

# BERDO 2.0 REGULATIONS - PHASE 2 WORKING SESSION #3

*September 21, 2022*



# AGENDA

- **Welcome (5 min)**
- **District Energy Systems Overview (10 min)**
- **Emissions Factors Discussion**
  - Independent district energy systems **(40 min)**
  - Campus cogeneration systems **(30 min)**
- **Next Steps (5 min)**

The background of the slide is a dark blue wireframe map of a city, showing building footprints and street layouts in a light blue color. The map is viewed from an elevated perspective, looking down at the city.

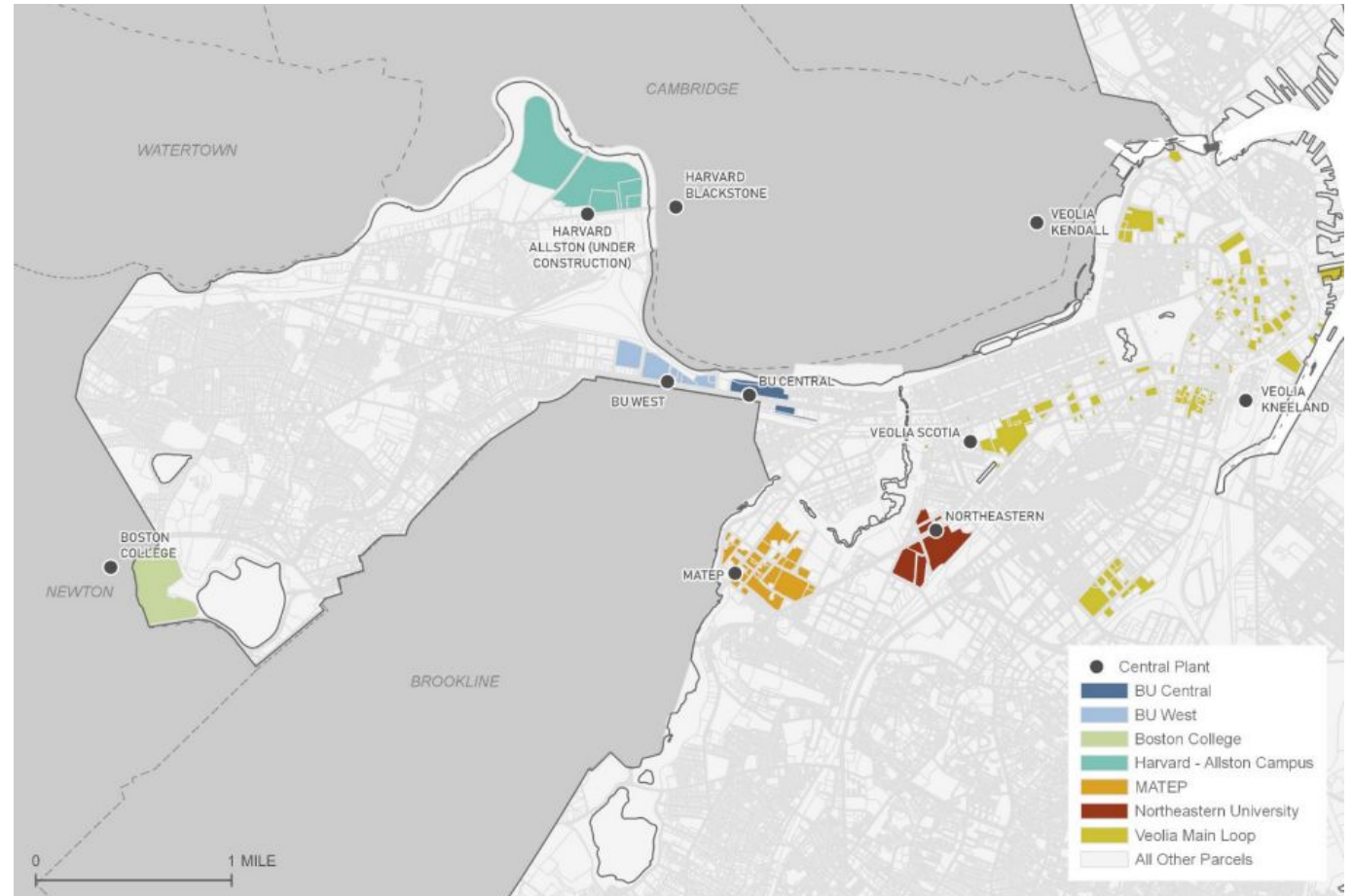
# District Energy Systems

*Overview and goals for regulations*

# District Energy Systems



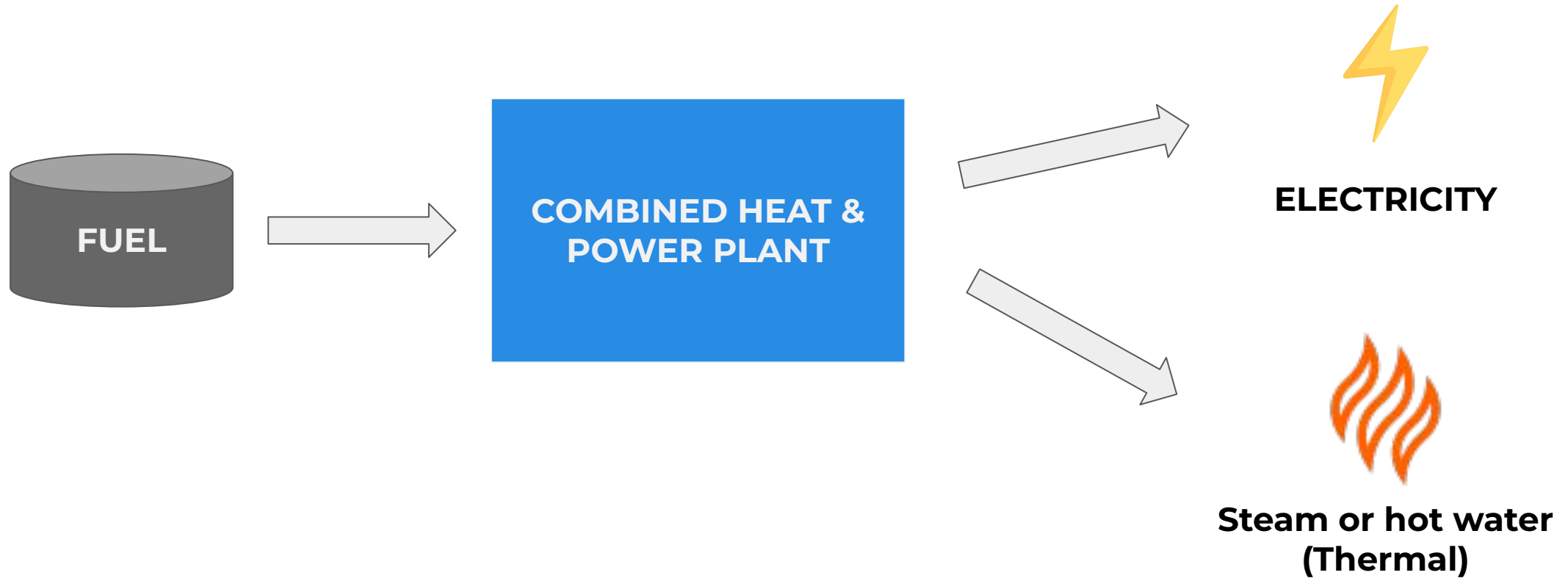
- Numerous buildings in Boston use steam, hot water, chilled water, or electricity provided by district energy systems.
- District heating or cooling systems produce thermal energy resources at a central plant and distribute them to buildings for heating or cooling.
- We need to set methodologies for determining the emissions factors for the local district energy systems.



Source: Carbon Free Boston, Boston University Institute for Sustainable Energy.  
Note: Wentworth Institute of Technology's district system is missing from this map.

# Simple cogeneration system

*Combined Heat and Power (CHP)*



# District Energy and Campus Cogeneration

*For the purposes of BERDO*

## Independent District Energy System

- Independent owner of a central plant and district distribution system.
- Customers are separate from the system operator.
- BERDO reporting done by buildings, need to apply independent system emissions factor to their energy.

## Campus Cogeneration Systems

- Central plant connected to a campus of buildings with one shared owner.
- One owner is responsible for buildings and the central plant under BERDO.

# Goals for emissions factors

- *Regulations set consistent, transparent methodology for district energy systems.*
- *Emissions factors can be customized to reflect the plant's actual operations and are responsive to decarbonization actions.*
- *Emissions factors reflect the entire system, including both electricity and thermal (steam, hot water) production.*
- *Emissions factors for district systems are updated annually and will be available within first few months of the year.*

# Community priorities identified during the BERDO 2.0 Ordinance process

We heard that residents want carbon reduction in Boston that:



*Improves  
air quality  
for residents*



*Reduces renter  
energy bills*



*Does not contribute  
to displacement*



*Improves  
heating + cooling  
in homes*



*Creates jobs for  
residents*



*Is good for the  
environment*



The background of the slide is a dark blue aerial wireframe map of a city, showing the outlines of buildings, streets, and parks. The map is rendered in a light blue color, creating a technical and urban aesthetic.

# Independent District Energy Systems

# CHP emission allocation methods

Methodologies from World Resource Institute's GHG Protocol

## 1. Efficiency method

- Allocates GHG emissions according to the **amount of fuel energy used to produce each final energy stream.**
- Assumes that conversion of fuel energy to steam energy is more efficient than converting fuel to electricity.
- Requires the use of assumed efficiency values.

## 2. Energy Content

- Allocates GHG emissions according to the **useful energy contained in each output stream.**
- Need information regarding the intended use of the heat energy.
- Best suited where heat can be characterized as useful energy, e.g., for process or district heating.

*WRI recommends using the efficiency method as the preferred methodology.*

# CHP emission allocation methods

## 3. Default Factors from EPA (as reported in Portfolio Manager)

Fuel Type	CO <sub>2eq</sub> Emissions (kg/MBtu)	
	United States	Canada
District Steam	66.40	88.54
District Hot Water	66.40	88.54
District Chilled Water - Electric Driven Chiller	52.70	17.19
District Chilled Water - Absorption Chiller using Natural Gas	73.89	73.86
District Chilled Water - Engine-Driven Chiller Natural Gas	49.31	49.29

# Option 4. Full Emissions Allocation to Electricity

## Allocating 100% of emissions to electricity production

- Total emissions of large CHP systems are counted by ISO-NE (grid operator) in grid emissions rate
- No emissions are applied to the thermal production (steam, hot water)

## EPA Part 75 Reporting Requirements

- Part of the EPA's Acid Rain Program
- All generators >25 MW, including CHP, must continuously monitor and report nitrous oxides, sulfur dioxide, and carbon dioxide emissions
- Data reported in US EPA Clean Air Markets Database (CAMD).
- ISO-NE uses CAMD data as the primary data source for emissions calculations.

# Comparison of CHP emission allocation methods



Option	Consistent and Transparent Methodology	Responsive to actual conditions/ operation	Emissions allocated across electricity and thermal production	Annual update of emissions factors (timely)	Additional considerations
Efficiency Method				Data availability? 	Possible overestimate for some systems
Energy Content Method				Data availability? 	Possible overestimate for some systems. Need information on the end uses.
EPA Default Values					Not dynamic, no credit for decarbonization efforts.
100% to electricity				Data availability? 	No emissions attributed to thermal production.

# Regulatory Considerations and Questions

- **Do any of these methodologies seem more or less appropriate for Boston's systems?**
- **What emissions reporting is already required on district systems?**
- **How should losses be accounted for?**
  - *Losses can be assigned to either the building off-takers or the system operator. If assigned to system operator, we would not necessarily see the emissions from losses in BERDO if the plant is outside of Boston.*
- **What other questions or considerations do you have?**

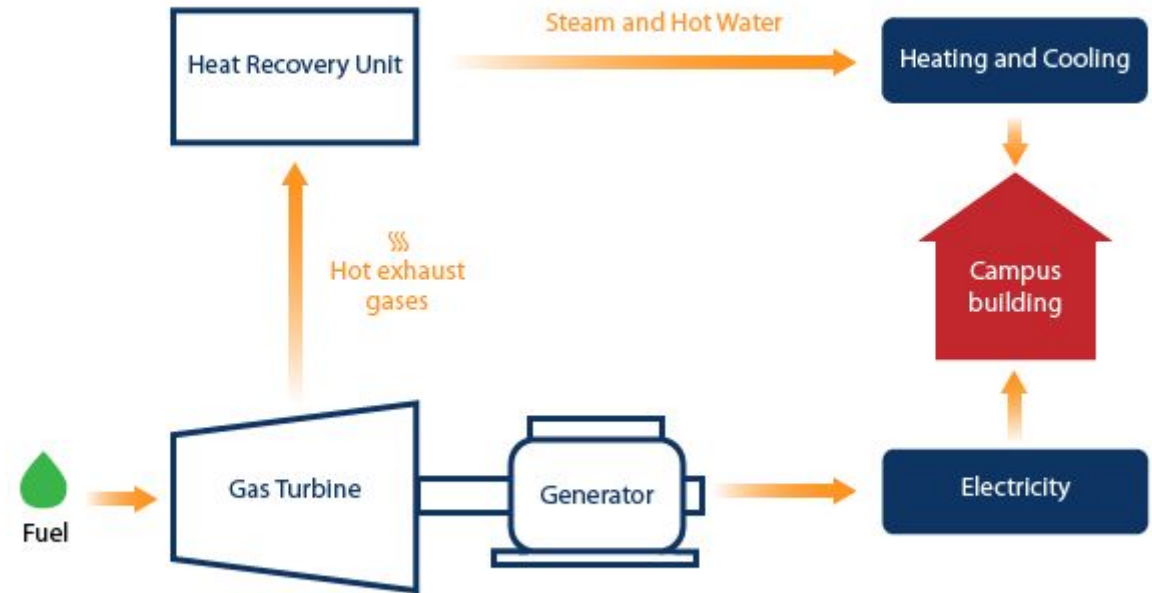
The background of the slide is a dark blue wireframe illustration of a city or campus, showing various building footprints and structures from an aerial perspective. A semi-transparent dark blue horizontal band is overlaid across the middle of the image, containing the main title text.

# Campus Cogeneration Systems

# Campus CoGeneration Plants in Boston

- Central plant connected to a campus of buildings with one shared owner.
- Reporting for buildings and central plant are done by one entity for BERDO.

How cogeneration works



Source: MIT Central Utilities Plant



# Regulations for Co-Generation Power Plants

## Preliminary proposals for discussion:

1. Campus cogen plants can choose to use the same methodology as the independent district systems, or;
2. Campus cogen plants can apply an emissions factors to their central plant's fuel inputs and apportion the emissions across their campus.
  - *Buildings with metered or submetered energy must report the metered data at the building level.*
  - *If energy is not separately metered:*
    - *For buildings with the same Building use, the total shared Energy use should be apportioned by the Gross Floor Area.*
    - *Buildings with different Building Uses, should be reported as a campus as defined in Portfolio Manager.*

# Regulatory Questions

- **How is energy data currently tracked campus cogen systems?**
  - *Does energy use get assigned to individual buildings?*
- **What emissions reporting reporting is already required on campus cogeneration systems?**
- **Does the proposed approach work with existing reporting and tracking?**
- **What other questions or considerations do you have?**

An aerial wireframe map of a city, rendered in a light blue color against a darker blue background. The map shows a dense grid of buildings and streets, with a prominent curved road or highway cutting through the center. The overall style is technical and architectural.

# Next Steps

# Upcoming APCC Hearings

Meetings publicly noticed and accessible via [boston.gov/public-notice](https://boston.gov/public-notice).

## TENTATIVE SCHEDULE SUBJECT TO CHANGE:

- **September 28 time at 1:30 p.m. (APCC Special Hearing)**
  - City presents first proposals for regulations.
- **October 19 at 1:00 p.m. (APCC Monthly Hearing)**
  - City submits draft regulations language. At the discretion of the Commission, first public comment period will open.
- **November 16 at 1:00 p.m. (APCC Monthly Hearing)**
  - Discussion of feedback from public comment period.
- **December 14 at 1:00 p.m. (APCC Monthly Hearing)**
  - To be determined by prior hearing.

# Reminders

- Please share additional feedback via [Google Form](#)
  - <https://forms.gle/aJgVgM1ZLUPtBYf3A>
- Updates will be posted on BERDO regulations page:
  - [boston.gov/departments/environment/berdo-regulations-development](https://boston.gov/departments/environment/berdo-regulations-development).
- [Boston.gov/berdo](https://boston.gov/berdo) is also updated regularly

# THANK YOU!

*Please visit [boston.gov/berdo](https://boston.gov/berdo) for more information and updates.*

