

April 12th, 2021

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# ZNC - Low Carbon Building TAG Meeting #4

Boston Planning & Development Agency



**Thornton Tomasetti**

# Zoom Meeting Guidance

**The BPDA will record this meeting** and post it on BPDA's Zero Net Carbon Building Zoning webpage. The recording will include the presentations, discussions and a transcript of Q&A / Chat comments.

It is possible that participants may be recording this meeting as well.

**If you prefer not to be recorded during the meeting, please turn off your microphone and camera.**

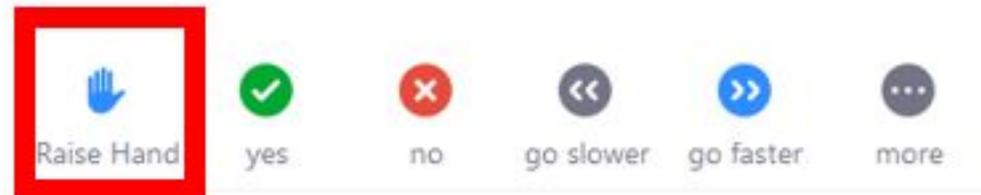
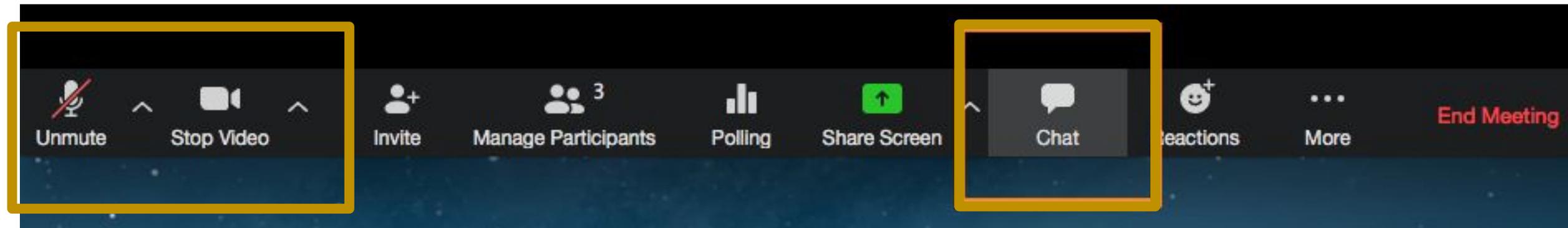
# Zoom Meeting Guidance

- Help us ensure that this conversation is a pleasant experience for all.
  - Please mute your mics during the presentation to avoid background noise.
  - It's great to see you! Participant video can be on during the meeting.
  - **Use the Chat** feature for questions and comments during the presentation.
  - Use the Raise Hand feature during the discussion segment.
  - Please be respectful of each other's time.
- 
- As always please feel free to reach out to me directly!  
John Dalzell, AIA, LEED Fellow at [John.Dalzell@Boston.gov](mailto:John.Dalzell@Boston.gov)

# Zoom Tips

Your controls should be available at the bottom of the screen.

Clicking on these symbols activates different features:



# COVID-19 Resources

Stay up-to-date with COVID-19 related announcements, City of Boston reopening plans, and resources for you and your community at:

[boston.gov/coronavirus](https://boston.gov/coronavirus)



The screenshot shows the City of Boston website page for COVID-19 resources. The header includes the City of Boston logo, Mayor Martin J. Walsh's name, and navigation links for 'PAY AND APPLY' and 'PUBLIC NOTICES'. The main heading is 'CORONAVIRUS DISEASE (COVID-19) IN BOSTON'. Below the heading, a paragraph states: 'The state has updated guidance on the Reopening Massachusetts website. We also continue to update City-specific guidance for Boston on our reopening website.' The date 'July 12, 2020' is displayed. A 'PUBLISHED BY: PUBLIC HEALTH COMMISSION' logo is shown. A 'MULTILINGUAL CONTENT' section lists various languages: العربية (Arabic), Kriolu (Cabo Verdean creole), 中文 (Chinese), Français (French), Kreyòl ayisyen (Haitian Creole), Português (Portuguese), and Русский (Russian). A navigation bar includes 'TOPICS', 'COVID-19 UPDATES', and 'LATEST PRESS CONFERENCE'. Below this, it says 'BOSTON (AS OF FRIDAY, JULY 10)' and displays '13,673 CASES | 9,683 RECOVERED'.

# AGENDA

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1. Introductions (5 min)
2. Process (5 min)
3. Progress Summary (5 min)
4. Recommended Pathway (10 min)
5. Recommended LEED Requirements (5 min)
6. Other Recommendations (5 min)
7. Discussion (50 min)

# AGENDA

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1. Introductions
2. Process
3. Progress Summary
4. Recommended Pathway
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# INTRODUCTIONS

## CONSULTING AND CITY TEAM

Alejandra Menchaca, Ph.D., LEED AP, WELL AP  
Vice President, Thornton Tomasetti

Colin Schless, CPHC, LEED AP BD+C  
Vice President, Thornton Tomasetti

Jacob Knowles  
Associate Principal, BR+A Consulting Engineers

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Debra Perry  
Senior Associate, Cadmus Group

John Dalzell, AIA, LEED Fellow  
Sr. Architect Sustainable Development, BPDA

Richard McGuinness  
Deputy Director, BPDA

Chris Busch, AICP  
Assist Deputy Director, BPDA

Kathleen Pedersen  
Sr. Land Use Planner / Sustainability Specialist, BPDA

Alison Brizius  
Director of Climate and Environmental Planning  
City of Boston

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# ZNC BUILDING ZONING UPDATE

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**Boston Carbon Neutral 2050 – Climate Action Plan**

***“Strengthen Article 37 Green Building Zoning requirements to a zero net carbon standard”***

**Policy Framework**

*Zero = Bldg Emissions – On-site and Procured Renewable Energy*

**Low Carbon Buildings (this TAG)**

Establish Emission Targets and Pathways

**On-site Renewable Energy**

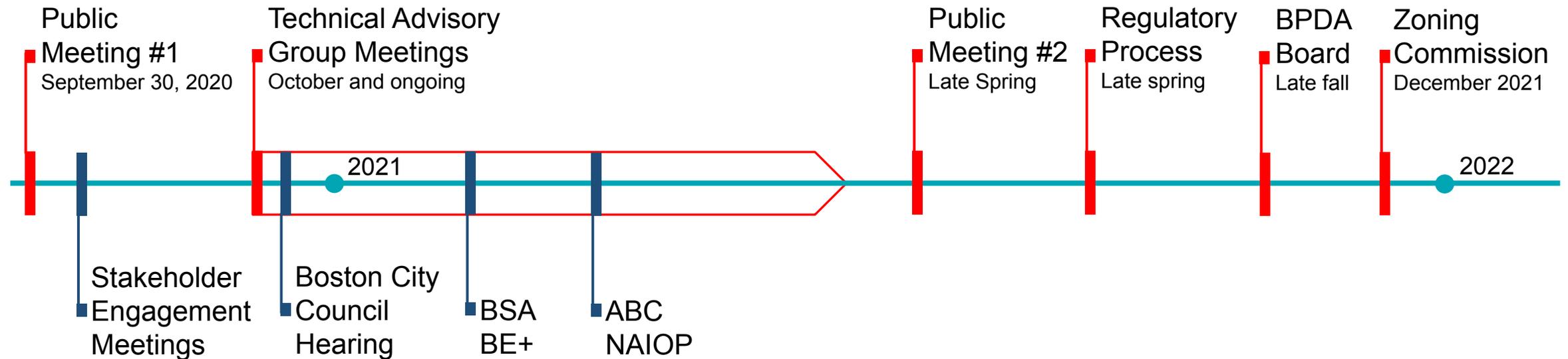
On-site Energy Generation Standard

**Renewable Energy Procurement**

Determine Options & Reporting

# ZNC Building Zoning

## PUBLIC PROCESS TIMELINE



- Open House and Office Hours events - *to be schedule*
- Organizational Meetings – *as requested*

# TAG GOALS

## Low Carbon Building TAG

Establish Emission Targets and Pathways:

- Establishing means for prioritizing low carbon building performance
- Identify pathways for small (20,000sf+) and large buildings and all use typologies
- Reward innovation and high performance

## Key Considerations

- Focus on carbon and emissions reduction – Carbon Emission Intensity (CEI)
- Align with industry best practices, utility incentives, and market drivers
- Compliance process efficiency (leverage familiar third-party frameworks)
- Compatible with upcoming BERDO v2 emissions performance standards

# PROCESS

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## TAG Meetings

- **Meeting 1** - Framework and Pathways
- **Meeting 2** - Emissions Targets
- **Meeting 3** - Compliance Pathways and Thresholds
- **Meeting 4** - Finalizing Recommendations (**Today**)

## Today's Meeting Outcomes:

- Review final recommendations for any final comments / discussion

# PROCESS

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## TAGs and Additional Policy Development

### Cross TAG and General Policies

- Compliance Threshold - Reduce to include Small Project Review (Buildings > 20k sf)
- LEED Outcome - Increase to Gold or Platinum (presently Certified level)
- LEED Credits - Identify specific ZNC supportive credit requirements
- Carbon Neutral - Add ZNC framework
- Embodied Carbon - Investigate potential strategies
- Compliance - Update project submission and review procedures

### Regulatory Process

Reflecting the final recommendations and guidance of the ZNC Building Zoning process the City / BPDA will develop specific zoning standards that will be shared and made available for public response and feedback prior to proposing to BPDA Board and the Boston Zoning Commission.

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# TAG Meeting #3 RECAP

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- Proposed Path
  1. Percent Carbon Reduction + Carbon Performance Targets
  2. Incentives for exceptional third party performance certification
  3. LEED Certification and Credit requirements
- Meeting discussion and feedback, and survey responses gathered

# FEEDBACK FROM TAG Meeting 3

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## 1. Percent Carbon Reduction

- 90.1-2013 requirement - does it add one more baseline?
- 90.1-2016 baseline would change % savings for labs

## 2. CEI target

- Consider aligning with Tier 1 of MAss Save program
- Carbon emissions - look at MA values instead of ISO-NE
- Consider more leniency for Hotel target, not same occupancy profile as residences
- Schools funding mechanisms for charter schools may make achieving the EUI of 25

## 3. Exceptional Performance

- Consider ILFI Zero Carbon
- Consider rewarding with expediency through the review process or more buildable space
- Reward E+ (energy positive) and 100% on-site generation

## 4. LEED

- Consider maxing out Regional Priority credits

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# RECOMMENDED PATHWAY - LOW CARBON BUILDINGS

- A. Percent Carbon Reduction
- B. CEI Target
- C. Rewarding Innovation / Exceptional Performance
- D. Modeler Accreditation
- E. Required Reporting

# A. PERCENT CARBON REDUCTION

## Requirement

All building typologies must meet a minimum 40% carbon emissions reduction compared to ASHRAE 90.1-2013 baseline\*.

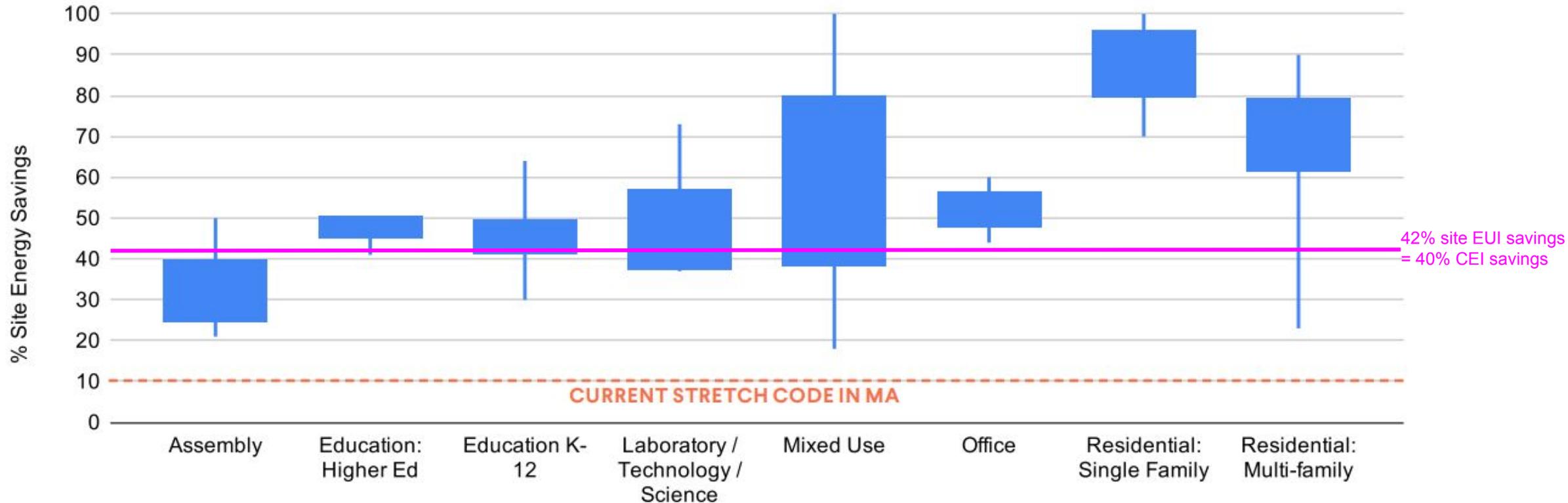
Allowable Alternative:

1. Residential buildings that meet the below requirements:
  - Building does not trigger stretch code AND the total area of non-residential program does not exceed any of the following:
    - 50% of total GSF
    - 40,000 GSF
  - These buildings must:
    - Model HERS Index Score of < 38.
    - Provide use-specific CEI data for non-residential areas.
2. Buildings committed to achieving Passive House certification via PHIUS+ or PHI (WUFI Passive model must be provided as documentation)

\* Project teams may opt to use either the ASHRAE 90.1-2013 baseline they are using for LEED, or the Massachusetts stretch code baseline (ASHRAE 90.1-2013 with MA amendments, including additional efficiency packages). --**FOR DISCUSSION**

# A. PERCENT CARBON REDUCTION

## Benchmarking



Source: Built Environment Plus - Massachusetts is Ready for Net Zero 2021 report, **ADD SAMPLE SIZE**

# A. PERCENT CARBON REDUCTION

## Requirement

Projects must meet a 40% carbon emissions reduction compared to ASHRAE 90.1-2013 baseline\* for all building typologies.

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  - These buildings must:
    - Modeled HERS Index Score < 38 (*benchmarking still being finalized*)
    - Provide use-specific CEI data for non-residential areas.
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# B. CEI TARGETS

Select building typologies must aim to not exceed a CEI performance target, following the below table:

Building Typology	CEI Targets [kg CO <sub>2</sub> e/sf] Recommended	All electric site EUI [kBtu/sf-yr] (for reference only)
Office	1.6	30
College / University Office	1.6	30
K-12 School	1.3	25
Hotel	1.9	35
Residence Hall	1.6	30
Low Density Multifamily	1.1	20
High Density Multifamily	1.6	30
Dry Lab	4.3	80
Wet Lab	6.4	120
Hospital	7.4	139

- Targets are calculated using predicted 2035 carbon emission factors for electricity published by ISO-NE, and current carbon emission factors as published by BERDO.
- Projects that are composed of more than one listed building typology should use a target based on area-weighted average.\*
- Projects with unique conditions (e.g. schedules, loads, etc.) meeting the 40% carbon emissions reduction but not meeting the CEI target should have an opportunity to make a case for an adjusted value.

\*The CEI performance targets assume some degree of mixed program. For example, lab buildings typically include both lab and office; in this case, an area-weighted average is not necessary. But, if a large portion of the building is dedicated to a second program type, such as a dedicated office tower above a lab/office podium, a weighted average of the office tower and lab podium should be calculated to define the CEI limit.

# B. CEI TARGETS

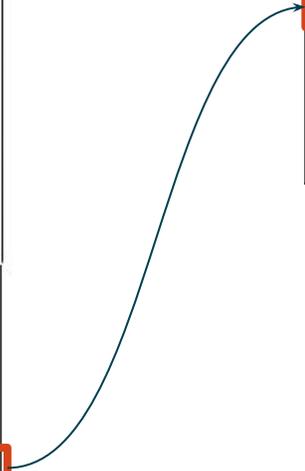
## Carbon Emission Factors

BERDO TABLES - as of November 12

Emissions factors by fuel type	Source	CO2eq emissions (kg/MMBtu)
Natural Gas	ESPM	53.11
Fuel Oil (No. 1)	ESPM	73.5
Fuel Oil (No. 2)	ESPM	74.21
Fuel Oil (No. 4)	ESPM	75.29
Diesel Oil	ESPM	74.21
Fuel Oil, average	Calculated	74.30
District Steam	ESPM	66.4
District Hot Water	ESPM	66.4
<b>District Chilled Water</b>		
Electric Driven Chiller	ESPM	52.7
Absorption Chiller using Natural Gas	ESPM	73.89
Engine-Driven Chiller Natural Gas	ESPM	49.31
System electricity	ISO-NE	87.5
Avoided electricity (for on-site renewable)	ISO-NE	129.1

Projected ISO-NE Emission Factors

Year	CO2 Emissions (lb/MWh)	CO2 Emissions (kg/MMBtu)
2018	658	87.5
...		
2035	392	52.1
...		
2050	157	20.8



# C. Rewarding Innovation / Exceptional Performance

Projects pursuing **outstanding performance in low carbon building design (e.g., extraordinary levels of third party certification or industry-leading innovation)** may be eligible for regulatory incentives (e.g., expedited review). These projects should have maximized on-site renewable energy generation.

- **For instance:**
  - Energy positive buildings (100%+ on-site renewables), including E+ Green Building Program
  - Passive House
  - Living Building Certification
  - ILFI Zero Energy (100% on-site, no combustion)
  
- **Examples that are not sufficient to comply:**
  - ILFI Zero Carbon\*
  - LEED Zero Energy\*
  - LEED Zero Carbon\*

\* Programs that require projects to meet ZNE through on- or off-site renewables. This is equivalent to the ZNC requirement by the zoning policy and doesn't make these buildings "exceptional" in terms of performance.

# D. Modeler Accreditation

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Model results / report must be signed off by a PE, Certified Energy Modeler, Certified Energy Manager, or BEMP.

# E. REQUIRED REPORTING

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All project teams should also report the following values:

1. Envelope UA calculations (area weighted U-value)
  - Overall
  - Vertical envelope (excluding horizontal surfaces such as roof, slab-on-grade, etc.)
2. AHU energy recovery efficiency\*
3. Peak heating load:
  - Model breakdown (envelope, ventilation, infiltration, etc.)
  - Heating equipment system size per design
4. Carbon Emission Intensity (CEI), regardless of building typology
  - Using 2035 emissions
  - Using year of occupancy (City/BPDA to provide forecasted emission factors)
  - Buildings with multiple primary uses to provide typology-specific CEI (e.g., building that's 50/50 resi/office)

\* Weighted average exhaust air sensible energy recovery ratio for each HVAC system (sensible energy recovery ratio, per ASHRAE 90.1-2019 definition)

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# LEED CREDIT REQUIREMENTS

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Required Certifiability level: LEED Platinum  
(Consider LEED Gold for 20,000 - 50,000 sf, major renovations)

## Required Credit Compliance:

- Integrative Design Process
- Enhanced and monitoring-based Commissioning
- Envelope Commissioning
- Building Life-Cycle Impact Reduction
- Enhanced Refrigerant Management Credit (If not meeting, document it)

## Addressed by other TAGs

- On-site Renewable Energy Production (geothermal, solar PV)
- Renewable Energy Procurement (green power, RECs, carbon offsets)

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# OTHER RECOMMENDATIONS

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Recommended that the City of Boston:

- Develops a data collection / reporting system where metadata can be analyzed upon submission (Google forms, etc).
- Utilize practice data to annually update performance thresholds and targets.
- Creates a case studies of exemplary projects and library of design strategies.
- Compile annual project filing report including a summary of key findings from submissions.

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# DISCUSSION - PROPOSED PATHWAY

## A. Percent Carbon Reduction

## B. CEI Target

## C. Rewarding Innovation / Exceptional Performance

## D. Modeler Accreditation

## E. Required Reporting

- Likes idea to meet stretch code. It would make sense to have a slightly different threshold.
- CEI targets - Labs always have offices. How are the targets being defined in terms of “commonly seen” typology mixes? (see not on CEI targets table) Rec: Provide a visual example of floor layout of lab/office to show how the blended rate is arrived to.
- Steam emission factors - will they be punished? (Steam is similar to burning fossil fuels - there is a general move to move to electrification)
- Rehabilitation projects - how do target apply to those? Take owners on a path to zero over time? Historic buildings. Consider different requirement? Use BERDO framework.
- Appreciates comment on unified way to get data (google forms). Recommends thinking about what type of info wants to be requested at which stage of the design? How much data does the city *need* / *want* to collect? Should city collect LEED form? Define what’s useful to the city. Look to the modeling documentation required by the EPA for the Energy Star Multifamily Program, for teams that are moving in that direction. Look at MEP, MAssSave
- What is the origin of the benchmark for various building typologies? Data collection for various high performance city project has been used. Further benchmarking through the data collection process will be recommended.
- Why 2035 and not a weighted average for the life of the building? Need more refinement around 2035 recommendation. CEI is only meaningful when carbon emission factors used are known / understood. Guidance should indicate how frequently the emission factors will be updated.
- Consider upstream emissions (e.g., account for methane leaks).

# DISCUSSION - LEED REQUIREMENTS

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- Need to translate LEED requirements into LEED for Homes standard also for applicable projects. Consider LEED v4.1 Residential.
- Challenges to meet transportation credits - what to do with projects which don't meet those points? Openly allow for flexibility there? Or leave it as a discussion? City of Somerville hasn't had any projects expressing serious concern having trouble meeting LEED Platinum because of limited location points achievable.
- Look at v4.1 Residential - they have tried to fix the LEED for Homes vs NC issue. (All resi projects would go into the same rating system.)

# Meeting Chat Notes

Norm Lamonde: On that last discussion w/ Chris and Jacob. What are the targets based on in the chart for say Labs? Is it for the Lab portion only or is it based on a blend of Labs w/ office?

Alejandra Menchaca: It's the blend. We definitely need to be clearer on that.

Norm Lamonde: Thanks Alejandra. Just thinking about this some more. Maybe providing a visual example of floor layout of Lab/office to demonstrate how the blended rate was arrived at.

Alejandra Menchaca: @Norm, that's a great idea.

Chris Schaffner: Can you talk bit about what is planned for offsite renewables. I know it's not our TAGs issue, but I think many of us are interested where that is going.

Abe Menzin: I think what Jacob was suggesting is that space in the building that is designed to be leased to a lab tenant (a mix of office supporting lab and lab itself) use the lab values, whereas floors above that are designed for different users (pure office) should be treated as office.

Chris Schaffner: The LEED Form is a bit tough, but it does a good job of picking up obvious errors.

Joelle Jahn, WSP: For pathway C would the recommended credits be required of all projects under A37?

Jacob Knowles | BR+A: Good description, thanks Abe.

Lauren Baumann: perhaps also look to the modeling documentation required by the EPA for the Energy Star Multifamily Program, for teams that are moving in that direction

Chris Schaffner: Other standard reporting you could look at - MEPA, MassSave

Lauren Baumann: Again, it might be too much information, so it will be important to think about exactly what data fields are useful to the city

Chris Schaffner: The city should decide if it wants enough detail to confirm the quality of the model, or just enough info to track the model results.

# Meeting Chat Notes - continued

Lauren Baumann: It feels like this wants to be more about tracking the modeled results than QA/QC of the model

Lauren Baumann: how will the targets be applied to rehabilitation projects? These buildings may already be in a BERSO compliance process.

Vincent Martinez, Hon. AIA, Architecture 2030, COO (he/him/his): Additional comment on the GHG emissions intensity factors, is that the guidance should indicate how frequently the emissions factors will be updated.

Chris Schaffner: Or change of use triggering A37

Chris Schaffner: Boston Design Center as an example

Chris Schaffner: Starting with ASHRAE 2013, reno projects use code as the baseline, instead of existing conditions

Lauren Baumann: please make sure to translate the LEED required criteria to the LEED for Homes rating system as well

Hannah Payne (she/her), Somerville: We haven't actually had any projects in Somerville to date that have had trouble meeting LEED Platinum because of limited location points achievable.

Alejandra Menchaca: Thanks Hannah!

Chris Schaffner: Look at v4.1 Residential - they have tried to fix the LEED for Homes vs NC issue. All resi projects go into the same rating system.

Alejandra Menchaca: Thanks Chris

Vincent Martinez, Hon. AIA, Architecture 2030, COO (he/him/his):  
<http://www.bostonplans.org/planning/planning-initiatives/zero-net-carbon-building-zoning-initiative>

Vincent Martinez, Hon. AIA, Architecture 2030, COO (he/him/his): [Renewable Energy Procurement Technical Advisory Group Meeting #3: Presentation-Discussion](#) |

# AGENDA

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1. Introductions
2. Process
3. Precedents
4. Pathway and Target Setting
5. LEED Requirements
6. Discussion
7. Next Steps

# NEXT STEPS

- Today's TAG Meeting Presentation & Discussion will be posted to the ZNC web page
- The Initiative Team will be documenting and complying recommendations and will follow up with any potential clarifications.
- Later this spring, the BPDA / City of Boston will host a ZNC Building Zoning Public Meeting to present final recommendation for public comment.

## Ongoing Public and Stakeholder Engagement

- Please let us know of Organization and Association Meeting opportunities.
- We will be hosting Open Houses and Office Hours late spring / summer

### Contact:

[John.Dalzell@Boston.gov](mailto:John.Dalzell@Boston.gov)

### Visit:

[Boston Zero Net Carbon Building Zoning](#)

*Please sign up on our contact list!*

**THANK YOU**

