

The following Executive Summary, Proposed Zoning Update and Proposed Policy and Standards are provided as DRAFTS for public review and comment.

The BPDA will be hosting Public Office Hours on October 11th at 6 pm and on October 12th at 2 pm, and a Public Feedback Meeting on October 19th at 6 pm. Comments are due by October 28th.

Please visit [Zero Net Carbon Building Zoning Initiative](#) for meeting links and to submit comments online or email comments directly to John Dalzell at: John.Dalzell@boston.gov

EXECUTIVE SUMMARY OF PROPOSED ZONING & POLICY UPDATES

Since enactment in 2007, Boston's Green Building zoning has contributed to the transformation of building practices in Boston and beyond. Today, new building projects typically achieve LEED Gold and include strategies to reduce heat island sources, storm water discharge, water use, construction and operation carbon emissions, and generate onsite renewable energy and often procure 100% renewable electricity.

As a national leader in innovation and sustainable development, Boston has set goals to be carbon neutral by 2050. In response, the City and BPDA launched the Zero Net Carbon Building Zoning Initiative. Working with community representatives, local organizations, stakeholders, and building practice leaders, the BPDA convened an extensive series of Public and Technical Advisory Groups Meetings that resulted in a comprehensive set of recommendations for updating Boston Zoning Article 37 and including a zero net carbon building standards.

These recommendations propose three areas of updates to the current zoning, reporting standards, and ongoing policy development:

- Lower the applicability threshold to buildings 20,000 square feet and larger,
- Raise the minimum LEED score to Gold,
- Add a zero net carbon building standard that prioritizes low carbon building construction practices and the use of on and off site renewable electricity sources,
- Align with and annually report ZNC practices in Building Emission Reduction and Disclosure Ordinance (BERDO), and
- Convene an Advisory Committee to assist in maintaining, updating, and advancing related policies and standards.

In support of these recommendations proposed zoning updates, the City and BPDA are proposing Article 37 Zoning Updates and related Green Building Policies and Standards.

Zoning Updates and related Policy & Standards Summary

Applicability Threshold

The current threshold is reduced from 50,000 sq. ft. to all buildings over 20,000 sq. ft. These thresholds align with the Zoning Article 80 Review framework and the new BERDO standards.

Minimum LEED Score

The current minimum LEED Score is raised from LEED Certified (40+ points) to LEED Gold (60+ points). The USGBC's LEED Rating Systems provide comprehensive standards for sustainable building development and management practices that are widely recognized and market valued. Third party certification remains NOT required but encouraged.

Zero Net Carbon Emissions

New requirements have been added for projects to minimize carbon emissions from building planning, development, and operations, maximize on-site renewable electricity generation, procure renewable electricity, and annually meet standards for zero net carbon emissions.

Minimize Building Construction Carbon Emissions - Also known as embodied carbon, approximately 50% of the total carbon emissions in the first 30 years of a high performance building are from building materials. Recognizing the emerging status of industry and practice standards, new requirements focus on best practices and achieving LEED Materials & Resources prerequisites and credits including:

- Construction and Demolition Waste Management
- Building Life-Cycle Impact Reduction
- Building Product Disclosure and Optimization
- Low embodied carbon structural designs, materials, and systems

Minimize Building Operation Carbon Emissions - New standards establish building operation carbon emission targets. For the most common building use types, buildings can be designed to meet a predictive Carbon Emission Intensity (pCEI) target specific for the building's use. Alternatively, buildings can be designed to meet a predictive comparative greenhouse gas reduction target of 40% for most uses and 30% for licensed hospital and healthcare uses.

Maximize On-site Renewable Electricity Generation - Buildings should be planned, developed, and managed to optimize renewable electricity output and meet new on-site solar energy system(s) installation targets. Minimum area requirements may be reduced in whole or part due to shading, set-backs, access, safety, mechanical, regulatory, or interconnection conditions.

Zero Annual Net Greenhouse Gas Emissions - Starting at building occupancy and accounting for greenhouse gas emissions from building operations, avoided emissions from on and off site renewable electricity sources, and Alternative Compliance Payments for any on-site fossil fuel emissions, annually emit a net total of zero or less greenhouse gasses. Compliance is reported in accordance with the new BERDO standards.

Advisory Committee

The BPDA will organize a Green Building Advisory Committee consisting of community and professional representatives. The Committee will assist the BPDA and the City in maintaining, updating, and advancing the related policies and standards.

Please see attached Proposed Zoning Update (DRAFT) and Propose Policy & Standards (DRAFT) documents dated September 26, 2022 for more specifics.

PROPOSED ZONING UPDATE (DRAFT)

ARTICLE 37 GREEN BUILDINGS (Revised)

Section 37-1. Statement of Purpose.

The purposes of this article are to ensure that major building projects are planned, developed, and managed to minimize and mitigate adverse environmental impacts; to conserve natural resources; to promote sustainable development; and to enhance the quality of life in Boston.

This article is intended to protect persons and structures from the adverse effects associated with environmental pollution and climate change by:

- minimizing and mitigating the adverse impacts of greenhouse gas emissions;
- promoting the generation of renewable energy;
- promoting resilient planning and development;
- promoting the co-benefits of sustainable development that address multiple environmental impacts; and
- providing consistent standards for the review of projects.

This article conforms to the general plan for the City of Boston, as expressed in Imagine Boston 2030, Climate Ready Boston, Boston Climate Action Plan, Building Emissions Reduction and Disclosure Ordinance, and related plans. The Zoning Commission hereby recognizes the parts of the City's general plan that address environmental impacts, climate change, and sustainable development as the plan for this article.

Section 37-2. Definitions.

For the purposes of this article only, the following words and phrases when capitalized shall have the meanings indicated.

Applicant - Any person or entity having a legal or equitable interest in a Proposed Project subject to the requirements of this article, or the authorized agent of any such person or entity.

BERDO – The Building Emissions Reduction and Disclosure Ordinance, CBC Chapter VII, Sections 7.2.1 and 7.2.2, as it may be amended from time to time.

Boston Interagency Green Building Committee (“IGBC”) - An interdisciplinary committee consisting of representatives of city agencies including but not limited to, the Boston Redevelopment Authority, the Boston Environment Department, the Boston Transportation Department, the Inspectional Services Department and the Mayor's Office. Such Committee will advise the Boston Redevelopment Authority on a Proposed Project's compliance with the provisions of this article.

Compliance Report – Any report required to be submitted in order to demonstrate the projected compliance of a Proposed Project with the standards and procedures of this article, Article 25A, or any other article of the code relating to the environmental impacts of a Proposed Project.

Emissions - The emission of greenhouse gases, measured in units of Carbon Dioxide Equivalent associated with the generation and transmission of Energy used by a building or structure within a Proposed Project.

LEED certifiable – A building or structure that is planned, designed and constructed to achieve any level of the U.S. Green Building Council LEED (“Leadership in Energy and Environmental Design”), regardless of whether such building or structure is certified by the Green Building Certification Institute.

Proposed Project - The erection, extension, rehabilitation, alteration, or substantial demolition of any building or structure or part thereof, or the change of use of any building or structure or land, for which the Applicant is required to obtain a building or use permit.

Qualified Professional - An individual who holds an active professional license, accreditation, or other qualification in the design and engineering of buildings and systems, sufficient to satisfy at least one of the credentials approved from time to time by the Boston Redevelopment Authority.

Renewable Energy - A form of Energy that is generated by non-Carbon Dioxide Equivalent emitting renewable sources and that meets the RPS Class I eligibility criteria outlined in 225 CMR 14.05, as may be amended from time to time.

Any term not defined in this article and defined in BERDO shall have the meaning set forth therein.

Section 37-3. Applicability.

Any Proposed Project which is subject to or shall elect to comply with any of the following sections of this Code shall be subject to the requirements of this article: (1) Section 80B, Large Project Review; (2) Section 80C, Planned Development Area Review; (3) Section 80D, Institutional Master Plan Review; or (4) Section 80E, Small Project Review, if the Proposed Project includes (a) the erection or extension of one or more buildings that results the addition of an aggregate gross floor area of twenty thousand (20,000) or more square feet, or (b) the construction of fifteen (15) or more Dwelling Units (but not including rehabilitation or alteration projects unless they result in a net increase of fifteen (15) or more Dwelling Units).

The following Proposed Projects, however, shall be exempt from the provisions of this article, unless otherwise stated in the Proposed Project approvals:

1. Any Proposed Project for which appeal to the Board of Appeal for any Zoning Relief has been granted prior to the first notice of hearing before the Commission for adoption of this article, provided that such Zoning Relief has been or is thereafter granted by the Board of Appeal pursuant to such appeal.
2. Any Proposed Project or site for which application for Article 80, development impact project plan or planned development area development plan, has been approved by Boston Redevelopment Authority prior to the first notice of hearing before the Commission for adoption of this article.

Section 37-4. Green Building Requirements.

Any Proposed Project subject to the provisions of this article shall be designed, engineered, and constructed to be LEED certifiable at the Gold level or better under the most appropriate LEED building rating system.

Section 37-5. Zero Net Carbon Building Requirements

37-5.1 Operational Emissions performance standard.

Any Proposed Project subject to the provisions of this article shall be designed, engineered, and constructed to meet or exceed an annual net Emissions performance standard of zero kg of Carbon Dioxide Equivalent (CO₂e) / sf-yr. The Emissions performance standard shall be applicable starting at the commencement of operation of any portion of the Proposed Project for which a temporary or final certificate of occupancy has been issued.

Continuing compliance with the annual net Emissions performance standard for a Proposed Project, starting upon the conclusion of the first full calendar year of operation as set forth above, shall be demonstrated via data reporting pursuant to BERDO, or, in the absence of data reporting requirements pursuant to BERDO, via no less stringent requirements set forth by the Boston Redevelopment Authority.

37-5.2 Operational Emissions minimization measures.

Any Proposed Project subject to the provisions of this article shall be designed, engineered, and constructed to minimize its Emissions from annual operations to the maximum extent feasible, in accordance with any standards or guidance issued and modified from time to time by the Boston Redevelopment Authority.

37-5.3 Operational Emissions mitigation measures.

To the extent that a Proposed Project will be unable, through implementation of its selected minimization measures, to attain the Emissions performance standard set forth in Section 37-5.1, the Proposed Project shall incorporate one or more of the following mitigation measures to offset any remaining Emissions from electricity use and all on-site non-electricity-use Emissions, in the order of priority set forth below.

- (1) To mitigate Emissions from electricity use only, the Proposed Project shall be designed, developed, and managed to enable the on-site production of Renewable Energy, in accordance with any standards or guidance issued and modified from time to time by the Boston Redevelopment Authority.
- (2) If mitigation measure (1) is not projected to enable the Proposed Project to attain the Emissions performance standard set forth in Section 37-5.1, the Proposed Project shall incorporate, as a further measure to mitigate Emissions from electricity use only, either (a) purchasing renewable electricity, (b) purchasing Renewable Energy Certificates, (c) entering into a Power Purchase Agreement, or (d) any other Compliance Mechanism identified in BERDO or otherwise approved under no less stringent requirements from time to time by the Boston Redevelopment Authority.
- (3) To mitigate all remaining electricity-use Emissions and all non-electricity-use Emissions, the Proposed Project shall make Alternative Compliance Payments pursuant to BERDO or, in the absence of such requirements pursuant to BERDO, pursuant to no less stringent requirements for payments set forth by the Boston Redevelopment Authority.

37-5.4 Construction Emissions minimization measures

Any Proposed Project subject to the provisions of this article shall be planned, developed, and managed to minimize Emissions from the extraction, harvesting, fabrication, transportation, installation, maintenance, and disposal of building products and materials, and other construction-related activities, in accordance with any standards or guidance issued and modified from time to time by the Boston Redevelopment Authority.

Section 37-6. Procedures.

Any Applicant subject to the provisions of this article shall demonstrate a Proposed Project's compliance with its requirements by providing to the Boston Redevelopment Authority any and all Compliance Reports required by the Boston Redevelopment Authority, in accordance with any standards or guidance it may issue and modify from time to time. The Boston Redevelopment Authority may require a Compliance Report to demonstrate the compliance of a Proposed Project with Article 37, or with any other article of the code relating to the environmental impacts of a Proposed Project. The Applicant shall demonstrate that the Proposed Project meets the requirements of this article with appropriate supporting documentation contained in the Compliance Reports, and by certification(s) from a Qualified Professional and/or other experts

recognized by the Boston Redevelopment Authority.

Within five (5) days of its receipt of a completed Compliance Report submitted by an Applicant under this article, the Boston Redevelopment Authority shall transmit a copy of the submission to the Boston Interagency Green Building Committee.

Section 37-7. Regulations.

The Boston Redevelopment Authority may promulgate regulations to administer this article.

Section 37-8. Enforcement.

The Commissioner of Inspectional Services shall not issue any building permit, use or occupancy permit for a Proposed Project that is subject to the provisions of this article unless the Director of the Boston Redevelopment Authority has issued a Certification of Compliance pursuant to Section 80B-6 and the IGBC has issued a letter of compliance with this Section.

The enforcement of a Proposed Project's continuing compliance with the annual net Emissions performance standard set forth in Section 37-5, following the completion of construction and the commencement of operations, shall be carried out by the Air Pollution Control Commission, pursuant to BERDO, or, in the absence of such requirements pursuant to BERDO, pursuant to no less stringent requirements for continuing compliance set forth by the Boston Redevelopment Authority.

Section 37-9. Severability.

The provisions of this article are severable, and if any such provision or provisions shall be held invalid by any decision of any court of competent jurisdiction, such decision shall not impair or otherwise affect any other provision of this article.

END of Article 37 – continue to Related Zoning Amendments

Related Zoning Amendments (*Revisions*)

Section 2 – Definitions.

Height of Building. The vertical distance from grade to the top of the highest point of the roof beams of a flat roof, or the mean level of the highest gable or of the slope of a hip roof, excluding belfries, cupolas, domes, monuments, church spires, water, observation, radio and transmission towers, windmills, chimneys, smokestacks, silos, derricks, conveyors, masts, flagpoles, aerials, elevator penthouses, water tanks, monitors, signs, or other roof structures and penthouses normally built above the roof and not used or designed to be used for human occupancy, but such structures shall be erected only to such heights, and cover only such areas, as are necessary to accomplish the purpose they are intended to serve, provided that in any event, the total area of such roof structures and penthouses does not exceed 33 1/3 percent of the total of all roof areas, measured horizontally, of such building, except that, for any Proposed Project that is

- (a) subject to Article 80B (Large Project Review); and
- (b) is within a downtown district established under Section 31-C, "height of building" means the vertical distance from grade to the top of the structure of the last occupied floor. A mansard roof shall be considered a flat roof.

Add:

Solar photovoltaic panels and associated mounting systems shall not count towards building height provided that they do not exceed 48 inches above the top of the highest point of the roof beams of a flat roof, or in the case of a canopy over rooftop parking on a parking structure, not more the 48" above highest horizontal structural element of the canopy, and in no case, exceed 14 feet above the surface of the rooftop parking.

(As amended on July 9, 1973, September 23, 1987, June 23, 1989, and March 15, 2006)

Section 2A - Definitions

Building Height. The vertical distance from grade to the top of the highest point of the roof beams of a flat roof, or the mean level of the highest gable or of the slope of a hip roof, excluding belfries, cupolas, domes, monuments, church spires, water, observation, radio and transmission towers, windmills, chimneys, smokestacks, silos, derricks, conveyors, masts, flagpoles, aerials, elevator penthouses, water tanks, monitors, signs, or other roof structures and penthouses normally built above the roof and not used or designed to be used for human occupancy, but such structures shall be erected only to such heights, and cover only such areas, as are necessary to accomplish the purpose they are intended to serve, provided that in any event, the total area of such roof structures and penthouses does not exceed 33 1/3 percent

of the total of all roof areas, measured horizontally, of such building. A mansard roof shall be considered a flat roof.

Where a maximum building height is specified in this Code, or in a second numerical suffix in the designation of sub district as provided in a neighborhood district article, no building or part of a building in a district, and devoted to a use specified, shall exceed the number of stories or feet in height so specified except as provided herein.

Whenever a legally existing structure not excepted above exceeds the height limit specified in a neighborhood district article on a lot in the same district as , and adjoining, the lot on which such legally existing structure is located a structure may be built to a height greater than said height limit, but shall not project above a line drawn between the highest point of said legally existing structure and any point at the height limit whose distance from said highest point is three times the height of said highest point above the height limit.

Add:

Solar photovoltaic panels and associated mounting systems shall not count towards building height provided that they do not exceed 48 inches above the top of the highest point of the roof beams of a flat roof, or in the case of a canopy over rooftop parking on a parking structure, not more the 48" above highest horizontal structural element of the canopy, and in no case, exceed 14 feet above the surface of the rooftop parking.

(As amended on March 15, 2006)

Section 80E-2. – Applicability of Small Project Review.

Small Project Review shall apply as set forth in this Section 80E-2; provided, however, that Small Project Review shall not apply to any Proposed Project that meets the size thresholds for Large Project Review, as set forth in Section 80B-2. The components of Small Project Review consist of the following:

Add:

Sustainability (Section 80E-2.6)

Add:

6. Sustainability Component: If a Proposed Project is subject to the Sustainability Component of Small Project Review, the application submitted pursuant to Section 80E-5 shall include such descriptions, analysis, performance modeling, plans, drawings, and specifications as are necessary for the Boston Redevelopment Authority to determine that the Proposed Project is consistent with the standards set forth in Section 37 (Green Buildings).

Section 80E-3. - Scope of Small Project Review; Content of Application.

Small Project Review shall consist of one or more of the following components: (1) design; (2) site plan; and (3) comprehensive sign design. The components of Small Project Review are applicable as set forth in Section 80E-2.

Add:

5. Sustainability Component. If a Proposed Project is subject to the Sustainability Component of Small Project Review, the application submitted pursuant to Section 80E-5 (Procedures) shall include those descriptions, reports, performance models, plans, drawings and specifications the Boston Redevelopment Authority finds necessary to determine whether the Proposed Project is consistent with the standards set forth in Section 37 (Green Buildings).

Section 80E-4. - Standards for Small Project Review Approval.

Add:

5. Sustainability Component. Any Proposed Project that is subject to the Sustainability Component of Small Project Review shall be consistent with the applicable standards set forth in Section 37 (Green Buildings).

PROPOSED POLICY & STANDARDS (DRAFT)

GREEN / ZNC BUILDING POLICY (New)

A. DEFINITIONS

BERDO – The Building Emissions Reduction and Disclosure Ordinance, CBC Chapter VII, Sections 7.2.1 and 7.2.2, as it may be amended from time to time.

Compliance Report – Any report required to be submitted in order to demonstrate the projected compliance of a Proposed Project with the standards and procedures of Article 37, Article 25A, or any other article of the code relating to the environmental impacts of a Proposed Project.

Green Zero Net Carbon Building Advisory Committee consisting of community and professional representatives of Boston’s resident, business, planning, design, engineering, construction, real estate development, property management sectors and appointed by the BPDA Director. The Advisory Committee is purposed to assisting the BPDA and City of Boston in maintaining, updating, and advancing policies and standards related to Zoning green building and zero net carbon practices. The Advisory Committee shall meet annually or as otherwise determined by the BPDA.

Low Embodied Carbon Building is a building or structure that has been designed, engineered, and constructed to minimize and mitigate greenhouse gas Emissions from the extraction, harvesting, fabrication, transportation, installation, maintenance, and disposal of building products and materials, and from other construction-related activities, in accordance with the standards of Article 37-5.4.

Qualified Professional is an individual who holds an active professional license, accreditation, or other qualification in the design and engineering of buildings and systems, sufficient to satisfy at least one of the credentials approved from time to time by the Boston Redevelopment Authority.

Renewable Energy is a form of Energy that is generated by non-CO₂e emitting renewable sources and that meets the RPS Class I eligibility criteria outlined in 225 CMR 14.05, as may be amended from time to time.

Solar Energy System is a Renewable Energy generating system that employs solar photovoltaic or solar thermal technology.

Zero Net Carbon (ZNC) Building is a low carbon-emitting building or structure that has been designed, engineered, and constructed to minimize and mitigate greenhouse gas Emissions

from annual operations to zero kg of Carbon Dioxide Equivalent (CO₂e) / sf-yr in accordance with the standards of Article 37-5.1.

Any term not defined in this document shall have the meaning set forth in Article 37 or in BERDO.

B. ZERO NET CARBON BUILDING REQUIREMENTS: OPERATIONAL EMISSIONS MINIMIZATION MEASURES

In accordance with Section 37-5.2 of the code, any Proposed Project subject to the provisions of Article 37 shall be designed, engineered, and constructed to minimize its Emissions to the maximum extent feasible, in accordance with any standards or guidance issued and modified from time to time by the Boston Redevelopment Authority.

MINIMIZE BUILDING OPERATIONAL CARBON EMISSIONS: Predictive Carbon Emissions Intensity Targets and Calculations

Based on technical studies, current best practices, and technical and financial feasibility considerations the BPDA has established building predictive carbon emissions intensity (pCEI) targets to ensure buildings are planned, designed, engineered and constructed to reduce greenhouse gas emissions from operations. In consultation with the Advisory Committee, pCEI targets will be reviewed on an annual basis and updated as required.

Building pCEI targets are determined by either (1) Predictive Performance Comparative Analysis or (2) Use Specific Best Practice Performance as described below.

Building industry predictive performance modeling applications and the following Greenhouse Gas (GHG) Emission Factors for Common Energy Sources shall be used to calculate building operation carbon dioxide equivalent (CO₂e) emissions for Baseline, Proposed Design, Alternative Low Carbon Design(s), and similar scenarios.

To best reflect initial building performance, use 2035 Grid Electricity GHG Emission Factors for building performance calculations, assessments, and building and design decisions. Use the planned first year of occupancy energy GHG Emission Factors for calculating year one emissions.

Building pCEI is measured in kilograms of carbon dioxide equivalent per conditioned square feet of building area per year (kg CO₂e/sf-yr). Calculation of pCEI may exclude loads from any on-site Emergency Backup Generation/Backup Power and/or Electric Vehicle Supply Equipment, to the extent that such exemptions are currently allowed pursuant to BERDO. Mitigation measures, including renewable energy generation, renewable electricity, RECs, or Alternative Compliance Payments should be calculated and reported separately from the Building pCEI, as described in Section C below.

1) Predictive Performance Comparative Analysis

Proposed Projects should be planned, developed, and managed to attain a 40% carbon emissions reduction compared to modeled performance of the Stretch Code (ASHRAE 90.1-2013 with MA amendments) or LEED baseline (ASHRAE 90.1 version used for LEED credit determination).*

Except:

1. Licensed healthcare facilities that are not medical office buildings, which shall target a 30% carbon emissions reduction target.
2. Residential buildings that the total area of any non-residential program is less than 40,000 GSF and does not exceed 50% of total GSF, which should target a HERS score of 38 or lower.
3. Buildings committed to achieving Passive House certification via PHIUS+ or PHI.

*To reduce predictive modeling efforts, reference standards and corresponding reduction targets will be added and updated to align with current and future applicable codes and standards.

2) Use Specific Best Practice Performance

Proposed Projects should be planned, developed, and managed to attain the Best Practice pCEI for specific building uses. Buildings with multiple uses should calculate a blended pCEI target based on the weighted area average of use.

Table 1 - Building Use Predictive Carbon Emission Intensity (pCEI) Performance Targets

Primary Building Use Type	kg CO2e/sf-yr	Notes
Multifamily (low density)	1.1	Average Occupancy Density \geq 500 SF/Person
Multifamily (high density)	1.6	Average Occupancy Density btw 220 to 500 SF/Person
Residence Hall	1.6	
Hotel	1.9	
K-12 School	1.3	
Office - College or University	1.6	
Office - Commercial	1.8	

Retail & Service	1.6	
Dry Lab	4.3	
Wet Lab	6.4	
Hospital	7.4	Not including medical office uses

Greenhouse Gas Emission Factors for Common Energy Sources^{1,2}

Use the following Energy Emission Factors for calculating building operation CO₂e emissions:

- 2035 Grid Electricity: 392 lbs CO₂e / MWh = 177.8 kg CO₂e / MWh = 52 kg CO₂e / MBtu
- 2030 Grid Electricity: 470 lbs CO₂e / MWh = 213.2 kg CO₂e / MWh = 62 kg CO₂e / MBtu
- 2029 Grid Electricity: 486 lbs CO₂e / MWh = 220.4 kg CO₂e / MWh = 65 kg CO₂e / MBtu
- 2028 Grid Electricity: 501 lbs CO₂e / MWh = 227.2 kg CO₂e / MWh = 67 kg CO₂e / MBtu
- 2027 Grid Electricity: 517 lbs CO₂e / MWh = 234.5 kg CO₂e / MWh = 69 kg CO₂e / MBtu
- 2026 Grid Electricity: 533 lbs CO₂e / MWh = 241.8 kg CO₂e / MWh = 71 kg CO₂e / MBtu
- 2025 Grid Electricity: 548 lbs CO₂e / MWh = 248.6 kg CO₂e / MWh = 73 kg CO₂e / MBtu
- 2024 Grid Electricity: 564 lbs CO₂e / MWh = 255.8 kg CO₂e / MWh = 75 kg CO₂e / MBtu
- 2023 Grid Electricity: 580 lbs CO₂e / MWh = 261.1 kg CO₂e / MWh = 77 kg CO₂e / MBtu
- 2022 Grid Electricity: 595 lbs CO₂e / MWh = 269.9 kg CO₂e / MWh = 79 kg CO₂e / MBtu
- Natural Gas: 117 lbs / MBtu = 53.11 kg CO₂e / MBtu = 5.31 kg CO₂e / therm
- District Steam^{3,4}: 193 lbs / MBtu = 87.5 kg CO₂e / MBtu

Notes:

1. All GHG emission factors will be reviewed on an annual basis and may be amended from time to time by the BRA.
2. The forecasted Grid Electricity emission factors are design standards.
3. As calculated by Massachusetts DOER for determining CO₂e emissions from Vicinity provided District Steam to Mass General Hospital's recent building project
4. Alternative distributed thermal energy system GHG emission factors, with supporting analysis and reporting, may be consider.

Example - Best Practice Building 2035 pCEI (kg CO₂e/sf-yr) Target and Performance Summary

Use Type	Use Area (sf)	Best Practice pCEI Target	Proposed Design pCEI / Energy	Alterative #1 pCEI / Energy
Residential	120,000	1.6 kg	1.1 kg / Elec.	1.1 kg / Elec.
			0.0 kg / Gas	0.0 kg / Gas
Residential Subtotal		1.6 kg	1.1 kg	1.1 kg

Retail	6,000	2.2 kg	2.8 kg / Elec.	3.3 kg / Elec.
			0.9 kg / Gas	0.0 kg / Gas
Retail Subtotal		2.2 kg	4.8 kg	3.3 kg
Whole Building pCEI	126,000	1.62 kg	1.27 kg	1.20 kg
Whole Building Emissions		204,120 kg	160,020 kg	151,800 kg

C. ZERO NET CARBON BUILDING REQUIREMENTS: OPERATIONAL EMISSIONS MITIGATION MEASURES

In accordance with Section 37-5.3 of the code, to the extent that a Proposed Project, through implementation of its selected minimization measures, as projected under Section 37-5.2 of the code and Part B of this document, will be unable to attain the Emissions performance standard set forth in Section 37-5.1 of the Code, the Proposed Project shall incorporate one or more of the following mitigation measures to offset any remaining Emissions, in the order of priority set forth below.

1) Mitigation of electricity use emissions: On-site production of Renewable Energy

To mitigate its Emissions from electricity use only, the Proposed Project shall be planned, developed, and managed to maximize the on-site production of Renewable Energy, in accordance with the following standards for a Solar Energy System or any other standards for Renewable Energy systems adopted and modified from time to time by the Boston Redevelopment Authority.

If a Proposed Project includes a Solar Energy System(s) as a mitigation measure, the minimum area of the Solar Energy System (the "Required Minimum Area") shall be calculated as an area that, cumulatively, equals:

1. 50% of the building roof area(s) that is/are either (a) flat, or (b) if sloped, is/are oriented between 90 degrees and 300 degrees of true north; and
2. 90% of the area of any uncovered parking structure deck(s); and
3. 5% of the paved or hardscaped site area that is not occupied by buildings, structures or water elements.

provided, however, that (i) no specific portion of a building or site needs to be used for Solar Energy Systems, provided that the size of the Solar Energy System(s) equals or exceeds the Minimum Required Area, and (ii) Solar Energy System(s) occupying an area smaller than the

Minimum Required Area is permissible, if the energy produced by such Solar Energy System(s) exceeds 120% of the annual Energy loads of the Proposed Project.

The Minimum Required Area for Solar Energy System(s) may be reduced, in whole or in part, based on an Applicant's demonstration of any of the following conditions:

1. Roof areas with building mechanical and structural systems restrict the siting of Solar Energy System(s).
2. Roof, building, and ground plane areas are shaded for more than 30 percent of daylight hours annually.
3. Ground plane areas with site uses and/or mature trees of environmental or aesthetic value restrict the siting of Solar Energy System(s).
4. Access areas, set back areas and other restrictions imposed by applicable historic preservation, building, fire, or environmental laws, codes, regulations or permits restrict the siting of Solar Energy System(s).
5. Solar Energy System(s) are limited in generation capacity by local electrical grid interconnection standards.

To accommodate unanticipated delays in solar energy equipment supply, and changes in renewable energy incentives, and interconnection standards, the BRA may provide a limited time extension for system installation.

2) Mitigation of electricity use emissions: Renewable Electricity Purchases

If the mitigation of electricity-use Emissions from a Solar Energy System, as described in Part C.2, is not projected to enable the Proposed Project to attain the Emissions performance standard set forth in Section 37-5.1 of the Code, the Proposed Project shall incorporate, as a further measure to mitigate its Emissions from electricity use only, either (a) purchasing renewable electricity, (b) purchasing Renewable Energy Certificates, (c) entering into a Power Purchase Agreement, or (d) any other Compliance Mechanism identified in BERDO or otherwise approved from time to time under no less stringent requirements by the Boston Redevelopment Authority. The Compliance Report shall identify how all such identified mitigation measures shall be implemented and reported.

3) Mitigation of non-electricity use emissions: Alternative Compliance Payments

If the Proposed Project is unable to attain the Emissions performance standard set forth in Section 37-5.1 of the Code, for its non- electricity emissions, then Alternative Compliance Payments shall be used to mitigate any non-electricity-use Emissions. Such payments shall be made pursuant to BERDO or, in the absence of such requirements pursuant to BERDO, pursuant to no less stringent requirements for payments set forth by the Boston Redevelopment Authority.

D. LOW EMBODIED CARBON BUILDING REQUIREMENTS: CONSTRUCTION EMISSIONS MINIMIZATION MEASURES

Any Proposed Project subject to the provisions of Article 37 shall be designed, engineered, and constructed to minimize Emissions from the extraction, harvesting, fabrication, transportation, installation, maintenance and disposal of building products and materials, and from other construction-related activities, in accordance with the following standards and guidance.

Reduce Construction Operation Carbon Emissions

The Compliance Report shall identify best practices for mitigation measures that will be implemented during the construction of the Proposed Project, to reduce construction phase GHG Emissions to the extent feasible, including:

- Temporary Lighting - utilize all LED lighting fixtures and lamps and include lighting controls systems to reduce use.
- Renewable Electricity - procure 100% renewable electricity.
- Use of low and no-carbon emission vehicles and equipment.
- Sequencing of trucks and other construction vehicles to reduce vehicle trips and idling.

Minimize Demolition, Construction and Building Materials Embodied Carbon

Recognizing the emerging status of industry and practice standards, the Compliance Report shall identify additional embodied carbon reduction mitigation measures, with a focus on emerging best practices, with the goal of achieving LEED Materials & Resources prerequisites and credits and further reducing GHG Emissions to the extent feasible. Such measure shall include:

- Construction and Demolition Waste Management;
- Building Refrigerant Management;
- Building Life-Cycle Impact Reduction;
- Building Product Disclosure and Optimization; and
- Low embodied carbon structural designs, materials, and systems.

The Compliance Report shall identify how all such identified mitigation measures shall be implemented and reported.

END