Commonwealth of Massachusetts
Division of Professional Licensure
Office of Public Safety and Inspections

1000 Washington Street, Suite 710
Boston, Massachusetts 02118

MASSACHUSETTS STATE BUILDING CODE – CODE CHANGE PROPOSAL FORM

Impacted code: 780 CMR	■ Base Code ☐ Residential Code	**State Use Only**	
Date Submitted:	11/05/19	**Date Received:**	
Code Section:	Appendix 115 AA	**Code Change Number:**	
Name of proponent:	John Nunnari		
Company / Organization represented, if any:	MA Chapter of the American Institute of Architects	**Check** ☐ if representing self	
Address (number, street, city, state, ZIP):	290 Congress Street, Boston MA 02210		
Telephone number:	617-901-4685		
Email address:	jnunnari@architects.org		

PLEASE CHECK √ THE TYPE OF AMENDMENT PROPOSED

☐ Change existing section language ☐ Add new section ☐ Delete existing section and substitute

☐ Delete existing section, no substitute ■ Other, Explain: Add new option with existing Appendix

PLEASE TYPE THE PROPOSED AMENDMENT BELOW. If you propose to change a section, please copy the original text from either the relevant model code and/or MA amendment and indicate the code edition. Indicate, with a ~~strikethrough~~, the text that you propose to delete. Please also indicate any new text in both *italic* and red font. Finally, for each proposal submitted, please provide the justification items requested below. Completed code amendment forms may be emailed to Dan Walsh, Director of Code Development and Manufactured Buildings at Dan.P.Walsh@mass.gov . **Please attach additional pages as necessary.**

Existing language: None

Proposed changes: See attached

Background and rationale: See attached

Pros of the proposed change: See attached

Cons of the proposed change: See attached

Estimated impact on life safety: See attached

Estimated impact on cost: See attached

Existing language:
None.

Proposed changes:
See attached

Background and rationale:
The new appendix deals with renewable energy and creates a path to a zero energy design approach, similar to the zEPI that is already found in the 2015 IgCC. It is designed to build on top of the IECC which already sets the minimum energy efficiency requirement.

By putting this information in the current Appendix 115 AA (the stretch energy code), those municipalities that have received the Green Communities designation would be required to comply with the proposed new net zero provisions.

For communities that have not received the Green Communities designation, the proposed new net zero provisions would be optional.

Pros of the proposed change:
This proposal would address the stated concerns of various municipal and state-wide elected officials that have requested that the BBRS provide a net zero option within the state building code. Of the 351 cities and towns in Massachusetts, 78%, or 274 communities, have been designated as Green Communities – meaning they must comply with the provisions of Appendix 115 AA. By including these provisions, designated Green Communities would now have another tool to help them in their quest toward mandating a higher level of energy efficiency in their municipalities building stock.

Cons of the proposed change:
None.

Estimated impact on life safety:
None.

Estimated impact on cost:
While there are a variety of factors that affect construction cost such as building type, location, size, owner preference, and siting, this proposal will have no effect on design costs. While construction costs will need to account for the purchase and installation of newly required on-site solar generating equipment, overall operations and maintenance costs will decrease. A 2019 report from USGBC MA titled, *Zero Energy Buildings in Massachusetts: Saving Money from the Start*, noted five key findings:

1. ZE buildings are being built in Massachusetts today with zero additional up-front costs.
2. Return on investment for ZE Existing and New Office Buildings can be as little as one year for ZE ready buildings.
3. Of the six building types studied, all can be Zero Energy Ready (ZER) for upfront costs of 0 – 7%, and when zero energy, all types break even in eight years or less when there are no additional upfront costs.
4. Existing office buildings retrofitted to zero energy, with renewables, can produce a return on their investment in as little as five to six years, given today's incentive structure.
5. Building energy demand can be reduced 44 – 54% across all building types with technology that's readily available today.

Add new text as follows:

AA 105 ZERO CODE RENEWABLE ENERGY STANDARD

AA 105.1 Purpose The purpose of the Zero Code Renewable Energy Standard is to supplement the 780 CMR 13.00 and require renewable energy systems of adequate capacity to achieve zero-net-carbon.

AA 106 Scope This appendix applies to new buildings that are addressed by the 780 CMR 13.00

Exceptions:

1. Single-family houses, multifamily structures of three stories or fewer above grade in height, manufactured homes (mobile homes), and manufactured houses (modular).
2. Buildings that use neither electricity nor fossil fuel.

AA 107 Definitions The following definitions supplement or modify the definitions in the International Energy Conservation Code and 780 CMR 13.00.

Adjusted Off-Site Renewable Energy. The amount of energy production from off-site renewable energy systems that may be used to offset building energy.

Building Energy. All energy consumed at the building site as measured at the site boundary. Contributions from on-site or off-site renewable energy systems shall not be considered when determining the building energy.

Energy Utilization Intensity (EUI). The site energy for either the baseline building or the proposed building divided by the gross conditioned floor area plus any semi-heated floor area of the building. For the baseline building, the EUI can be divided between regulated energy use and unregulated energy use.

Renewable Energy System. Photovoltaic, solar thermal, geothermal energy, and wind systems used to generate energy.

On-Site Renewable Energy System. Renewable energy systems on the building project.

Off-Site Renewable Energy System. Renewable energy system not located on the building project.

Zero Energy Performance Index (zEPIPB,EE). The ratio of the proposed building EUI without renewables to the baseline building EUI, expressed as a percentage.

Semi-Heated Space. An enclosed space within a building that is heated by a heating system whose output capacity is greater than or equal to 3.4 Btu/h*ft² of floor area but is not a conditioned space.

AA 108 Minimum renewable energy On-site renewable energy systems shall be installed or off-site renewable energy shall be procured to offset the building energy.
[if gte msEquation 12]>REonsite +REoffsite â‰¥Ebuilding

where

REonsite = annual site energy production from on-site renewable energy systems (see Section AA 108.1)

REoffsite = adjusted annual site energy production from off-site renewable energy systems that may be credited against building energy use (see Section AA 108.2)

Ebuilding = building energy use without consideration of renewable energy systems.

When 780 CMR 13.00 Section C401.2 (2) is used for compliance, building energy shall be determined by multiplying the gross conditioned floor area plus the gross semi-heated floor area of the proposed building by an EUI selected from Table AA 108.1. Use a weighted average for mixed-use buildings.

When Section 780 CMR 13.00 C401.2 (1) or C401.2 (3) is used for compliance, building energy shall be determined from energy simulations.

TABLE AA 108.1 ENERGY UTILIZATION INTENSITY FOR BUILDING TYPES AND CLIMATES (kBtu/ftÂ²-Y)

	Climate Zone																
Building Area Type	0A/ 1A	0B/ 1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
kBtu/ftÂ²-y																	
Multifamily (R-2)	43	45	41	41	43	42	36	45	43	41	47	46	41	53	48	53	59
Healthcare/hospital (I-2)	119	120	119	113	116	109	106	116	109	106	118	110	105	126	116	131	142
Hotel/motel (R-1)	73	76	73	68	70	67	65	69	66	65	71	68	65	77	72	81	89
Office (B)	31	32	30	29	29	28	25	28	27	25	29	28	25	33	30	32	36
Restaurant (A-2)	389	426	411	408	444	420	395	483	437	457	531	484	484	589	538	644	750
Retail (M)	46	50	45	46	44	44	37	48	44	44	52	50	46	60	52	64	77
School (E)	42	46	42	40	40	39	36	39	40	40	39	43	37	44	40	45	54
Warehouse (S)	9	12	9	11	12	11	10	17	13	14	23	17	15	32	23	32	32
All others	55	58	54	53	53	51	48	54	52	51	57	54	50	63	57	65	73

AA 108.1 Calculation of On-Site Renewable Energy The annual energy production from on-site renewable energy systems shall be determined using the PVWatts software or other software approved by the code official.

AA 108.2 Off-Site Renewable Energy Off-site energy shall comply with Sections AA 108.2.1 and AA 108.2.2

AA 108.2.1 Qualifying off-site procurement methods. The following are considered qualifying off-site renewable energy procurement methods:

1. Community Renewables: an offsite renewable energy system for which the owner has purchased or leased renewable energy capacity along with other subscribers.
2. Renewable Energy Investment Fund: an entity that installs renewable energy capacity on behalf of the owner.

3. Virtual Power Purchase Agreement: a power purchase agreement for off-site renewable energy where the owner agrees to purchase renewable energy output at a fixed price schedule.
4. Direct Ownership: an offsite renewable energy system owned by the building project owner.
5. Direct Access to Wholesale Market: an agreement between the owner and a renewable energy developer to purchase renewable energy.
6. Green Retail Tariffs: a program by the retail electricity provider to provide 100 percent renewable energy to the owner.
7. Unbundled Renewable Energy Certificates (RECs): certificates purchased by the owner representing the environmental benefits of renewable energy generation that are sold separately from the electric power.

AA 108.2.2 Requirements for all procurement methods. The following requirements shall apply to all off-site renewable energy procurement methods.

1. The building owner shall sign a legally binding contract to procure qualifying off-site renewable energy.
2. The procurement contract shall have duration of not less than 15 years and shall be structured to survive a partial or full transfer of ownership of the property.
3. RECs and other environmental attributes associated with the procured off-site renewable energy shall be assigned to the building project for the duration of the contract.
4. The renewable energy generating source shall be photovoltaic systems, solar thermal power plants, geothermal power plants, and/or wind turbines.
5. The generation source shall be located where the energy can be delivered to the building site by the same utility or distribution entity; the same ISO or RTO; or within integrated ISOâ€™s (electric coordination council).
6. The off-site renewable energy producer shall maintain transparent accounting that clearly assigns production to the building. Records on power sent to or purchased by the building shall be retained by the building owner and made available for inspection by the code official upon request.

AA 108.2.3 Adjusted Off-Site Renewable Energy. The process for calculating the adjusted off-site renewable energy is shown in the following equation:

[if gte msEquation 12]>$RE_{offsite}$ = PF â ˆ ™RE =PF â ˆ ™RE +PF â ˆ ™RE +â ¯ +PF â ˆ ™RE

where

$RE_{offsite}$ = Adjusted off-site renewable energy

PF_i = Procurement factor for the i^{th} renewable energy procurement method or class taken from Table AA 108.2.

RE_i = Annual energy production for the i^{th} renewable energy procurement method or class

n = The number of renewable energy procurement options or classes considered

TABLE AA 108.2 Default Off-Site Renewable Energy Procurement Methods, Classes, and Coefficients

Class	Procurment Factor (PF)	Procurement Options	Additional Requirements (see also Section AA 108.2.2)
1	0.75	Community Solar	_

REIF's	Entity must be managed to prevent fraud or misuse of funds	–	–
Virtual PPA	–	–	–
Self-Owned Off Site	Provisions shall prevent the generation from being sold separately from the building	–	–
2	0.55	Green Retail Tariffs	The offering shall not include the purchase of unbundled REC's
Direct Access	The offering shall not include the purchase of unbundled REC's	–	–
3	0.2	Unbundled REC's	The vintage of the REC's shall align with building energy