Seattle's Building Emissions Performance Standard (BEPS) Rulemaking

Technical Rulemaking Workgroup – Meeting #1

City of Seattle

Agenda

- **Welcome + Introductions** (10 minutes)
  - Consent to record
- **Introduction to the Rulemaking Process** (10 minutes)
- **Introduction to Greenhouse Gas (GHG) Emissions Reporting & GHG Intensity Targets (GHGITs)** (10 minutes)
  - Discussion: Adding additional building activity types (10 minutes)
  - Breakout groups (20 minutes):
    - Gross floor area for calculating GHGITs
    - GHG Report Details
- **Break** (5 minutes)
- **Introduction to GHGIT Normalization Factors** (15 minutes)
  - Breakout groups (15 minutes)
    - Normalization factor for nonresidential hours of operation
    - Normalization factor for multifamily housing
- **Review Emissions Factors & Reporting of Renewables** (10 minutes)
- **Wrap-Up** (10 minutes)

Welcome + Introductions

OSE & Consultant Team for Rulemaking

OSE Team

BEPS Program Manager, Rulemaking Advisor, Outreach Spec.

Subject Matter Experts (e.g., benchmarking)

Technical / Analysis Consultant

SBW Consulting Inc.

WMBE Firm

Facilitators

Unrooz Solutions

WMBE Firm

Introductions

- Your name
- Your organization
- What's your favorite neighborhood in Seattle and why?

Charter Agreements

- **Mutual respect** - All working group participants and facilitators are respectful of each other. Members will value each other's time, listen when people are speaking, and speak kindly to each other.
- **Open-mindedness** - Members are open to new ideas and perspectives, and do not disregard ideas they disagree with.
- **Equity** - All members are treated fairly, both by the facilitation team and by one another. Efforts are made to eliminate any real or perceived barriers to participation.
- **Be present** - You reserved the time to be here. Avoid outside distractions as much as possible but take care of your personal needs.
- **Accountability for Accuracy** - When sharing data and information make sure it is accurate and be prepared to provide a credible reference.
- **Chatham House Rule** - Participants are free to use the information received in meetings but should not identify the speaker or their affiliation.

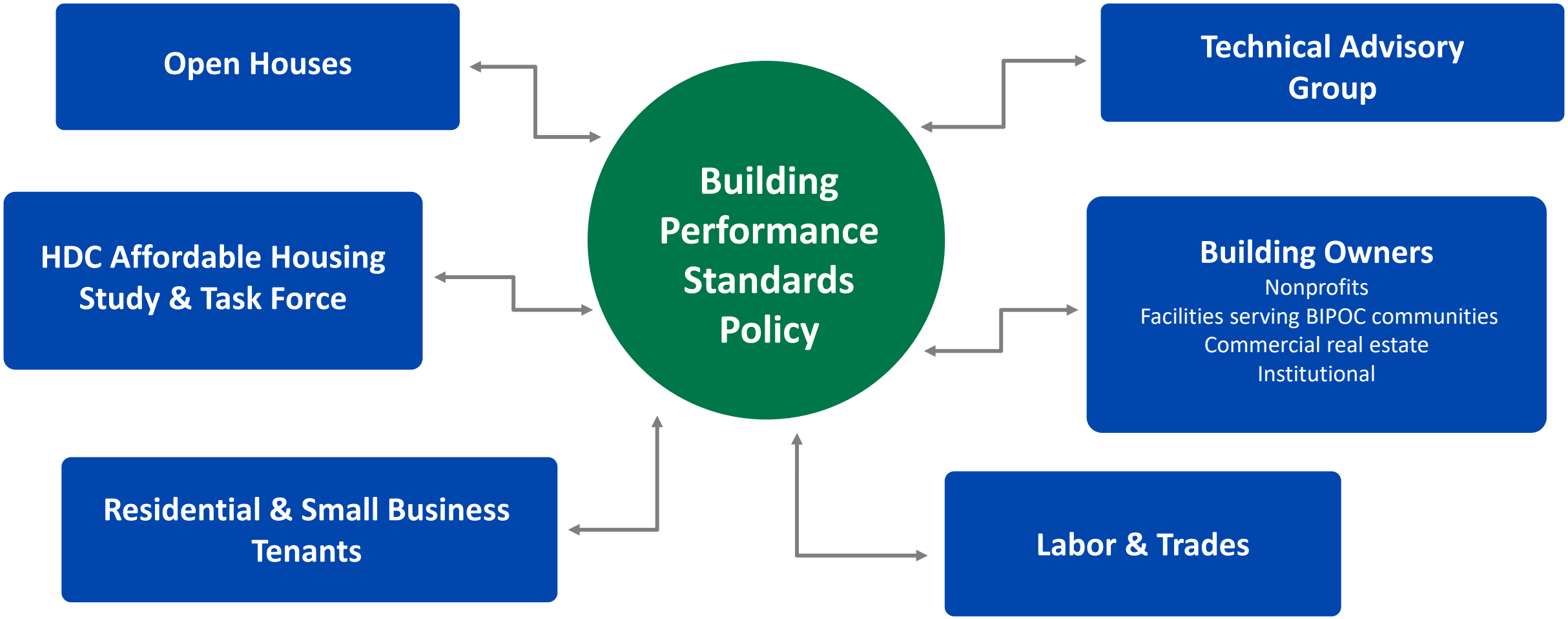
Introduction to the BEPS Rulemaking Process

"The Building Emissions Performance Standards (BEPS) policy continues Seattle's leadership on climate action and represents a milestone for our city's efforts to reduce greenhouse gas emissions and build healthy communities," said Mayor Bruce Harrell.

"This bold legislation will not only create cleaner buildings for people to live, work, and play in, but also hundreds of local jobs and build pathways to careers in the green economy…"

Mayor Bruce Harrell,
BEPS Press Release, December 13, 2023

Many voices helped shape the legislation



What does BEPS require of building owners?

Every five years:

- **Energy benchmarking verification**: Verify previous year's building energy use and GHG emissions (compliance starts in 2027)
- **Report emissions performance and plan**: Document current performance & equipment and planned actions to achieve targets (compliance starts in 2027)
- **Meet Greenhouse Gas Intensity Targets (GHGIT)**: Three pathways to achieve compliance (compliance starts in 2031)
- **Achieve**: Net-zero emissions (with narrow exceptions) by 2041-2050 (depending on building type and size)

Existing **Building Tune-Ups** requirements will sunset after the 2023-2026 compliance cycle is done.

Next steps for 2024 -2025: Director's Rule or "Rulemaking" process

2022 - 2026	2027 - 2030	2031 - 2035	2036 - 2040	2041 - 2045	2046 – 2050
Policy Development / Support / Launch Tools	Verify Energy & Emissions, Plan, and Start Reductions	Nonresidential Emissions Targets		Net-Zero Targets	
		Multifamily Emissions Targets*			Net-Zero Targets
Director's Rule Mid-2024-Mid-2025	Support & Early Adopter Incentives →				

*Extension for affordable housing & human services until 2036-2040 to meet targets.

State of WA Clean Buildings Performance Standard

2026 - 1st Energy Targets Commercial >50K	**2031 >>** Future Energy Targets – To be Determined by Rule Commercial & Multifamily >20K

This will be a long and detailed Director's Rule!

PATH A:
Meet standard or portfolio GHGI emissions targets at each five-year compliance interval

Compliance includes:
Measure Energy & Emissions
Energy/Emissions Reduction Planning
Meet Targets
Achieve Net Zero by 2041-2050

PATH B:
Small variances but overall can meet compliance with modifications.

Extensions (7 options):
Get a bye on one or more compliance intervals before returning to Path A

Emissions Deductions
(9 options): Time-limited deductions (cooking, steam, lab process loads...)

Compliance Payment:
Payment in lieu 2031-2035; revenue supports under-resourced buildings.

PATH C:
Special consideration and flexibility due to unique circumstances.

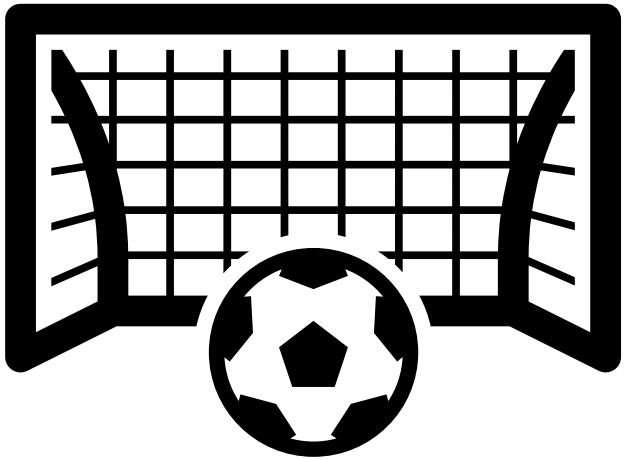
Decarbonization Plan:.
Must include energy/GHG emissions audit and cost analysis.
- Net-Zero by 2050
- Low-Emissions by 2050

Eligibility Criteria Include:
- Conflicts with historic status
- Sub-alt or seismic upgrade
- Infeasible structural/electric upgrades req. to meet net-zero
- And more…

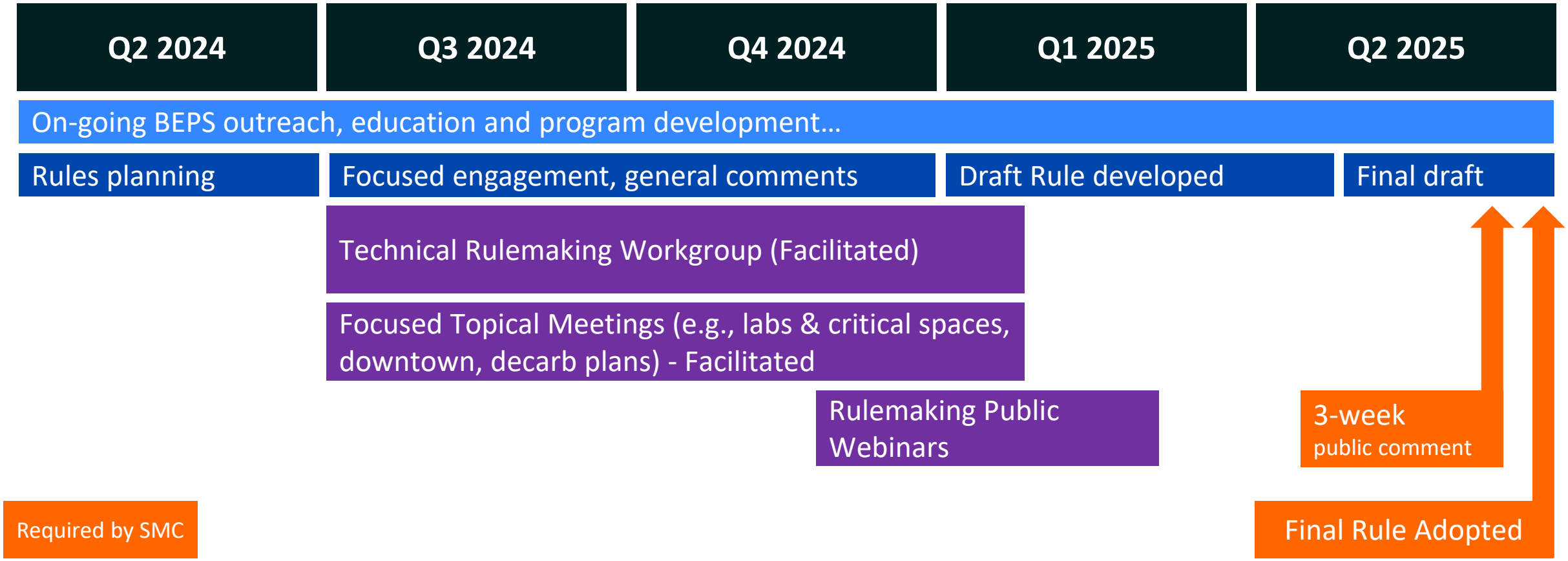
Rulemaking Goals for OSE

Per Seattle Municipal Code a Director's Rule is the required next step to clarify ordinance elements (e.g., timeline for exemptions requests, documentation required.)

- ✓ Engaged key stakeholders who have an opportunity to constructively contribute.
- ✓ A rule that maintains the stringency of BEPS and explains how to use the flexibility.
- ✓ A readable, approachable final Director's Rule document.



Director's Rule Timeline Overview



BEPS Technical Rulemaking Stakeholder Engagement

Technical Rulemaking Workgroup – Facilitated

- ❑ Eight 2-hour meetings with about 15 experts. July 2024 – January 2025.

Focused Topic Specific Meetings - Facilitated sessions with 4-6 experts.

- ❑ Labs & critical spaces (hospitals, life sciences)
- ❑ Downtown concerns (office vacancy rate, private building portfolios)
- ❑ Decarbonization plans
- ❑ Multifamily / Affordable housing – prescriptive path, low-emissions decarb plan
- ❑ 3 Others TBD

BEPS Technical Rulemaking Stakeholder Engagement

Public Webinars & Comment Opportunities

- ❑ Up to three facilitated open to all webinars to share draft rule and take questions / feedback. (Late 2024 – Early 2025)
- ❑ Online comments accepted (prior to formal comment)

Draft Rule Released for Public Comment

- ❑ Three-week formal public comment period. (Q2 2025)
- ❑ Final published no later than June 1

BEPS Technical Rulemaking Meeting Topics

Meeting #	Topics	Date (*tentative*)
1	Intro + Standard compliance with one building	July 11
2	Standard compliance with building portfolio and connected buildings (campus)	July 30
3	Review mtgs 1 & 2; Alternative Compliance: Alternate GHGIT, Multifamily Prescriptive path	*September 9*
4	Third party verification for benchmarking	*October 7*
5	End use deductions	*October 28*
6	Extensions + exemptions	*November 18*
7	Decarbonization plans (low emissions and net-zero)	*December 16*
8	Review + Unfinished Business	*January 6*

Note: Topic order may change pending planning and scheduling of topical focus group meetings.

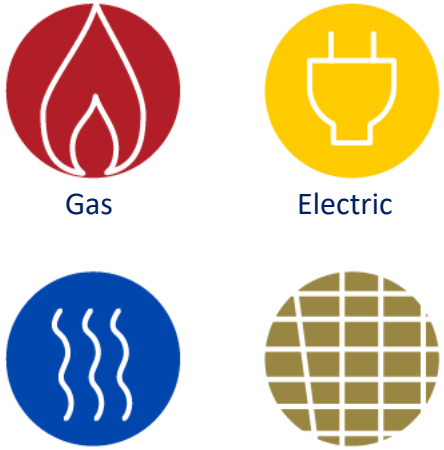
2025 is the Foundational Rule – Others to come!

Rulemaking Dates Listed in the Adopted Ordinance	By Dec 31st *By Oct 1st
1st Director Rule Required (The Big Lift needed to launch program!)	Q2 2025
2031-35 Laboratory GHGIT, Emissions Factors 2031-35 Rule, Raise ACP cost for 31-35	2027
2036-40 GHGITS; Emissions Factors 2036-40	2031
Revised Penalty Amounts 2036-40	2034*
2041-45 GHGITS; Emissions Factors 2041-45	2036
Revised Penalty Amounts 2041-45	2039*
2046-50 GHGITs; Emissions Factors 2046-50	2041
Revised Penalty Amounts 2046-50	2044*

Questions?

Greenhouse Gas (GHG) Emissions Reporting

BEPS uses Greenhouse Gas Intensity (GHGI) as the reporting metric



÷

=

Greenhouse Gas Intensity (GHGI) ($kgCO_2e/ft^2/year$)

Total **annual weather normalized fuel use** for each energy source (kBtu/year)
X
Emissions factor of each energy source (kgCo2e/kBtu)

= Total kgCO2e/year

Building's **total square feet** (ft^2) (excluding parking)

CO_2e = carbon dioxide emissions equivalent

Emissions Factor = the CO2e associated with a unit of energy

BEPS Reporting Requirements

(SMC 22.925.090) Building owners shall submit to the Director a **Seattle greenhouse gas emissions standard report**, completed by a qualified person. The report shall be in a form developed by the Director and contain all of the following:

1. The **GHGIT and the compliance GHGI** for that compliance interval;
2. A description and documentation of the **actions completed to meet the GHGITs**;
3. **Documentation for any approved alternative compliance option used, including baseline GHGIs and alternate GHGITs, and the list of individual buildings in a building portfolio, district campus, or connected buildings that are included in any aggregate or alternate GHGIT calculations;**
4. **Documentation for any approved extensions or exemptions**;
5. **Documentation of any end-use deductions** allowed and used for calculating the compliance GHGIs;
6. **A list of major building mechanical equipment**, such as equipment used for space heating and cooling, water heating, cooking, and other activities and their age and fuel sources;
7. An outline of the **actions needed for the building to meet subsequent GHGITs**; and
8. Any additional information required by the Director.

Greenhouse Gas Intensity Targets (GHGIT) are set based on space types in buildings

BEPS Building Activity Types	Portfolio Manager Building / Space Types Included
College/University	College/University
Entertainment/Public Assembly	Convention Center, Lifestyle Center, Movie Theater, Other - Entertainment/Public Assembly, Social/Meeting Hall, Performing Arts, Museum, Transportation Terminal/Station, Stadium (Open), and Pre-school/Daycare
Fire/Police Station	Fire Station, Police Station
Hospital	Hospital (General Medical & Surgical), Other/Specialty Hospital
Hotel	Hotel, Other-Lodging/Residential
K-12 School	K-12 School
Laboratory	Laboratory
Multifamily Housing	Multifamily Housing
Non-Refrigerated Warehouse	Non-Refrigerated Warehouse, Distribution Center
Office	Office, Medical Offices, and Other-Financial Offices
Other	Courthouse, Adult Education, Other – Education, Prison/Incarceration, Other, Other – Utility, and Energy/Power Station, Outpatient Rehabilitation/Physical Therapy, Urgent Care/Clinic/Other Outpatient.
Recreation	Fitness Center/Health Club/Gym and Other – Recreation
Refrigerated Warehouse	Refrigerated Warehouse
Residence Hall/Dormitory	Residence Hall/Dormitory
Restaurant	Restaurant, Food Service, Other - Restaurant/Bar
Retail Store	Retail Store, Automobile Dealership, Bank Branch, Enclosed Mall, Other – Mall, Strip Mall
Self-Storage Facility	Self-Storage Facility
Senior Living Community	Senior Living Community, Residential Care Facility
Services	Library, Repair Services (Vehicle, Shoe, Locksmith, etc), Other – Services, Other - Public Services, Mailing Center/Post Office, and Personal Services (Health/Beauty, Dry Cleaning, etc)
Supermarket/Grocery Store	Supermarket/Grocery Store
Worship Facility	Worship Facility

GHGI targets (GHGIT) set in the Legislation

(2031-35 established; 2036-40 and later may be updated by future rule Dec 31, 2031)

Building Activity Type	2031 - 2035	2036 - 2040[1]	2041 - 2045[1, 2]	2046 - 2050[1, 3]
College/University	2.69	*1.57*	*0*	*0*
Entertainment/ Public Assembly	1.18	*0.69*	*0*	*0*
Fire/Police Station	2.23	*1.30*	*0*	*0*
Hospital	4.68	*2.73*	*0*	*0*
Hotel	2.06	*1.20*	*0*	*0*
K-12 School	0.95	*0.56*	*0*	*0*
Laboratory	6.30	*3.68*	*0*	*0*
Multifamily Housing	0.89	*0.63*	*0.37*	*0*
Non-Refrigerated Warehouse	0.77	*0.45*	*0*	*0*
Office	0.81	*0.47*	*0*	*0*

Building Activity Type	2031 - 2035	2036 - 2040[1]	2041 - 2045[1, 2]	2046 - 2050[1, 3]
Other	2.48	*1.45*	*0*	*0*
Recreation	3.22	*1.88*	*0*	*0*
Refrigerated Warehouse	0.98	*0.57*	*0*	*0*
Residence Hall/ Dormitory	1.16	*0.68*	*0*	*0*
Restaurant	5.73	*3.34*	*0*	*0*
Retail Store	1.03	*0.60*	*0*	*0*
Self-Storage Facility	0.31	*0.18*	*0*	*0*
Senior Living Community	2.11	*1.23*	*0*	*0*
Services	1.36	*0.79*	*0*	*0*
Supermarket/ Grocery Store	3.42	*2.00*	*0*	*0*
Worship Facility	1.20	*0.70*	*0*	*0*

1 – Targets may be revised by future rule, per subsection 925.070.A.
2 – Net-zero emissions by 2041-2045 for nonresidential.
3 – Net-zero emissions by 2046-2050 for multifamily housing.
4 – Pursuant to Section 22.925.110, owners of low-income housing, human service use, and low-rent housing may receive an extension from meeting the GHGITs in 2031-2035 but still must meet benchmarking verification and all other reporting obligations for 2031-2035.

Example GHGI and GHGIT Reporting

First steps for reporting:

1. Estimate the building's **greenhouse gas intensity target (GHGIT)**
2. Determine the building's **compliance greenhouse gas intensity (GHGI)**

Example 75,000 SF "Office" Building

- 65,000 SF Office space
- 10,000 SF Retail space
- 5,000 SF Gym space

Look up building activity type to determine the GHGIT

Building Activity Types	Portfolio Manager Building / Space Types Included
College/University	College/University
Entertainment/Public Assembly	Convention Center, Lifestyle Center, Movie Theater, Other - Entertainment/Public Assembly, Social/Meeting Hall, Performing Arts, Museum, Transportation Terminal/Station, Stadium (Open), and Pre-school/Daycare
Fire/Police Station	Fire Station, Police Station
Hospital	Hospital (General Medical & Surgical), Other/Specialty Hospital
Hotel	Hotel, Other-Lodging/Residential
K-12 School	K-12 School
Laboratory	Laboratory
Multifamily Housing	Multifamily Housing
Non-Refrigerated Warehouse	Non-Refrigerated Warehouse, Distribution Center
Office	Office, Medical Offices, and Other-Financial Offices
Other	Courthouse, Adult Education, Other – Education, Prison/Incarceration, Other, Other – Utility, and Energy/Power Station, Outpatient Rehabilitation/Physical Therapy, Urgent Care/Clinic/Other Outpatient.
Recreation	Fitness Center/Health Club/Gym and Other – Recreation
Refrigerated Warehouse	Refrigerated Warehouse
Residence Hall/Dormitory	Residence Hall/Dormitory
Restaurant	Restaurant, Food Service, Other - Restaurant/Bar
Retail Store	Retail Store, Automobile Dealership, Bank Branch, Enclosed Mall, Other – Mall, Strip Mall
Self-Storage Facility	Self-Storage Facility
Senior Living Community	Senior Living Community, Residential Care Facility
Services	Library, Repair Services (Vehicle, Shoe, Locksmith, etc), Other – Services, Other - Public Services, Mailing Center/Post Office, and Personal Services (Health/Beauty, Dry Cleaning, etc)
Supermarket/Grocery Store	Supermarket/Grocery Store
Worship Facility	Worship Facility

GHGIT will be prorated by building activity types

Building Activity Type	2031 - 2035	2036 - 2040[1]	2041 - 2045[1, 2]	2046 - 2050[1, 3]
College/University	2.69	*1.57*	*0*	*0*
Entertainment/ Public Assembly	1.18	*0.69*	*0*	*0*
Fire/Police Station	2.23	*1.30*	*0*	*0*
Hospital	4.68	*2.73*	*0*	*0*
Hotel	2.06	*1.20*	*0*	*0*
K-12 School	0.95	*0.56*	*0*	*0*
Laboratory	6.30	*3.68*	*0*	*0*
Multifamily Housing	0.89	*0.63*	*0.37*	*0*
Non-Refrigerated Warehouse	0.77	*0.45*	*0*	*0*
Office	0.81	*0.47*	*0*	*0*

Building Activity Type	2031 - 2035	2036 - 2040[1]	2041 - 2045[1, 2]	2046 - 2050[1, 3]
Other	2.48	*1.45*	*0*	*0*
Recreation	3.22	*1.88*	*0*	*0*
Refrigerated Warehouse	0.98	*0.57*	*0*	*0*
Residence Hall/ Dormitory	1.16	*0.68*	*0*	*0*
Restaurant	5.73	*3.34*	*0*	*0*
Retail Store	1.03	*0.60*	*0*	*0*
Self-Storage Facility	0.31	*0.18*	*0*	*0*
Senior Living Community	2.11	*1.23*	*0*	*0*
Services	1.36	*0.79*	*0*	*0*
Supermarket/ Grocery Store	3.42	*2.00*	*0*	*0*
Worship Facility	1.20	*0.70*	*0*	*0*

1 – Targets may be revised by future rule, per subsection 925.070.A.
2 – Net-zero emissions by 2041-2045 for nonresidential.
3 – Net-zero emissions by 2046-2050 for multifamily housing.
4 – Pursuant to Section 22.925.110, owners of low-income housing, human service use, and low-rent housing may receive an extension from meeting the GHGITs in 2031-2035 but still must meet benchmarking verification and all other reporting obligations for 2031-2035.

GHGIT will be prorated by building activity types

Pro-rate GHGIT by Building Activity Types:

Activity Types	Space GFA (SF)	Percent of GFA (SF)	Bldg Activity GHGIT	Normalization Factor	Pro-rated GHGIT
Office	60,000	80%	.81	TBD	.64
Retail	10,000	13%	1.03	TBD	.13
Gym (Recreation)	5,000	7%	3.22	TBD	.23
Total GFA	**75,000**			**GHGIT**	**1.00**

Will discuss in polls/ breakouts today about GHGIT:

- Adding 3 New Building Activity Types
- Space SF - Minimum for prorating GHGIT
- Normalization factors for:
  - Non-residential operating hours
  - Multifamily housing

How is GHGI calculated?

ENERGY STAR Portfolio Manager Data	2019 Annual WN Energy Use (kBtu/yr)	Fuel Emissions Factors (2019-2025) (kg CO2e/kBtu)	Annual GHG Emissions (kg CO2e/yr)
Electric	2,350,000	0.0058	13,630.00
Gas	2,200,000	0.053	116,600.00
Steam	0	0.081	0.00
Sub-Total	**4,550,000**		**130,230.00**
Less Eligible BEPS Deductions (TBD)	**TBD**	**NA**	**TBD**
Totals	**4,550,000**		**130,230.00**
Total Gross Floor Area (SF) Excluding Parking = 75,000			
		BEPS Compliance GHGI (kg CO2e/sf/yr)	**1.74**

To be discussed in future workgroup meetings:

- Cooking emissions
- High intensity process equip. (hospitals & labs)
- High intensity laundry equip. (hotels & healthcare)
- Emergency power back-up
- Back-up emergency heat (hospitals & labs)
- EV charging

BEPS & Benchmarking Reporting Tool Concept

EXISTING

ENERGY BENCHMARKING

ENERGY STAR® Portfolio Manager®

Owner/Provider:

- Enters GFA & spaces uses
- Utility consumption (automated from City Light, PSE, CenTrio)

Reported to City

FUTURE (in planning)

BEPS & BENCHMARKING TOOL

- Pulls ENERGY STAR PM Data

Owner/Provider:

- Benchmarking Verification
  - GHG Report Details
  - Create GHGI Target
- Creates "Compliance GHGI" = (ESPM GHGI - BEPS Deductions)

Reported to City

Discussion & Poll: Adding three building activity types in rulemaking

Option in rulemaking: Add building activity types

Building Activity Type	2031 - 2035	2036 - 2040[1]	2041 - 2045[1, 2]	2046 - 2050[1, 3]
College/University	2.69	*1.57*	*0*	*0*
Data Center	1.43	*0.83*	*0*	*0*
Entertainment/ Public Assembly	1.18	*0.69*	*0*	*0*
Fire/Police Station	2.23	*1.30*	*0*	*0*
Hospital	4.68	*2.73*	*0*	*0*
Hotel	2.06	*1.20*	*0*	*0*
K-12 School	0.95	*0.56*	*0*	*0*
Laboratory	6.30	*3.68*	*0*	*0*
Medical Office	2.11	*1.23*	*0*	*0*
Multifamily Housing	0.89	*0.63*	*0.37*	*0*
Museum	2.11	*1.23*	*0*	*0*
Non-Refrigerated Warehouse	0.77	*0.45*	*0*	*0*

Building Activity Type	2031 - 2035	2036 - 2040[1]	2041 - 2045[1, 2]	2046 - 2050[1, 3]
Office	0.81	*0.47*	*0*	*0*
Other	2.48	*1.45*	*0*	*0*
Recreation	3.22	*1.88*	*0*	*0*
Refrigerated Warehouse	0.98	*0.57*	*0*	*0*
Residence Hall/ Dormitory	1.16	*0.68*	*0*	*0*
Restaurant	5.73	*3.34*	*0*	*0*
Retail Store	1.03	*0.60*	*0*	*0*
Self-Storage Facility	0.31	*0.18*	*0*	*0*
Senior Living Community	2.11	*1.23*	*0*	*0*
Services	1.36	*0.79*	*0*	*0*
Supermarket/ Grocery Store	3.42	*2.00*	*0*	*0*
Worship Facility	1.20	*0.70*	*0*	*0*

Why are we recommending these three types?

- All three were recommended by stakeholders late in the legislation process
  - Museum and Medical Office had enough buildings to generate their own GHGI targets (currently they are included in Office and Entertainment/Public Assembly)
  - Data Centers are a high energy use building activity type and are required to be broken out by Seattle benchmarking regardless of size (along with restaurant and laboratory)
- Adding these three would not change any of the other target metrics!

Poll: Add building activity types

- Should OSE add **medical office**, **museum**, and **data center** as additional building activity types?

Poll

- Do you have any questions or concerns about adding these additional building activity types?

Discussion and Questions

Breakout Session #1

Breakout Session #1

Group A

What is the minimum space use SF for calculating and/or prorating building activity GHGITs?

Nicole, Santiago, Kirstin

Group B

Level of detail for GHG Report and what other information, if any, should be collected for the GHG report?

Gemma, Faith, Sepideh

Note: For both groups, please assume we are talking about an individual building. Portfolio and campuses will be talked about at next meeting.

Group A: Prorating building activity types for GHGIT calculations

- OSE proposes aligning with existing Seattle Benchmarking guidelines:
  - All secondary space uses greater than 5,000 SF must be included
  - These property uses must be included regardless of space use size:
    - data center
    - laboratory
    - restaurant
- All GFA must be included in GHGIT calculation
- Space uses less than 1,000 square feet should be combined with largest space type (excluding data centers, labs, and restaurants)

How does this align with the CBPS guidelines?

- The CBPS uses a percentage-based process to calculate area-weighted EUIt
- Using percentages would make it harder for some buildings to meet emissions targets
- Spaces where more than 75% of the gross floor area has a single building activity can be reported as a single-use building or a multi-use building.
- This disadvantages high GHGIT spaces that could make up less than 25% of GFA (e.g., restaurants and labs)

Group A: Prorating building activity types for GHGIT calculations

Proposal:

1. Under 1000 square feet, must combine (unless restaurant, lab, or data center)
2. Over 5000 square feet, must break out
3. In between, users' choice (unless restaurant, lab, or data center)

What I like about this plan:

- Restaurants/data centers impact scores a lot, so helpful to be able to break them out
- Helpful to align with existing benchmarking requirements.
- Could over 5000 sq ft move from a “must” to a “can”?

My concerns about this plan:

- Can’t reuse efforts from CBPS
- Could be hard to define data center vs laboratory usage. Portfolio manager definition may not be adequate

Group B: Reporting Requirements

(SMC 22.925.090) Building owners shall submit to the Director a Seattle greenhouse gas emissions standard report, completed by a qualified person. The report shall be in a form developed by the Director and contain all of the following:

1. The **GHGIT and the compliance GHGI** for that compliance interval;
2. A description and documentation of the **actions completed to meet the GHGITs**;
3. **Documentation for any approved alternative compliance option** used, including baseline GHGIs and alternate GHGITs, and the list of individual buildings in a building portfolio, district campus, or connected buildings that are included in any aggregate or alternate GHGIT calculations;
4. **Documentation for any approved extensions or exemptions**;
5. **Documentation of any end-use deductions** allowed and used for calculating the compliance GHGIs;
6. **A list of major building mechanical equipment**, such as equipment used for space heating and cooling, water heating, cooking, and other activities and their age and fuel sources;
7. An outline of the **actions needed for the building to meet subsequent GHGITs**; and
8. Any additional information required by the Director.

Will be addressed in future sessions

Group B: Reporting requirements

Questions for discussion:

- What level of documentation is needed to show the building is on a track to future compliance? (items 2 & 7)
- List of major building mechanical equipment – what's the right level of detail? (item 6)
- What other information, if any, should be collected for the GHG report? (item 8)

What information should be necessary in the GHG Report to show that a building is on track for future compliance to meet the upcoming GHGIT?

Summary of group brainstorm:

- Plan/schedule for:
  - Analysis of Electrical supply capacity in street, in vault, switchgear and panels - to ensure full assessment of supply and distribution before design decision start
  - Load analysis - how much head space do they really have?
- Schedule of replacement, though not sure how that will be done on a portfolio level
- General plan and phasing of capital projects to meet targets, with projected reductions.
  - Plan to include projected timeline with milestones
- Funding plan for those future projects to confirm moving forward
- This is going to lead to similar CBPS itemizations of HVAC components/building envelope GHG emissions…
- Difficult for portfolio level compliance

How can a building owner demonstrate the actions already taken in a building towards compliance? (Ex. permits, photos)

Summary of group brainstorm:

- Photo documentation, energy modeling report/deliverable
- Seattle City Light service request/application (if additional electrical service will be needed)
- Documentation that doesn't require a third party, but can be provided by in-house engineering/energy staff - proof installation (photos, plans, etc..), M&V of the measures taken.
- Actions should be represented in future data, forecast of energy/emissions reduced whether verified by third party or produced by internal staff
- Permits pulled from the City/County to show potential work in progress.

What level of detail should be expected when listing the major building mechanical equipment?

Summary of group brainstorm:

- Sizing assumptions and calcs and equipment capacity
- For heat pump DHW in MF, system design and controls set up is critical to operational energy efficiency
  - Specs on the Refrigerant Type used in systems (yes) Yes - partic for HVAC; DHW will mostly be CO2 refrigerant
- Equipment type, manufacturer and year
  - Limit to equipment above a certain size/load (define major)
- Eventual plans for total electrification
- Space heat distribution type - steam/hydronic replacement is a big challenge

What other information, if any, should be captured in the GHG Report?

Summary of group brainstorm:

- Building occupancy status
  - General Building Occupancy and Use Schedules

Facilitators shareout

Breakout Group A

What is the minimum space use SF for calculating and/or prorating building activity GHGITs?

Breakout Group B

What other information, if any, should be collected for the GHG report? What is most critical?


BREAK

Normalization Factors for GHGI Target (GHGIT) Setting

GHGIT will be prorated by building activity types

Pro-rate GHGIT by Building Activity Types:

Activity Types	Space GFA (SF)	Percent of GFA (SF)	Bldg Activity GHGIT	Normalization Factor	Pro-rated GHGIT
Office	60,000	80%	.81	TBD	.64
Retail	10,000	13%	1.03	TBD	.13
Gym (Recreation)	5,000	7%	3.22	TBD	.23
Total GFA	**75,000**			**GHGIT**	**1.00**

Will discuss in polls/ breakouts today about GHGIT:

- Adding 3 New Building Activity Types
- Space SF - Minimum for prorating GHGIT
- Normalization factors for:
  - Non-residential operating hours
  - Multifamily housing

Normalization factor reference in BEPS ordinance

(SMC 22.925.080) “The Director by rule shall establish normalization factors including but not limited to hours of operation and multifamily occupancy density that may be used when calculating the GHGITs for covered buildings…”

- *Above text enables factors to be adopted, but there is no established formula for the above.*
- *Other BPS cities, thus far do not use normalization factors for GHGIT.*

Nonresidential Hours of Operation Normalization – WA CBPS for EUI Targets (EUIt)

- The Washington CBPS uses an **hours of operation normalization factor** based on the ASHRAE 100 Standard to adjust a building's EUIt.
- Buildings are categorized in three bins of **light occupancy** (50 hours or less per week), **medium occupancy** (51 to 167 hours per week) and **24/7 occupancy** of 168 hours per week.
- SBW Consulting analyzed how using these factors could impact BEPS targets.

Table 7-3 Building Operating Shifts Normalization Factor

	Building Activity Type[1,2]				Weekly Hours[1,2]		
No.	Portfolio Manager Types	Portfolio Manager Sub-Types	Sub-Types: Detailed	Notes	50 or less	51 to 167	168
1	Banking/financial services	Bank Branch		3	0.8	1	1.5
2	Banking/financial services	Financial Office		3	0.8	1	1.5
3	Education	Adult Education		4	0.9	1.1	1.9
4	Education	College/University		4	0.9	1.1	1.9
5	Education	K-12 School	Elementary/middle school	4	0.9	1.1	1.9
6	Education	K-12 School	High school	4	0.9	1.1	1.9
7	Education	Preschool/Daycare		4	0.9	1.1	1.9
8	Education	Vocational School		4	0.9	1.1	1.9
9	Education	Other - Education		4	0.9	1.1	1.9
10	Entertainment/public assembly	Aquarium		4	0.6	1.1	1.6
11	Entertainment/public assembly	Bar/Nightclub		4	0.6	1.1	1.6
12	Entertainment/public assembly	Bowling Alley		4	0.6	1.1	1.6
13	Entertainment/public assembly	Casino		4	0.6	1.1	1.6

Nonresidential Hours of Operation Normalization (SBW)

- SBW examined the applicability of the WA CBPS metric to an emissions-based standard
  - Goal was to assess how an hours of occupancy normalization factor would impact the GHGIT of each building type
  - Methodology used the same bins to categorize hours of occupancy
- For the first compliance cycle, light occupancy buildings would have an average target reduction of 20% from the non-adjusted baseline and 24/7 buildings would have an average target increase of 30% from the non-adjusted baseline.
  - Impact varies widely across building activity types

Occupancy hours adjustments and their resulting compliance period GHGI targets in kg/CO2e/sqft/year

Building Activity Types	Occupancy hours adjustments (ASHRAE 100 / WA CBPS)			2031-2035 Compliance Period (kg CO2e/sqft/year)				2036-2040 Compliance Period (kg CO2e/sqft/year)			
	50 or Less	51 to 167	168	*Ordinance Targets*	50 or Less	51 to 167	168	*Ordinance Targets*	50 or Less	51 to 167	168
College/University	0.9	1.1	1.9	*2.69*	2.42	2.96	5.11	*1.57*	1.41	1.73	2.98
Data Center[2]	1.0	1.0	1.0	*1.43*	1.43	1.43	1.43	*0.83*	0.83	0.83	0.83
Entertainment/Public Assembly	0.6	1.1	1.6	*1.18*	0.71	1.30	1.89	*0.69*	0.41	0.76	1.10
Fire/Police Station	0.8	0.8	1.1	*2.23*	1.78	1.78	2.45	*1.30*	1.04	1.04	1.43
Hospital (General Medical & Surgical)	1.0	1.0	1.0	*4.68*	4.68	4.68	4.68	*2.73*	2.73	2.73	2.73
Hotel	1.0	1.0	1.0	*2.06*	2.06	2.06	2.06	*1.20*	1.20	1.20	1.20
K-12 School	0.9	1.1	1.9	*0.95*	0.86	1.05	1.81	*0.56*	0.50	0.61	1.06
Laboratory	1.0	1.0	1.0	*6.30*	6.30	6.30	6.30	*3.68*	3.68	3.68	3.68
Medical Office	0.8	1.1	1.3	*2.11*	1.69	2.32	2.74	*1.23*	0.98	1.35	1.60
Multifamily Housing	1.0	1.0	1.0	*0.89*	0.89	0.89	0.89	*0.63*	0.63	0.63	0.63
Museum	0.6	1.1	1.6	*2.11*	1.27	2.32	3.37	*1.23*	0.74	1.35	1.97
Non-Refrigerated Warehouse	0.8	1.0	1.4	*0.77*	0.62	0.77	1.08	*0.45*	0.36	0.45	0.63
Office	0.8	1.0	1.5	*0.81*	0.65	0.81	1.21	*0.47*	0.38	0.47	0.71
Other	0.8	1.2	1.3	*2.48*	1.98	2.97	3.22	*1.45*	1.16	1.73	1.88
Recreation	0.6	1.1	1.6	*3.22*	1.93	3.54	5.16	*1.88*	1.13	2.07	3.01
Refrigerated Warehouse	1.0	1.0	1.4	*0.98*	0.98	0.98	1.37	*0.57*	0.57	0.57	0.80
Residence Hall/Dormitory	1.0	1.0	1.0	*1.16*	1.16	1.16	1.16	*0.68*	0.68	0.68	0.68
Restaurant	0.6	1.1	1.5	*5.73*	3.44	6.30	8.59	*3.34*	2.01	3.68	5.01
Retail Store	0.6	1.0	1.5	*1.03*	0.62	1.03	1.54	*0.60*	0.36	0.60	0.90
Self-Storage Facility	0.8	1.0	1.4	*0.31*	0.25	0.31	0.44	*0.18*	0.15	0.18	0.25
Senior Living Community	1.0	1.0	1.0	*2.11*	2.11	2.11	2.11	*1.23*	1.23	1.23	1.23
Services	0.8	1.2	1.3	*1.36*	1.09	1.63	1.77	*0.79*	0.63	0.95	1.03
Supermarket/Grocery Store	0.5	0.9	1.3	*3.42*	1.71	3.08	4.45	*2.00*	1.00	1.80	2.59
Worship Facility	0.9	1.7	1.7	*1.20*	1.08	2.04	2.04	*0.70*	0.63	1.19	1.19

Nonresidential Hours of Operation Normalization: Examples of Impact

Building Activity Types	Occupancy hours adjustments (ASHRAE 100 / WA CBPS)			2031-2035 Compliance Period (kg CO2e/sqft/year)				2036-2040 Compliance Period (kg CO2e/sqft/year)			
	50 or Less	51 to 167	168 (24/7)	*Ordinance Targets*	50 or Less	51 to 167	168	*Ordinance Targets*	50 or Less	51 to 167	168
K-12 School	0.9	1.1	1.9	*0.95*	0.86	1.05	1.81	*0.56*	0.50	0.61	1.06
Non-Refrigerated Warehouse	0.8	1.0	1.4	*0.77*	0.62	0.77	1.08	*0.45*	0.36	0.45	0.63
Office	0.8	1.0	1.5	*0.81*	0.65	0.81	1.21	*0.47*	0.38	0.47	0.71
Supermarket/Grocery Store	0.5	0.9	1.3	*3.42*	1.71	3.08	4.45	*2.00*	1.00	1.80	2.59

If 51 to 167 hours:

K-12 School - target gets easier

Non-Refrigerated Warehouse and Office - targets stay the same

Supermarket/Grocery Store - target gets harder

Nonresidential Hours of Operation Normalization: SBW Observations

- Occupancy factors in WA CBPS and ASHRAE 100 are based on average EUIs for different building types
  - Data includes buildings of all sizes and fuel mixes across US and is not representative of Seattle building stock
- When a population of buildings applies normalization factors, the intent is that the EUI/GHGI averages for the population remain unchanged
- Normalizations may incentivize building operators to adjust building schedules to fit within a certain bin
- Reporting and verification burden for both the City and the building operator
  - E.g., for an office tracking “total number of hours per week where the majority of workers are present” (ENERGY STAR definition)

Multifamily Normalization Factor (OSE)

- Hours of occupancy does not apply, and stakeholders expressed concerns about density/number of tenants and/or subsidized housing status impacting GHGI
- Pacific Northwest National Laboratory (PNNL) analyzed the benchmarking data to understand the influence of various building features that could impact GHGI
  - Subsidized vs. unsubsidized buildings
  - Dwelling unit density
  - Bedroom density
  - Unit size in buildings with predominantly one-bedroom dwelling units
- PNNL's analysis results support an increase in the building performance target for subsidized, low-income housing compared to the current target established for all multifamily buildings
  - However, they could not identify a reliable factor for an adjustment based on unit density that worked across the multifamily buildings

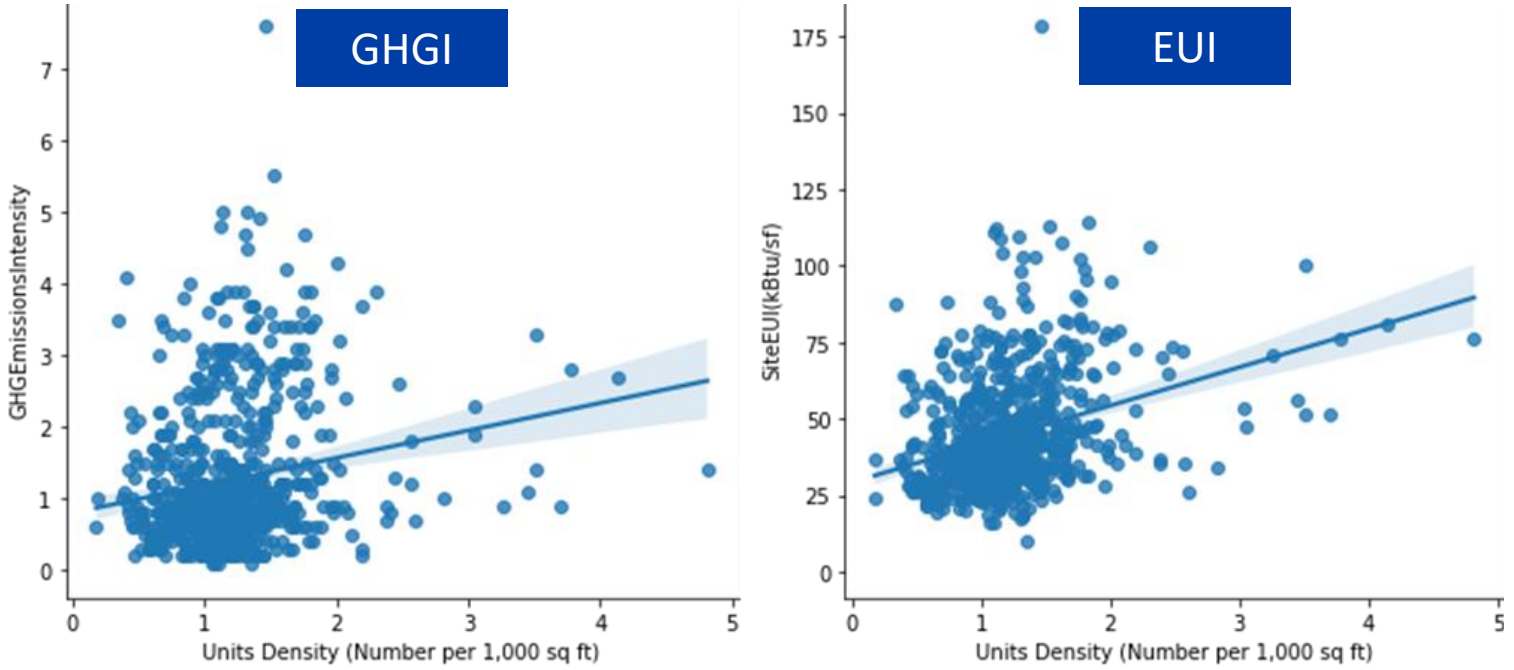
Multifamily: GHGI and EUI are both correlated with density, but the data is noisy

There is a correlation between GHGI and unit density (dwelling units per 1,000 ft2) but there is a lot of noise in the data

- The correlation between unit density and GHGI is 0.18

There is a stronger correlation between EUI and unit density

- The correlation between unit density and site EUI is 0.32

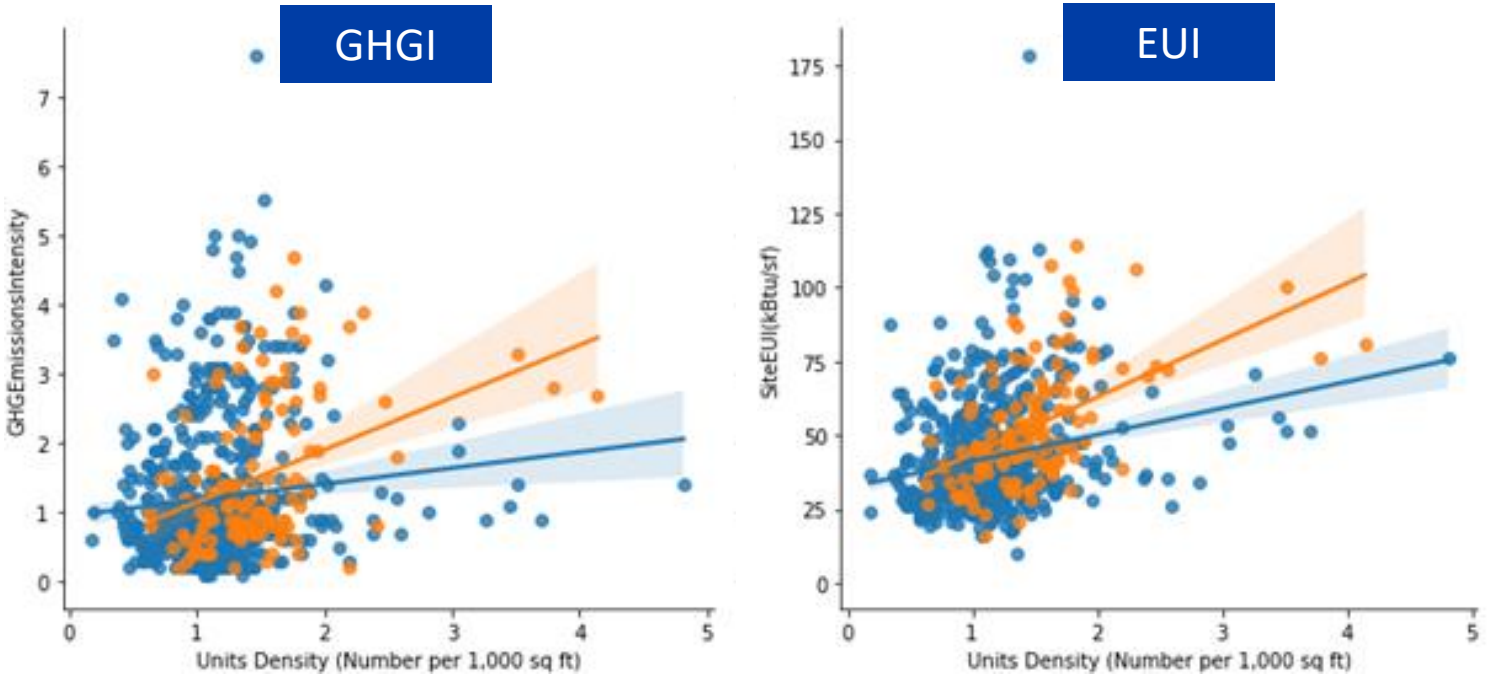


These figures compare the relationship between unit density in multifamily buildings and GHGI (left) or EUI (right). The shading represents the error bar.

Multifamily: Research supports a potential normalization factor for subsidized buildings

The analysis indicates for mixed fuel (mostly electric & gas) buildings that are **subsidized (in orange) have a higher GHGI than non-subsidized (in blue)**.

Subsidized buildings also have consistently higher EUIs than non-subsidized buildings.



These figures compare the relationship between unit density in multifamily buildings and GHGI (left) or EUI (right), based on subsidized or unsubsidized status. The shading represents the error bar.

Breakout Session #2

Breakout Session #2

Group A

What are the pros and cons of adopting a normalization factor for nonresidential hours of operation? Should OSE adopt the approach used by the Washington CBPS? Nothing? Something else?

Nicole, Santiago, Kirstin

Group B

What are the pros and cons of adopting a normalization factor for subsidized multifamily buildings? Is this an approach OSE should pursue further? Is it needed, given other flexible options?

Gemma, Faith, Sepideh

Group A: Hours of Operation

- **Question for discussion**: What are the pros and cons of adopting a normalization factor for hours of operation? Should OSE adopt the approach used by the Washington CBPS? Or nothing? Or something else?

Group A: Hours of Operation

Pros

- Could be helpful for 24/7 buildings [But could appear unfair to only have that option, and would shift overall averages]
- Get to net zero faster?

Cons

- Hard to define “occupancy hours”. Majority of workers present is not a good metric
- Occupancy hours may have little bearing on energy use
- Bound to lease language
- Different tenants have different hours of operation
- GHG is GHG, so if you think the targets are representative of building types, what would be the reason for OSNF
- What about having more bins? - Set by ASHRAE 100. Not enough data to build this out. But bins are large and may not capture building complexity.
- Lowers existing targets.
- Bigger reporting burden.

Group B: Multifamily Density

- **Question for discussion:** What are the pros and cons of adopting a normalization factor for subsidized multifamily buildings? Is this an approach OSE should pursue further? Is it needed given other flexible options for subsidized multifamily?

Group B: Multifamily Density

Pros

- Equitable distribution of responsibility
- Subsidized definition is not a good indication - Permanent supported housing - full-day occupancy, a lot of warp around services, vs work housing where occupants are at works. Also make sure NOAH is not penalized.
- By not considering non subsidized housing we are going to impact mid-level and NOAH
- Affordable Housing Transitional housing and Workforce (often in transit oriented zones) housing. Understanding the needs is important

Cons

- If we use density, it will be a lot of work and not impactful.
- Multifamily building type is more impactful on EUI vs density.
- Density can mean so many things.
- Building types of Mid -rise, high-rise, garden style or low-rise can make more sense.
- Energy consumption of a type is driven by occupancy. The more people in SQFT the intensity is higher

Facilitators shareout

Group A

What are the pros and cons of adopting a normalization factor for hours of operation? Should OSE adopt the approach used by the Washington CBPS? Nothing? Something else?

Group B

What are the pros and cons of adopting a normalization factor for subsidized multifamily buildings? Is this an approach OSE should pursue further? Is it needed, given other flexible options?

Emissions Factors for GHGI and Reporting of Renewables

Baseline emissions factors are established in the ordinance; compliance factors TBD

Energy source	Emissions factors (kgCO2e/kBtu)	
	For baseline GHGI (2019-2030)	For compliance GHGI (2031 – 2035) (Provisional)
Seattle City Light electricity	.0058	.0029
Puget Sound Energy natural gas	.053	.053
CenTrio district thermal energy	.081	.081

Table B for 22.925.070

Per the legislation, The Director shall establish by rule **the final emissions factors for energy sources for the 2031-2035 compliance interval by December 31 of 2027** and emissions factors for each subsequent compliance interval by December 31 of 2031, 2036, and 2041.

What does the ordinance say about renewables?

- The **emissions factors** for renewable energy such as biodiesel and renewable natural gas, are dependent on the specific supply sources of the renewable energy acquired.
- Renewable energy sources used in meeting a covered building's GHGIT **shall retain their environmental attributes and shall not be double counted or disaggregated** (SMC 22.925.070). This means that the renewable energy product and the environmental attributes are "bundled."
    - **Note: Renewable thermal certificates, carbon offsets, and renewable energy certificates (RECs) may not be used** to meet a covered building's compliance obligation.
    - Building owners shall provide the Director with an **attestation of the renewable energy purchased** which specifies the supply source and emissions factor of the renewable energy used.
- ***Examples of renewable energy:***
    - ***RNG purchased through Puget Sound Energy's*** *voluntary program to replace a portion of a covered buildings' conventional fossil gas*
    - ***Biodiesel*** *may be purchased through service providers to replace a portion of a covered buildings' use of conventional diesel*

Actions

- End of meeting check-in
- Shared drive, including the updated charter, and facilitation tools from today's meeting
- One more scheduling poll – general availability to schedule meetings through January
- We will circulate a 'what we heard' summary. Please let us know if anything wasn't captured correctly.

Conclusion

- Topics for next session on July 30th:
  - Building Portfolios
  - Connected Buildings and Campuses
  - Aggregate Portfolio Emissions
- Questions or comments? Email cleanbuildings@seattle.gov