



a chapter of The American Institute of Architects

March 17, 2022

The Department of Energy Resources  
100 Cambridge Street, Suite 1020  
Boston, MA 02114  
Attn: Nina Mascarenhas

Re: **Stretch Code Straw Proposal Comments**

Dear Ms. Mascarenhas:

I am writing to you as the President of the Massachusetts Chapter of the American Institute of Architects (AIA MA) to offer our organization's comments on the DOER recently released energy code straw proposals for an updated stretch energy code and new, municipal opt-in stretch energy code.

Established in 1963, 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, which consists of over 90,000 members representing more than 200,000 U.S. jobs.

As an organization, we continually support efforts that improve the quality of life for all citizens of the Commonwealth via the built environment. AIA MA advocated for language that is now law requiring DOER to develop and promulgate a municipal opt-in specialized stretch energy code that includes, but is not limited to, net-zero building performance standards and a definition of net-zero buildings. This requirement, along with the rest of Chapter 8 of the Acts of 2021 - the [Next-Generation Roadmap for Massachusetts Climate Policy](#), re-envision the Commonwealth's approach towards energy efficiency in the built environment.

We support this effort, the ambitious goals outlined in the Act, the [Commonwealth's 2050 Decarbonization Roadmap](#), and the Roadmaps subset recommendations contained in its [Building Sector Report](#). Lastly, we affirm that a workable net-zero building standard is a critical part of the Commonwealth's building codes and its overall decarbonization efforts.

We want to thank DOER for presenting its straw proposal to our membership on March 2, 2022. This provided us with the opportunity to hold follow-up conversations conducted by our Government Affairs Committee on March 9, 2022, and we offer the following comments for your consideration. Our comments are categorized as Base Code Comments, Stretch Code Comments, and Municipal Op-in Stretch Code Comments.

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## **Base Code Comments**

At the November 9, 2021, meeting of the Board of Building Regulations and Standards (BBRS), representatives from DOER presented its proposed base energy code amendments to the commercial and residential portions of the 2021 International Energy Conservation Code (IECC). Of note, DOER suggested including the 2021 IECC's Appendix CC Zero Energy Commercial Building Provisions and Appendix RC Zero Energy Residential Building Provisions as one of the many optional compliance paths offered in each code.

Each Appendix requires new commercial and residential buildings to install or procure enough renewable energy to achieve zero net carbon emissions annually. In addition, each Appendix requires renewable energy systems either on-building, on-site or off-site through another property if and when feasible. If a building is unable to conform to any combination of the three options, it requires off-site procurement of solar renewable energy credits (SREC's). ***AIA MA suggests extending those recommendations to the proposed stretch code and the new municipal opt-in code.***

We note that DOER's straw proposal has no requirements for solar panels in either the residential or commercial portions of the proposed stretch code. In the municipal opt-in code, for both residential and commercial construction, DOER would require that, when feasible, solar panel would be required on all unshaded parts of the roof for only new buildings using fossil fuels. From an operational perspective, we think this language should be clarified to provide guidelines as to what constitutes feasibility for PV.

To that question, as all three energy codes will continue to be enforced by state and local building inspectors, we urge DOER to begin conversations with both the BBRS and the Massachusetts Federation of Building Officials (MFBO). The BBRS has jurisdiction over licensing and training of building officials, and the MFBO is an umbrella organization representing city and town Building Commissioners and local inspectors throughout the Commonwealth. ***AIA MA suggests that DOER work with the BBRS to update the proposed base energy code amendments to provide this guidance at all three tiers.***

## **Stretch Code Comments**

Regarding DOER's proposed updates to the existing stretch energy code, we offer comments related to the following six topics: HERS Rating, Commissioning and Retro-Commissioning, Curtain walls, Embodied Carbon, Existing Buildings, and Thermal Energy Demand Intensity (TEDI).

### **HERS Rating**

At the November 9, 2021, meeting of the BBRS, representatives of DOER proposed base energy code amendments to raise the HERS index requirement for residential and commercial construction from 55 to 52. (HERS thermal performance increases with decreases in the index.) For both the residential and commercial portion of the stretch code

and buildings utilizing fossil fuel heating and cooling systems, DOER proposes to increase the HERS requirement to 42. For commercial and residential buildings using electric heating and cooling systems, DOER would set the HERS rating at 45.

While that is encouraging, we raise two questions: one, are 52, 42, and 45 the appropriate HERS requirements for 2021, and two, in the vein of the three energy codes increasing efficiency requirements as users move from base code to stretch to municipal opt-in, why are the HERS requirements the same for both the proposed new stretch and new, municipal opt-in energy codes instead of escalating in efficiency?

To the first question, while DOER has presented backup information to support their proposed HERS adjustments, AIA MA is concerned the adjustments do not go far enough. ***Therefore, while we do not suggest a specific number, we invite discussions with DOER to help determine the appropriate HERS requirement. Further, we recommend collaborating with Passive House Institute US (PHIUS), which has performed extensive optimization studies, to determine the most effective balance point between energy efficiency and the long-term costs of a building.***

To the second question, utilizing the suggestions in the previous paragraph, ***we recommend adjusting the proposed stretch code HERS rating toward a higher level of energy efficiency*** and, in keeping with the approach towards increasing performance requirements as the user moves up through the three codes. ***We also request that DOER also consider life cycle cost savings as part of the evaluation of costs for different HERS rating requirements.***

### **Commissioning/Retro-Commissioning**

Building commissioning provides tangible and quantifiable benefits to building owners, occupants, construction teams, and society. It results in direct and measurable energy savings, which translate to economic savings, to ensure that building owners get what they pay for when constructing or retrofitting buildings, and it detects and corrects problems that would eventually surface as far more costly maintenance or safety issues.

AIA MA understands that requiring commissioning/retro-commissioning is likely outside the authority of DOER to regulate, but it is within the control of the BBRS. ***We strongly encourage DOER to use its seat on the BBRS to coordinate language between the energy codes and building code related to energy system commissioning requirements.***

### **Curtain wall**

Curtain wall systems are less energy-efficient than alternative wall systems, and AIA MA is concerned about the environmental impact of large curtain wall areas on our larger buildings.

Slide 32 of DOER's straw proposal outlines key considerations around glazing and indicates the two levels DOER evaluated: high glazing (50% window) and normal glazing (30-40% window). ***AIA MA supports the normal glazing level as optimal for energy performance.***

***Further, we encourage DOER to consider assigning a maximum “U” value for above-grade components of buildings as a more comprehensive way to address curtain wall concerns.***

DOER proposes that the provisions of the proposed stretch code related to curtain walls be carried forward into the new municipal opt-in code. In addition, ***we suggest that, for inclusion within the new municipal opt-in code, DOER consider increasing the performance requirements at this tier.***

### **Embodied Carbon**

Embodied carbon is the energy and corresponding carbon emissions necessary to construct a building and includes the sourcing, production, transportation, and installation of building materials. The profound impact of embodied carbon in all our buildings is not a matter of debate. Embodied carbon accounts for greenhouse gas emissions at the start of a building's lifespan. It will remain in the atmosphere and affect climate for many years to come before operational carbon efficiencies offset this impact.

***We applaud DOER for introducing embodied carbon reductions and strongly encourage DOER to apply this metric to other building systems in both the stretch and municipal opt-in code.*** We believe it is critically important to immediately address this impact on as many building systems as possible.

***We also suggest that DOER add a requirement for a whole building life cycle assessment (LCA) for operating carbon and embodied carbon for all new commercial buildings.*** The benefits of requiring an LCA are profound. It provides a comprehensive view of the environmental impacts, requires designers to consider more than just the "use" phase of a building, quantifies environmental effects such as overall energy consumption and air emissions, recognizes inefficiencies or significant changes across life cycle phases, allows for an "apples to apples" comparison of alternatives, and reduces overall environmental impact and costs.

Lastly, in keeping with the requirement for DOER to coordinate with Mass Save to incentivize all-electric homes and higher HERS rated residential units, ***we recommend that DOER coordinate with Mass Save to extend current 1-4 unit incentives to owners of existing homes who are willing to undertake a whole home transition and are able to achieve an all-electric, HERS 45 result in renovation.*** Incentivizing comprehensive renovations and systems conversions of existing homes is a more productive means of achieving carbon reduction because existing homes require far fewer carbon emissions associated the transportation and manufacturing building materials.

### **Existing Buildings**

As noted on page (43) in the Commonwealths [Building Sector Report](#) published in December 2020,

*“... even by 2050, structures that exist today will still represent over 80% of the total building stock. Addressing these existing buildings is central to the meeting*

*the decarbonization targets of the Commonwealth.”*

***We strongly advocate that DOER use its seat on the BBRS to move this needed conversation forward. We encourage DOER to work with the BBRS to coordinate language between the energy codes and the building code related to Chapter 34 additions and renovation work for commercial structures and Appendix J for residential.***

### **TEDI**

DOER has included the Thermal Energy Demand Intensity, or TEDI, as a performance metric in both the stretch and municipal opt-in stretch codes. TEDI measures the amount of annual heating energy needed to maintain a building's stable interior temperature. It considers heat loss through the envelope and passive gains, such as the warmth generated by sunlight, body heat, and appliances. As they impact the heating demand before efficiencies are applied, only the heat recovery system, building energy management system, ventilation control system, and the percentage of exhaust recirculation have an impact on the TEDI. We do not consider this metric to be sufficiently comprehensive to serve as a principal performance metric in the code in our climate. ***We suggest DOER consider supplementing the TEDI requirement with an additional requirement for Energy Use Intensity (EUI) calculations, as prescribed in the 2021 IECC's Appendix CC Zero Energy Commercial Building Provisions.***

EUI calculation refers to the energy required to operate and sustain a building once it is occupied. By calculating the energy a building consumes annually, designers can better predict the projects' utility cost, which is directly linked to a building's energy consumption.

### **Municipal Op-in Stretch Code Comments**

Regarding DOER's proposal for the new, municipal opt-in stretch energy code, we offer our comments on the definition of Net Zero Buildings.

#### **Definition of Net Zero Building**

On March 2, 2022, representatives of DOER provided the reasoning behind their proposed definition by pointing to page (40) of the Commonwealth's Building Sector Report, which states,

*“Net Zero new construction is defined as being consistent with the electrification and deep efficiency benchmarks described in the All Options pathway, discussed in the Energy Pathways Report – that is, that the new construction is compatible, as-built, with the Commonwealth's net-zero emissions economy in 2050. Its focus is on-site emissions; it does not necessitate on-site or offsite renewables, nor the assumption that a building is net-zero energy.”*

The Building Sector Report is a policy document, not a building code. A building code is an instrument of policy but it regulates individual building projects. As a working tool for the design and construction industry, it is essential that definitions be applicable to each project

individually. Designers and builders have long-since established definitions for net-zero and AIA MA is concerned that DOER has chosen a definition that is outside the mainstream of building industry standards for such purposes. A common definition for zero energy buildings, prepared for the U.S. Department of Energy & the National Institute of Building Sciences, September 2015 states:

*“A zero energy building (ZEB) produces enough renewable energy to meet its own annual energy consumption requirements, thereby reducing the use of non-renewable energy in the building sector.”<sup>1</sup>*

***AIA MA would encourage DOER to consider a slightly broader definition, and as such, we propose a definition that could easily work within the current straw proposal framework.*** Further, with an understanding that Attorney General Healey has recently, for a second time, noted that only the Legislature has the authority to ban fossil fuels and that no state board, commission, or agency has the legal power to restrict the use of fossil fuels, ***we propose the following:***

*“a net-zero building is required to be an energy-efficient building that is able to offset its annual energy use and site emissions through the production or procurement of renewable energy”*

This definition would be better understood by designers and builders and be consistent with the formulation of other code definitions. It would also serve for future code editions when a net-zero definition will be relevant to requirements in all tiers of the code.

## **Conclusion**

The impact of energy efficiency, emissions and carbon-reduction in our buildings take years to manifest themselves. Much as any investment for the future, their benefits compound every year. AIA MA believes that our recommendations are critical to the building code’s 10<sup>th</sup> Edition and DOER’s new CMR 225. Indeed, several municipalities have sought, and are continuing to seek, legislative authority to implement similar changes. By incorporating our recommendations, the Commonwealth can avoid a patchwork of rules and regulations that would confuse regulators and burden the design and construction industry.

We would like to thank DOER for offering a framework to discuss the Commonwealth’s three energy codes and how they can build upon each other to increase energy efficiency requirements and move toward a future of net-zero buildings. As DOER takes its next step toward developing the Straw Proposal into actual code language, we hope these comments and suggestions are helpful. Further, we hope they will find a home in DOER’s new CMR 225, containing both the stretch code and new municipal opt-in code.

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<https://www.energy.gov/sites/prod/files/2015/09/f26/A%20Common%20Definition%20for%20Zero%20Energy%20Buildings.pdf>



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If our organization can provide any additional information, please do not hesitate to contact our Executive Director, John Nunnari at 617-901-4685 or [jnunnari@architects.org](mailto:jnunnari@architects.org)

Very truly yours;

A handwritten signature in blue ink, appearing to read "Mariana O'Brien". The signature is fluid and cursive, with a long horizontal stroke at the end.

Mariana O'Brien PhD.  
President  
AIA Massachusetts