

BERDO POLICIES & PROCEDURES

Air Pollution Control Commission

Adopted September 27, 2023

Version 2.4

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1. INTRODUCTION

This document includes policies of the Air Pollution Control Commission related to the Building Emissions Reduction and Disclosure Ordinance (BERDO). These policies may be updated by the Air Pollution Control Commission. All policies are to be considered in conjunction with the [BERDO ordinance language](#) and with all adopted Regulations.

2. DEFAULT ENERGY USE VALUES

Pursuant to BERDO Regulations Section 1.04(e), if no Energy use is known for a floor area, the appropriate energy use per square foot per month shall be multiplied by the floor area of that Building Use for which Energy use is unknown. If Energy use is known for one or more fuel types for a floor area, but is missing for others, report the actual Energy use for the known fuel types, and also report the net of the default values minus the actual Energy use.

Building Use	Total Energy Use (kBtu/sq ft/month)	2021 Emissions Factors (kgCO ₂ e/MMBtu)
Assembly	13.7	68.3
College/University	17.0	67.1
Education	9.3	59.8
Food Sales & Service	34.0	71.7
Healthcare	32.4	69.8
Lodging	11.8	66.6
Manufacturing/Industrial	53.7	54.9
Multifamily housing	8.0	63.9
Office	9.4	75.0
Retail	6.9	72.6
Services	14.9	65.8
Storage	3.9	70.2
Technology/Science	33.5	69.6

Default values are based on 2018 BERDO data. They represent total annual Energy use (kBtu) by each Building Use type, divided by the square footage of buildings of that Building Use type, divided by 12 to obtain the monthly value, and multiplied by 150%. Since the total annual Energy use is the sum of multiple fuel types, each Building Use type has a blended emissions factor that represents the mix of fuels for that Building Use, applying the

emissions factors used in the Technical Methods Overview. Blended emissions factors by Building Use type will be updated annually.

3. THIRD-PARTY VERIFICATION

- A. The third-party verifier of a Building cannot be the same person who completes reporting for that Building.
- B. The following credentials are approved as Qualified Energy Professional Credentials. All third-party verifiers must have at least one active credential from this list.

Profession	Credential	Organization
Architect	Licensed Architect	National Council of Architectural Registration Boards (NCARB)
Architect	Registered Architect (RA)	American Institute of Architects (AIA)
Building Operator	Building Operator Certification (BOC) Level 2	Northwest Energy Efficiency Council
Building Operator	BREEAM USA In-Use Assessor	BREEAM USA
Certified Passive House Consultant	Certified Passive House Consultant (CPHC) Training	Passive House Institute US (PHIUS)
Commissioning Professional	Commissioning Process Management Professional Certification (CPMP)	American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
Commissioning Professional	Certified Commissioning Professional (CCP)	Building Commissioning Association (BCA)
Commissioning Professional	Associate Commissioning Professional (ACP)	Building Commissioning Association (BCA)
Commissioning Professional	Certified Building Commissioning Professional (CBCP)	Association of Energy Engineers (AEE)

Profession	Credential	Organization
Commissioning Professional	Existing Building Commissioning Professional (EBCP)	Association of Energy Engineers (AEE)
Commissioning Professional	Certified Commissioning Authority (CxA)	AABC Commissioning Group (ACG)
Commissioning Professional	Qualified Commissioning Process Provider (QCxP)	UW-Madison
Commissioning Professional	Phius Certified Verifier	Passive House Institute US (PHIUS)
Energy Auditor	Building Energy Assessment Professional (BEAP)	American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
Energy Auditor	Certified Energy Auditor (CEA)	Association of Energy Engineers (AEE)
Energy Auditor	Building Energy Modeling Professional (BEMP)	American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
Energy Auditor	RPA/FMA High Performance Designation (RPA/FMA-HP)	BOMI International
Energy Auditor	Certified Measurement and Verification Professional (CMVP)	Association of Energy Engineers (AEE)
Energy Auditor	LEED Advanced Professional (AP) Building Operations & Maintenance	U.S. Green Building Council (USGBC)
Energy Auditor	SEP Performance Verifier	Association of Energy Engineers (AEE)
Energy Manager	Operations and Performance Management Professional (OPMP)	American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
Energy Manager	Certified Energy Manager (CEM)	Association of Energy Engineers (AEE)

Profession	Credential	Organization
Energy Manager	Energy Management Professional (EMP)	Energy Management Association (EMA)
Energy Manager	50001 Certified Practitioner in Energy Management Systems	Association of Energy Engineers (AEE)
Energy Modeler	Phius Certified Consultant	Passive House Institute US (PHIUS)
Engineer	Professional Engineer (PE)	National Society of Professional Engineers (NSPE)
Greenhouse gas verification professional	Greenhouse Gas Validation/Verification according to ISO 14065 standard.	ANSI National Accreditation Board (ANAB)

- C. Pursuant to the Regulations Section 1.08(a), the Review Board may approve additional credentials for designation as qualified energy professionals.

4. SPECIAL CONDITIONS

- A. The Environment Department may determine a building is vacant and therefore not subject to third-party verification. A vacant building shall be demonstrated by one or more of the following: demolition permits, insurance policies, no active water or gas utilities, transfer of all utilities to a construction company with an active construction permit, or if energy use is less than 5% of previously reported annual BERDO data. Owners must submit documentation in writing to the Environment Department. The Environment Department may ask for additional documentation and will issue a determination in writing to the Owner. An Owner may appeal the Environment Department's decision to the Commission in writing.
- B. Buildings with active demolition permits in 2021 or 2022, as demonstrated by an Article 85 approval from the Boston Landmarks Commission and a demolition permit from Inspectional Services, do not need to complete third-party data verification of their 2021 data.

5. EMISSIONS FACTORS

- A. Emissions factor methodologies will be reviewed at least every five years by the Commission.
- B. Electric Grid Emissions Factors
 - a. The Environment Department shall calculate an annual average electric grid emissions factor based on methodologies established by ISO New England.
 - i. Factors that the Environment Department shall consider include, but need not be limited to:
 - 1. Emissions Factors for electricity imported into and exported out of the ISO New England grid.
 - 2. Corrections to the allocation of emissions from District Energy Systems that send electricity to the ISO New England grid and thermal products to Boston buildings, to avoid duplication of emissions within BERDO Emissions Factors accounting.
 - b. The Environment Department shall publish projected electric grid Emissions Factors through 2050. Initial projections are included in Appendix A. These initial projections will be reviewed by the Commission before the 2030

compliance period and may be updated by the Commission based on available data and projections. Projected emissions factors will be reviewed by the Commission at least every five years thereafter and may be updated at the discretion of the Commission.

- i. Any new projections shall be published at least two years prior to use.
- ii. Projections shall be based on ISO-New England, NEPOOL, and federal datasets, state decarbonization and electricity generation policies, and other factors determined relevant by the Environment Department.

C. Boston Municipal Electricity Aggregation Program

- a. The Environment Department shall identify which Buildings include accounts that are enrolled in the municipal electricity aggregation program and shall provide each Owner with annual aggregated electricity usage and the associated RECs for each product available through the program.
- b. Owners are obligated to report the Building's total annual electricity usage regardless of whether any accounts are enrolled in the municipal aggregation program.

D. District Energy Systems

- a. District Energy System operators shall use the following methodology to calculate annual Emissions Factors for District Energy Systems:
 - i. Calculate the total direct greenhouse gas emissions for all fuels consumed using Emissions Factors defined in Regulations and Policy.
 - ii. Calculate the energy content of each output stream for the district energy system. Include each output stream of thermal energy (e.g., water/steam at various temperatures and pressures) and electricity. Convert all outputs to consistent units, such as MMBtu and calculate the energy content (enthalpy) of each output stream.
 - iii. Identify the efficiencies of production of each output stream from the district energy system.
 - iv. Allocate the total emissions to each output stream. Use the following formula:

$$E_i = \frac{Q_i/e_i}{\sum_{i=1}^n Q_i/e_i} \times E_T$$

Where:

E_i = emissions allocated to output stream i

Q_i = energy content of output stream i

e_i = efficiency of the production of output stream i

E_T = total emissions of the district energy system

n = number of output streams

- v. Calculate Emission Factors for each output stream. Divide the total emissions from each output stream by the total quantity of that output stream.
 - vi. Guidance documents may provide additional instructions for reporting and verification necessary for compliance.
- b. District Energy System annual Emissions Factors must be verified by a third-party prior to submission to the Environment Department.
- i. Third-party verification must include a review of the data, calculations and final Emissions Factors. Verifiers must provide a signed affidavit affirming the accuracy of the data and emissions factors.
 - ii. District Energy Emission Factor verifiers shall include entities with expertise on district energy system operations and electricity emissions accounting. District Energy System operators shall submit preferred verifiers and their relevant experience to the Environment Department for approval prior to completing third-party verification and no later than March 1st. The Environment Department may request additional information on a verifier's qualifications.
- c. Records documenting the Emissions Factor calculations shall be provided to the Environment Department, including documentation of system configuration, annual system fuel use, emissions for all fuels consumed, plant-specific efficiencies, total energy content of each output stream, total emissions and emissions factors for each product.
- d. Where possible, District Energy System operators are encouraged to provide interim estimated Emissions Factors to customers and the Environment Department periodically for planning purposes.

E. Time-of-Use Electricity Emissions Factors

- a. Owners or system operators that opt-in to a time-of-use (TOU) Emissions Factor shall:

- i. Notify the Environment Department of the intent to use a TOU Emissions Factor and provide the contact information of the entity providing independent, third-party verification of the TOU data.
 - ii. Provide hourly (8,760) or better metered data to the designated third-party verifier and the Environment Department and maintain a record pursuant to Section XI in the Regulations.
 - iii. The verifier shall review and quantify electricity-based emissions and interval electricity consumption data. After matching each interval with grid intensity, the verifier shall calculate one custom CO₂e electric emissions factor. All verified records shall be preserved pursuant to Section XI in the Regulations.
 - iv. The Owner shall submit the verified total annual electricity consumption, total electricity emissions, the site-specific average annual electricity emissions, and any accompanying documentation to the Environment Department.
 - v. Guidance documents may provide additional instructions for reporting and verification necessary for compliance.
- b. TOU accounting can include behind-the-meter battery storage and solar generation as long as appropriate interval data is documented and verified.
- c. TOU reporting verifiers shall include entities with demand management, automated emissions reduction, electricity emissions accounting, or other related service as a primary area of service.

6. CALCULATING BUILDING EMISSIONS

- A. Emissions from fuel or electricity consumption shall be calculated by multiplying the total amount of each fuel used by the Emissions Factor for each fuel or electricity type.
- B. The total Emissions per square foot shall be calculated by adding all emissions from all fuel and electricity consumption and then dividing this amount by the gross square footage of the Building or the corresponding primary use(s), as defined in the Blended Emissions Standard. This number shall be used to determine compliance with the appropriate Emissions Standard.

7. BLENDED EMISSIONS STANDARDS

- A. Building Owners shall use the following equation to calculate a blended emissions standard:

$$BES = \frac{\sum_{i=1}^m (SF_i \times ES_i) + (SF_{np} \times ES_1)}{\sum_{i=1}^m (SF_i) + SF_{np}}$$
$$= \frac{(SF_1 \times ES_1) + (SF_2 \times ES_2) + \dots + (SF_m \times ES_m) + (SF_{np} \times ES_1)}{SF_1 + SF_2 + \dots + SF_m + SF_{np}}$$

Where BES = blended CO2 Emissions standard, measured in kgCO2e/SF/yr
SF = square footage of a primary use
ES = emissions standard of a primary use, as defined by the Ordinance
SF₁ = square footage of the largest primary use
ES₁ = emissions standard of the largest primary use
SF_{np} = total square footage of all non-primary uses

- B. For the purposes of calculating a building's blended emissions standard, the square footage of all non-primary uses shall be aggregated and added to the square footage of the largest primary use.
- C. The sum of the gross square footages allocated to each primary use shall be equal to the total Gross Floor Area of the Building.
- D. Blended emissions standards shall be third-party verified. The Third-party verified blended emissions standards shall be used for compliance until the following Verification Year unless there are changes in primary use(s).
- E. If a building changes a primary use between verification years, a revised, third-party verified blended emissions standard shall be submitted.
- F. If errors are identified, a revised standard may be submitted. A variation in area of primary use(s) of 2% or less shall not be considered an error, so long as the sum of areas of primary uses equals the total gross floor area of the Building.
- G. Valid documentation to verify the primary use(s) include the Gross Floor Area listed in City of Boston Assessing Department records or Building documentation such as blueprints, architectural plans, or capital needs assessments.

8. ADDITIONAL COMPLIANCE MECHANISMS

A. Local Renewable Energy

- a. In the event that an interconnection request for an on-site renewable energy system was filed in a timely manner but significantly delayed due to no fault of the Owner or anyone working for the Owner, the Owner may appeal to the Review Board to use estimated renewable energy generation for compliance. Owners must provide proof of system installation and extended delay, and verification of the estimated renewable energy generation. The Review Board shall have discretion to approve or deny such a request, provided that approval for a particular compliance period shall not guarantee approval for future compliance periods.

9. BUILDING PORTFOLIOS

A. Applications

- a. Owners applying for Building Portfolios including (a) on-site Campus District Energy Systems that use non-renewable or CO₂e emitting fuels, on-site Combined Heat and Power plants, industrial or manufacturing Buildings, or energy/power station Buildings located in Environmental Justice Populations, (b) a combination of Residential Buildings located in both Environmental Justice Populations and non Environmental Justice Populations, or (c) a combination of Deed-Restricted Residential Buildings and other Residential Buildings shall use the following data sources and tools to prepare the map required in Section XX.c.ii.a.3:
 - i. For Environmental Justice Population criteria, Owners shall use the most recently updated Environmental Justice Populations Map created by the Massachusetts Executive Office of Energy and Environmental Affairs.
 - ii. For the overlay of asthma rates, Owners shall use the metric “asthma among adults aged 18 or older” included in the most recently updated

Environmental Justice Screening and Mapping Tool created by the U.S. Environmental Protection Agency.

- iii. For the overlay of the Air Toxics Respiratory Hazard Index, Owners shall use the metric “Air Toxics Respiratory HI” included in the most recently updated Environmental Justice Screening and Mapping Tool created by the U.S. Environmental Protection Agency.
- iv. For the overlay of heat resilience metrics, Owners shall use the metric “Urban Heat Island Intensity (UHII) Index” included in the most recently updated Climate Ready Boston Map Explorer created by the City of Boston

The Environment Department may update these data sources via guidance. The Environment Department shall provide either (i) a mapping tool for Owners to utilize or (ii) instructions for preparing standard maps.

B. Emissions Standard Compliance Plans and Progress Reports

- a. Any (i) initial Emissions standard compliance plan or (ii) updated Emissions standard compliance plan submitted in a Verification Year, shall include, at minimum, the following:
 - i. An update of the map submitted with the Building Portfolio application as required by Section XX.c.ii.
 - ii. A narrative description of plans to prioritize distribution of benefits associated with BERDO compliance in Buildings in the Building Portfolio that are located in Environmental Justice Populations and affordable housing. Examples of benefits may include, but need not be limited to, any of the following:
 - 1. For Buildings with residential dwelling units, affordability, including as it relates to rents, energy bills and energy burdens.
 - 2. Improvements to quality of life and public health, such as indoor air quality (e.g., replacement of gas stoves), and thermal comfort (e.g., improved insulation).

3. Climate resilience, such as access to cooling, reliable access to affordable energy, and backup systems in case of climate shocks.
 4. Investments in a Building Portfolio in emission reduction strategies, such as energy efficiency and renewable energy projects.
- iii. A narrative description of any planned Emissions standard compliance efforts that are expected to be implemented across the Building Portfolio over the next two compliance cycles. This may include, but need not be limited to, narrative discussions of the following:
1. Timeline and type of expected Emissions reduction measures and compliance mechanisms to be implemented across the Building Portfolio. Examples of measures may include, but are not limited to:
 - a. Any plans regarding the maintenance, upgrade, or replacement of existing heating and cooling systems, windows, stoves and other fossil fueled appliances, fossil fueled machinery, and industrial equipment.
 - b. Plans to incorporate energy efficiency or decarbonization measures into regular operational and maintenance procedures, *e.g.*, insulating pipes when they are exposed due to repair or maintenance work.
 - c. Any plans to perform energy audits in Buildings, including through the Mass Save Energy Audit program or other third-party program.
 2. Where applicable and feasible, a narrative description of any expected strategies to reduce emissions from on-site Campus District Energy Systems that use non-renewable or CO₂e emitting fuels, Combined Heat and Power plants, industrial or manufacturing Buildings, and energy/power station Buildings.

3. The types of heating systems, cooling systems, stoves, ventilation, and any air quality monitoring and filtration systems that are currently in operation for each Building.
- b. Any update to an Emissions standard compliance plan submitted in connection with a modification to a Building Portfolio shall include (i) a list of the Buildings added or removed from the Building Portfolio that identifies which, if any, Buildings are located in an Environmental Justice Population or are Deed-Restricted Residential Buildings and (ii) the compliance status of each Building added or removed from the Building Portfolio.
- c. By July 15 of each year, Building Owners shall submit annual progress reports that include a narrative description of any progress or delays towards achieving the measures described in the Emissions standard compliance plan, including any changes in compliance strategies for the Building Portfolio. If relevant, Building Owners shall include information on any efforts that have been delayed or stopped due to extenuating circumstances beyond their control. Building Owners are encouraged to submit, and the Review Board may request, documentation to support the narrative.
- c. The Review Board may request more information or hold a hearing to evaluate a Building Portfolio's (i) initial Emissions standard compliance plan, (ii) updated Emissions standard compliance plans submitted in a Verification Year, or (iii) annual progress reports. Any hearing shall be scheduled within sixty (60) Days of the Environment Department's receipt of an initial or updated Emissions standard compliance plan and within thirty (30) Days of the Environment Department's receipt of an annual progress report.

C. Amendments to Special Conditions and Revocation of Approved Building Portfolios

- a. Grounds for revoking or amending an approved Building Portfolio include a finding by the the Review Board that, absent extenuating circumstances beyond an Owner's control, an Owner has not prioritized distribution of benefits associated with BERDO compliance to Buildings in the Building Portfolio that are in Environmental Justice Populations and affordable housing as proposed in the Building Portfolio's Emissions standard compliance plan. Indicators of a failure to prioritize distribution of benefits associated with BERDO compliance may include, but are not limited to, disproportionate allocation across multiple compliance schedules of

benefits, investments in BERDO compliance and/or improvements to (i) Buildings located outside of Environmental Justice Populations, (ii) Buildings in areas with lower rates of asthma, Air Toxics Respiratory Hazard exposure, or urban heat island intensity, or (iii) Residential Buildings that are not affordable housing.

10. INDIVIDUAL COMPLIANCE SCHEDULES

A. Data sources for baseline year

- a. Building Owners may use a baseline from any year starting in 2005 to 2021, provided that the Owner provides documentation of the Building or Building Portfolio data required by the Ordinance. The following data may be used for the baseline year of an Individual Compliance Schedule:
 - i. Energy use
 - 1. Owners may use (a) historical utility data or utility bills, (b) public reports meeting a third-party standard or accreditation, including internally produced sustainability reports, and (c) any other records proposed by the Owner and deemed acceptable by the Review Board.
 - ii. Emissions Factors
 - 1. Emissions Factors for the electric grid shall correspond to the historical Emissions Factors published by ISO New England. If available, Owners shall use Emissions Factors including net imports to the ISO New England grid.
 - 2. District Energy System operators may provide historical Emissions Factors for their systems and shall have the respective data, calculations, and Emissions Factors verified by a third party following any requirements included in policies and procedures. If a District Energy System operator fails to provide third-party verified historical Emissions Factor, the

Owner shall use the relevant Emissions Factors reported by ENERGY STAR Portfolio Manager.

3. Owners of Campus District Energy Systems may calculate historical Emissions Factors for their systems by (a) following the Emissions Factors requirements for District Energy Systems as outlined in Section VIII.a.iii; or (b) applying the appropriate Emissions Factors to their central plant's fuel inputs and apportion the emissions across their connected buildings following Section VI.a of the Regulations. Owners may also choose to use the relevant Emissions Factors reported by ENERGY STAR Portfolio Manager.
4. Owners may propose alternative Emissions Factors to the Review Board. The Review Board shall have the discretion to accept or deny alternative Emissions Factors.

ii. Gross Floor Area

1. Owners may use the records of the Boston Assessing Departments or calculate the historical Gross Floor Area pursuant to Section IV.b. and any existing guidance by the Environment Department.

The Environment Department may update these data sources via guidance.

B. Individual Compliance Schedules for Building Portfolios with Multiple Baseline Years

- a. The Environment Department will provide model calculations explaining how to create an Individual Compliance Schedule for Building Portfolios with multiple baseline years.

11. HARDSHIP COMPLIANCE PLANS [RESERVED]

12. REVIEW BOARD POLICIES

A. COMPENSATION OF REVIEW BOARD MEMBERS

- a. Review Board members who are eligible for and request compensation shall receive a stipend of \$200 per day of service, up to a maximum of \$4,800 per year. Compensation rates may be updated from time to time by the Commission.
- b. Staff and volunteers of nominating Community-Based Organizations who are appointed as Review Board members shall be eligible for compensation.

B. DESIGNATION OF COMMUNITY-BASED ORGANIZATIONS

- a. Section XIII.a.i.a. of the Regulations states that, “the requirement in Section 7-2.2(b) that the majority of the governing body and staff in Community-Based Organizations be “local residents” means residents of the Greater Boston area.” “Greater Boston area” shall be defined as the municipalities in the Metropolitan Area Planning Council’s Inner Core Committee subregion.
 - i. The definition of Greater Boston may be reevaluated by the Commission prior to each application period for Community-Based Organizations and may be revised as needed.
 - ii. All other references to residents in the definition of Community-Based Organization in the Ordinance shall mean residents of the City of Boston.
- b. Applications to qualify as a nominating Community-Based Organization shall request evidence on how the applicant meets the requirements defined by Section 7-2.2(b), including:
 - i. What not-for-profit status does the organization have?
 - ii. Where do members of the governing body and staff live?
 - iii. Where are the operating offices located?
 - iv. How are priority issues for action and/or advocacy defined and developed?
 - v. How are Boston residents involved in leadership?
 - vi. How are Boston residents involved in program design, implementation, and/or evaluation?
 - vii. How long has the organization been active in Boston?

C. SELECTION OF REVIEW BOARD MEMBERS

- a. The nomination form for Review Board members shall request evidence on how the nominee meets the requirements defined in the Ordinance and Regulations, including:
 - i. Self-attestation of Boston residency

- ii. Self-attestation of expertise(s) represented
 - iii. Resume
 - iv. Personal statement
 - v. If the nominee is nominated by a nominating Community-Based Organization, the CBO shall provide a statement of support for the nominee. Additional letter(s) of support detailing how the nominee represents said expertise(s) may be submitted for all nominees.
- b. Preference will be given to nominees that:
 - i. Demonstrate more than one of the required expertise.
 - ii. Demonstrate expertise in areas not represented by active Review Board members.
 - iii. Bring diversity, including experience, expertise, geography, and background, to the Review Board.

D. WORKING GROUPS

- a. Within 90 days of being seated, the Review Board shall convene (i) a working group focused on healthcare institutions connected to district energy systems and (ii) a working group focused on commercial real estate.
- b. Individuals with appropriate expertise should be invited to participate in working groups. Boston residency is not a requirement to participate in working groups.
- c. Working group meetings shall be open to the public.
- d. Working groups shall provide updates to the Review Board and Environment Department periodically.

APPENDIX A - PROJECTED GRID EMISSIONS FACTORS

Year	Projected Grid Emissions Factor (lb/MWh)
2022	595
2023	580
2024	564
2025	548
2026	533
2027	517
2028	501
2029	486
2030	470
2031	454
2032	439
2033	423
2034	407
2035	392
2036	376
2037	360
2038	345
2039	329

Year	Projected Grid Emissions Factor (lb/MWh)
2040	313
2041	298
2042	282
2043	266
2044	251
2045	235
2046	219
2047	204
2048	188
2049	172
2050	157

Source: These projected emissions factors were prepared by Synapse as part of the development process of the BERDO Emissions Standards. See complete report [here](#).