section C402.** In many cases, this will require major upgrades and/or full replacement of a large percentage of the building envelope, resulting in negative impacts to sustainability.

In many cases, **this will preclude adaptive reuse of existing buildings for new uses or occupancies** and result in the likelihood of the building being torn down, **resulting in a dramatic increase in embodied carbon emissions to construct a new building.** Even if the structure is able to be retained, the increased embodied carbon emissions of replacing the envelope will in many cases never reach a payback in terms of operational carbon savings over the remaining lifespan of the building. **This is a serious negative consequence of this proposed code change, and NAIOP strongly urges DOER to consider using the more lenient approach for envelope upgrades defined under Section C503.1 for Alterations.**

#### **IV. Comments Regarding Effect on Lab and Life Science Buildings in Stretch Code Proposal**

With over 650 life science companies operating in Massachusetts, the innovation economy is a cornerstone of our success. Urban commercial lab space is becoming more and more popular as cluster development, public transportation access, and walkability have come to the forefront of residents’ minds. Investors are making real estate decisions holistically – hoping to attract and retain talent, as well as cultivate the type of quality work and living environment that enables companies and their employees to prosper. As we saw in Watertown and Kendall Square, when labs go in, restaurants, retail and housing follow. When labs open, foot traffic in the neighborhood increases, positively impacting small businesses and restaurants. Given the recent economic downturn and the very real negative effects many of our small businesses are facing in the city due to lack of foot traffic, it is critical that these new investments and projects be supported by policymakers. NAIOP offers the below comments specific to provisions affecting lab and life sciences development in an effort to ensure that this critical industry can continue to thrive here in the Commonwealth.

- i. **C401.2.1 – Option 3 Relative Performance Compliance (ASHRAE 90.1 Appendix G with MA Amendments).** The ASHRAE 90.1 Appendix G baseline for laboratory buildings may rely on the airflow turn-down of 50% and therefore are not required to include exhaust heat recovery. However, the

ASHRAE 90.1 text is not explicitly clear. Based on analysis from industry professionals, a Building Performance Factor of 0.51 is not reasonably achievable for laboratory buildings if the baseline includes energy recovery. Therefore, **NAIOP requests that DOER clarify that the ASHRAE 90.1 Appendix G baseline for laboratory buildings should rely on the airflow turn-down of 50% and therefore are not required to include energy recovery.**

- ii. **C401.4.1 Partial Space Heating Electrification.** This section requires air source or ground source heat pumps to be sized to 25% of the building's peak space heating load. Although air source and ground source are historically the most common types of heat pumps, NAIOP believes that DOER should not preclude the use of other innovative heat pump and efficient electrification systems.

For example, new cutting-edge laboratory buildings are applying exhaust-source heat pumps to achieve dramatic fossil fuel reductions. Exhaust heat pump systems have advantages over air source systems, including reduced embodied carbon and higher overall system efficiency and reduced peak demand on the electric grid. Therefore, **NAIOP believes that the code should allow exhaust-source heat pump systems to contribute to compliance with this section.**

Any concerns about double-counting this type of heat recovery system for compliance with both C401.4.1 Partial Space Heating Electrification and Section C403.7.5 Energy recovery systems could be addressed by defining a formula that isolates the additional heating capacity gained by the addition of the heat pumps to the exhaust heat recovery system, above the required minimum heat recovery effectiveness. Concerns about over-counting the heating capacity of the exhaust-source heat pump system could be addressed by defining an appropriate reduced exhaust airflow (such as 70% of design airflow) when calculating exhaust-source heat pump capacity. Overall, this would allow buildings to take advantage of the benefits of exhaust heat recovery systems for high ventilation buildings such as laboratories. Because engineers commonly differ in their methodology and assumptions when calculating peak heating load, the code terminology leaves room for interpretation and would result in inconsistent application of the partial space heating requirement. **NAIOP requests that DOER define the parameters and conditions by which to calculate the peak heating load and equipment capacity to comply with this requirement.**

- iii. **C403.7.5 Energy recovery systems.** Laboratory buildings have a mix of different space types and exhaust equipment that individually have different classifications of exhaust, often including Class 1, 2, 3, and 4. It is standard

practice, due to cost, complexity, resiliency and space limitations to combine these individual exhaust sources into a single common exhaust system. The combined exhaust is required by ASHRAE 62.1 to be classified as the highest classification of any exhaust in the system, unless re-classified by a qualified professional. **Therefore, NAIOP believes the stretch code language should clarify that the exhaust classification for section C403.7.5 Energy Recovery Systems does not preclude combining exhaust sources and appropriate assignment of combined exhaust classification per ASHRAE 62.1.**

## **V. Specific Comments Related to Draft Commercial Specialized Stretch Code**

### **i. CC101.5 Option 3 Mixed Fuel Pathway; and CC106 Wiring for Future Electrification**

Section CC101.5 Option 3 – Mixed Fuel Pathway requires compliance with CC106 Wiring for Future Electrification. Under CC106.1, Section CC106.1.5 Other Combustion Equipment requires a junction box to be located within 3 feet of the appliance or equipment and that the junction box, conduit and bus bar in the electrical panel to be rated and sized to accommodate a branch circuit with sufficient capacity for an equivalent electric appliance, equipment or end use with an equivalent equipment capacity.

This requirement is not a viable solution for high ventilation buildings, such as laboratories, licensed healthcare facilities and hospitals. The magnitude of the electrical capacity required to serve a fully electric central heating plant for these high ventilation buildings is enormous. Installing this magnitude of spare electrical infrastructure is costly, space intensive and may not be accepted by the electric utility provider.

In addition, installation of an electric heating plant is not a simple one-for-one swap out of fossil fuel equipment. For example, if a gas-fired boiler installed in the basement needs to be replaced in the future with air-source heat pumps on the roof, the configuration of the electrical infrastructure would be entirely different than the approach defined in the draft Stretch Code.

Furthermore, it may be fundamentally disadvantageous to fully electrify certain high load building types as the increase in embodied carbon for additional heat pumps is likely to outweigh the incremental benefit of electrification. Moreover, because fossil fuel heating systems in high-ventilation buildings such as labs and hospitals are often sized for beyond-normal conditions and include additional equipment for redundancy and resiliency, planning for equivalent capacity electrified systems would exceed what is necessary to heat those buildings in normal operation.

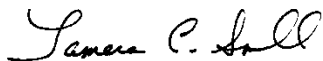
As electrification technologies, including heat pumps, are rapidly developing and improving in efficiency, installing additional electrical capacity for future electrification based on loads from today's equipment types may result in unnecessarily oversizing the supporting infrastructure which would have a negative impact on the electrical grid. **NAIOP urges DOER to consider requiring infrastructure for increased electrification for mixed fuel buildings that is consistent with the Commonwealth's holistic goals for reduction of both embodied carbon and operational carbon.**

Given the Baker-Polito Administration and the Legislature's recent recognition that full electrification of lab and life science space is technologically challenging and may not achieve the ultimate goals of decarbonization, **NAIOP strongly recommends that DOER consider making this requirement more flexible and allow the specific configuration of the electrical infrastructure to support future electrification be left to the judgement of the engineering professionals.**

NAIOP Massachusetts represents the interests of companies involved with the development, ownership, management, and financing of commercial properties. NAIOP has over 1,700 members who are involved with office, research & development, lab, industrial, mixed use, multifamily, retail and institutional space.

Thank you for the opportunity to provide comments. 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 Michael Kennealy, Executive Office of Housing and Economic Development  
Secretary Bethany Card, Executive Office of Energy and Environmental Affairs  
David Riquinha, Chair, Board of Building Regulations and Standards