



# **City of Bellevue Greenhouse Gas Emissions Inventory**

2024 Methodology Report

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# Inventory Approach

## Scope

The cities of Bellevue, Redmond, Kirkland, Issaquah, and Mercer Island (Eastside Cities) partnered to complete updated greenhouse gas (GHG) inventories for each city's communitywide and municipal operations. These inventories were completed for calendar year **2024** for all five cities and included emission sources and sectors intended to align closely with the methodology used for the 2022 Eastside Cities GHG inventories for Issaquah and Kirkland, and the 2023 Eastside Cities GHG inventories for Bellevue, Redmond, and Mercer Island.

The community-level inventories were completed in compliance with ICLEI's *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions* and the government operations inventories were completed in compliance with ICLEI's *Local Government Operations Protocol*.

## Inventory Platform

Emissions were calculated using a combination of [ICLEI's ClearPath platform](#) and Microsoft Excel.<sup>1</sup> ClearPath is the leading software platform used by local governments to complete communitywide and government operations GHG inventories in the United States.

# Inventory Processes & Data Sources

Conducting these inventories involved identifying and applying activity data and emission factors, summarized in Table 1 and Table 2 and detailed in the following sections:

- **Activity data** quantify levels of activity that generate GHG emissions, such as vehicle miles traveled and kWh of electricity consumed.
- **Emission factors** translate activity levels into emissions (e.g., MTCO<sub>2e</sub> per kWh).

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<sup>1</sup> Microsoft Excel was utilized to perform more detailed calculations than what is currently possible in ClearPath.

# Community

Table 1. Key approaches and data sources for 2024 communitywide inventories.

Sector	Activity Data	Emission Factors
<b>Transportation</b>		
On-road vehicles	<ul style="list-style-type: none"> <li>Modeled vehicle miles traveled by vehicle type. The BKR model was used for Bellevue, Kirkland, and Redmond and the PSRC model was used for Mercer Island and Issaquah.</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle carbon intensities (MTCO<sub>2</sub>e/mile) based on PSRC modeling</li> <li>Re-evaluation of passenger vehicle emissions rates by separating internal combustion vehicles from electric vehicles.</li> </ul>
Non-road vehicles and equipment	<ul style="list-style-type: none"> <li>County-level emissions from non-road vehicles (EPA MOVES) by sector (e.g., construction, lawn/garden) and fuel type, downscaled to cities by population</li> </ul>	
Aviation <i>Note: Aviation was included as “Information Only” in the inventories for Bellevue, Issaquah, Kirkland, and Redmond; these emissions are not counted as part of total emissions.</i>	<ul style="list-style-type: none"> <li>Fuel consumption data (SeaTac, Boeing Field), downscaled equitably to cities using passenger survey data (SeaTac), population (US Census), and average household income (US Census)</li> </ul>	<ul style="list-style-type: none"> <li>EPA emission factors, by fuel type (US EPA)</li> </ul>
Public transit	<ul style="list-style-type: none"> <li>Modeled transit vehicle miles traveled (PSRC; BKR model)</li> <li>Fuel consumption for KC Metro and Sound Transit (NTD Database)</li> </ul>	<ul style="list-style-type: none"> <li>EPA emission factors for fuels (US EPA)</li> </ul>
<b>Building Energy</b>		
Electricity	<ul style="list-style-type: none"> <li>Electricity consumption from PSE’s standard service and through green power programs, by sector (Puget Sound Energy)</li> <li>Grid loss rates (Puget Sound Energy)</li> </ul>	<ul style="list-style-type: none"> <li>Utility-specific emission factors (Puget Sound Energy)</li> </ul>
Natural gas	<ul style="list-style-type: none"> <li>Natural gas consumption, by sector (Puget Sound Energy)</li> <li>Natural gas leakage rates (Puget Sound Energy)</li> </ul>	<ul style="list-style-type: none"> <li>Utility-specific emission factor (Puget Sound Energy)</li> </ul>
Fuel oil	<ul style="list-style-type: none"> <li>Washington state energy consumption estimates (EIA), downscaled by:                             <ul style="list-style-type: none"> <li>Local households heated using fuel oil (US Census)</li> <li>Local employment, by sector (PSRC)</li> </ul> </li> <li>Regional building fuel type and fuel intensity data estimates (EIA) applied</li> </ul>	<ul style="list-style-type: none"> <li>ClearPath default emission factor (US EPA)</li> </ul>

## City of Bellevue Greenhouse Gas Emissions Inventory

Sector	Activity Data	Emission Factors
	to square footage by sector for commercial and industrial fuel oil (Redmond only)	
Propane	<ul style="list-style-type: none"> <li>• Washington state energy consumption estimates (EIA), downscaled by:                             <ul style="list-style-type: none"> <li>• Local households heated using propane (US Census)</li> </ul> </li> <li>• Local employment, by sector (PSRC)</li> </ul>	<ul style="list-style-type: none"> <li>• ClearPath default emission factor (US EPA)</li> </ul>
<b>Solid Waste &amp; Wastewater</b>		
Solid waste and compost generation & disposal	<ul style="list-style-type: none"> <li>• Annual tons disposed and composted, as reported by City staff from haulers</li> <li>• Landfill and composted waste characterization (King County Solid Waste Division)</li> </ul>	<ul style="list-style-type: none"> <li>• EPA WARM v16 model</li> </ul>
Wastewater process emissions	<ul style="list-style-type: none"> <li>• Process emissions for South Plant and Brightwater Plant are based on 2023 per capita emissions scaled according to 2024 population (King County Wastewater Treatment Division)</li> </ul>	
<b>Refrigerants</b>		
Refrigerants	<ul style="list-style-type: none"> <li>• Nationally reported fugitive gas emissions, scaled by local population (US EPA)</li> </ul>	

## Government Operations

Table 2. Key approaches and data sources for 2024 government operations inventories.

Sector	Activity Data	Emission Factors
<b>Transportation</b>		
Vehicle fleet	<ul style="list-style-type: none"> <li>Gallons of fuel, vehicle type, and miles travelled, as reported by City staff</li> </ul>	<ul style="list-style-type: none"> <li>ClearPath default emission factors (US EPA)</li> <li>Re-evaluation of passenger vehicle emissions rates by separating internal combustion vehicles from electric vehicles.</li> </ul>
Employee commute	<ul style="list-style-type: none"> <li>Average one-way commute, number of employees, and working days as reported by WSDOT CTR Employer Survey (Bellevue, Redmond, and Issaquah)</li> <li>Employee survey (Mercer Island)</li> <li>City staff estimates (Kirkland)</li> </ul>	<ul style="list-style-type: none"> <li>WSDOT CTR Employer Survey (Redmond &amp; Issaquah)</li> <li>ClearPath default emission factors (US EPA)</li> </ul>
Business travel	<ul style="list-style-type: none"> <li>Air miles traveled, as reported by City staff</li> </ul>	<ul style="list-style-type: none"> <li>ClearPath default emission factors (US EPA)</li> </ul>
<b>Building Energy, Streetlights/Traffic Signals, and Water Conveyance</b>		
Electricity	<ul style="list-style-type: none"> <li>Electricity consumption from PSE's standard service and through green power programs (Puget Sound Energy)</li> <li>Grid loss rates (Puget Sound Energy)</li> </ul>	<ul style="list-style-type: none"> <li>Utility-specific emission factors (Puget Sound Energy)</li> </ul>
Natural gas	<ul style="list-style-type: none"> <li>Natural gas consumption (Puget Sound Energy)</li> <li>Natural gas leakage rates (Puget Sound Energy)</li> </ul>	<ul style="list-style-type: none"> <li>Utility-specific emission factor (Puget Sound Energy)</li> </ul>
Fuel oil/diesel	<ul style="list-style-type: none"> <li>Consumption for generators (City staff)</li> </ul>	<ul style="list-style-type: none"> <li>ClearPath default emission factors (US EPA)</li> </ul>
<b>Solid Waste</b>		
Solid waste generation & disposal	<ul style="list-style-type: none"> <li>Annual tons disposed and composted (City staff)</li> <li>Landfill waste characterization studies (King County Solid Waste Division)</li> </ul>	<ul style="list-style-type: none"> <li>ClearPath default emission factors</li> </ul>
<b>Refrigerants</b>		
Refrigerants	<ul style="list-style-type: none"> <li>Annual tons of refrigerants used in City facilities and vehicles (City staff)</li> </ul>	

# Data Limitations and Assumptions

Notable limitations of the approach and data sources are summarized below.

## Defaults

### Global Warming Potentials

- **Non-Fossil Fuel Methane:** The 2024 GHG inventories used AR6 Global Warming Potentials, per the Greenhouse Gas Protocol's guidance<sup>2</sup>. The GHG Protocol non-fossil GWP value for methane (CH<sub>4</sub>) is 27.0, whereas ClearPath's calculators are hardcoded to use a value of 27.2. This discrepancy was communicated to ICLEI. It's recommended that, in future years, cities should assess which GWP value is being used in ClearPath and re-calculate the ClearPath outputs for the 2024 inventories if necessary to ensure that the appropriate value is being used in all calculators.

## Community

### Transportation

- **Non-Road Vehicles and Equipment:** The EPA MOVES model estimates emissions at the county level, so emissions were scaled from county to city level by population for this analysis.
- **Aviation:** Aviation emissions were estimated by equitably attributing emissions from fuel consumption at Seattle-Tacoma International Airport and Boeing Field, using passenger survey data and total income by jurisdiction. Some jurisdictions opted to include aviation as "Information Only"; these emissions are not counted as part of communities' total emissions.

### Building Energy

- **Electricity:** Electricity provided through Puget Sound Energy's green power programs, such as Green Direct and Community Solar, was assumed to be zero

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<sup>2</sup> [Microsoft Word - Global-Warming-Potential-Values.docx](#)

emission. This assumption is based on information provided by Puget Sound Energy and guidance provided by ICLEI and standard protocols.

- **Electricity:** These inventories use utility-specific emission factors to estimate emissions from electricity use, rather than regional eGRID emission factors that were used in previous inventories. Puget Sound Energy's fuel mix has varied over time as the utility uses different amounts of individual fuels to generate electricity. Since 2011, PSE's annual emission factor has increased and decreased, reaching up to 35% higher than the utility's 2011 emission factor. This may account for some fluctuations in emissions from electricity over time. From 2023 to 2024, PSE's electricity emission factor decreased by 3%.
- **Electricity and natural gas:** For the 2024 inventories, the consumption used was provided by Melvin Lie, and the Green Power, Green Direct, and Community Solar electricity values were provided by Kelsey Saty, which were subtracted from the total consumption provided by Melvin to account for zero emission electricity purchases. This methodology is consistent with the approach used for the 2022 and 2023 inventories.
- **Propane and fuel oil:** 2024 EIA consumption data was unavailable at the time of this analysis, so 2023 data was used as a proxy. Beginning in 2024, Redmond used land area as a proxy for total building square feet when calculating commercial and industrial fuel oil emissions.

## Solid Waste & Wastewater

- **Compost:** Emissions from composted waste were estimated using King County's most recent residential and commercial organics studies, completed in 2018 and 2019.
- **Wastewater:** In 2022, KC WTD provided each plant's calculated emissions. To estimate emissions by jurisdiction, a per-capita emission factor was determined based on the approximate population served by each plant, and this factor was applied to each jurisdiction's population. In 2023, KC WTD did not provide emissions per-plant but provided total emissions. KC WTD did not provide any emissions data for 2024. For this reason, emissions were estimated for 2024 based on 2023 per capita emissions scaled according to 2024 population.

## Refrigerants

- Emissions from refrigerants were downscaled from national data based on population.

- The EPA has not released the 2024 *Inventory of U.S. Greenhouse Gas Emissions and Sinks*. As such, refrigerant emissions from the EPA's 2023 draft report were scaled to 2024 using population. Note that the 2023 draft report became available in 2025 and represents an update compared to last year's methodology report. The 2023 draft report was also used to retroactively update 2023 emissions for Bellevue.

## Government Operations

Each of the Eastside Cities collects and maintains records differently. Due to the variation in data available, each city's municipal operations inventory was completed using slightly different activity data and methodologies for certain emission sources (e.g., employee commute, refrigerants), as noted in Table 2.

## Retroactive Updates

Due to adjustments in methodologies, there have been several retroactive updates made to the 2023 community-wide emissions and to the City's municipal operations from 2021-2023.

### **Communitywide Updates:**

For the 2024 GHG Inventory and all prior years, aviation emissions and commercial and industrial fuel oil emissions were removed as they did not reflect accurate emissions activity that occurs within the city's boundaries. On-road transportation emissions were re-calculated to better reflect the growing share of electric vehicles within the city. As a result, updated emissions for all years prior to 2024 have been updated to reflect these changes.

### **Municipal Operations:**

The city began purchasing Renewable Energy Credits (RECs) from PSE's Green Direct program to offset emissions from electricity consumption for select city meters. Previously, RECs were applied on a billing-period basis, which did not align with inventory start-end dates of January-December. By applying RECs on a month-by-month service period, the January-December RECs totals were slightly adjusted.