

# 2022 Greenhouse Gas Emissions Inventory



Pacific Northwest Transportation Services

January 1 to December 31, 2022

Completed By	Arctica Cunningham & Chloe Shore
Email	<a href="mailto:Arctica@synergyenterprises.ca">Arctica@synergyenterprises.ca</a>
Completed	1/6/2023

synergy

## Executive Summary

Pacific Northwest Transportation Services (PNWTS), a wholly owned subsidiary of Western Stevedoring, provides shuttle bus services between the Ogden Point Cruise Ship terminal to downtown Victoria and Butchart Gardens. PNWTS leases one office building on Dallas Road, and new in 2022 they began leasing a warehouse on McDonald Park Road. 2022 marks the fourth year that PNWTS has measured, reported, and offset their emissions.

Emissions in 2022 were 955 tCO<sub>2</sub>e. Refrigerant consumption in buses A/C units contributed 493 tCO<sub>2</sub>e (51.7% of total), followed by diesel at 320 tCO<sub>2</sub>e (33.6%), natural gas at 71.3 tCO<sub>2</sub>e (7.47%), and electricity at 0.94 tCO<sub>2</sub>e (0.10%). Scope 3 emissions (water, waste, paper, travel, commuting) together contributed 6.4% of the total footprint. Biogenic emissions from biodiesel (7.39 tBioCO<sub>2</sub>) are also included in the inventory, but do not need to be offset.

Both 2020 and 2021 business operations were heavily affected by COVID-19, resulting in the elimination of several emissions sources. As such, these years should not be considered representative of normal business operations.

## Inventory Information

Company Name	Pacific Northwest Transportation Services		
Contact Information	David Roberts	david@pnwts.com	(778) 405-0301
Company Description	One office building, one warehouse, 44 buses, 3 shuttles, 1 electric bus, one pickup truck		
Reporting Period	January 1 to December 31, 2022		
Inventory Boundary	<b>Scope 1 (Direct Emissions)</b>		
	- Natural Gas, Gasoline, Diesel, Refrigerant (R-134A)		
	<b>Scope 2 (Indirect Emissions from Purchased Electricity)</b>		
	- Purchased Electricity (BC Hydro)		
	<b>Scope 3 (Indirect Emissions from Other Sources)</b>		
	- Water, Waste, Stationery, Paper Products, Company Travel, Staff Commuting		
Scope 2 Approach	Location Based Emissions Calculation		
Consolidation Approach	Operational Control: Accounting for 100% of emissions from operations over which the company has operational control.		
Primary Measurement	Greenhouse gas emissions measured in Carbon Dioxide Equivalent (CO <sub>2</sub> e)		
Reporting Guidelines	Aligned with those defined in <i>The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, Revised Edition (The GHG Protocol, www.ghgprotocol.org)</i> . Emissions factors reviewed & approved by Ostrom.		

# Summary of Results

Total tCO<sub>2</sub>e **955**

Equivalent to:



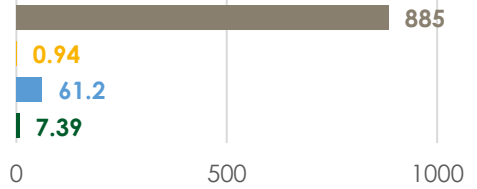
**272**

Cars per Year

Offset Cost **\$28,440**

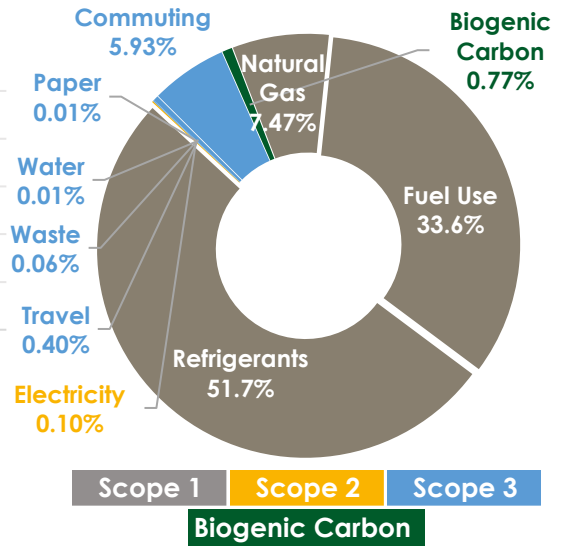
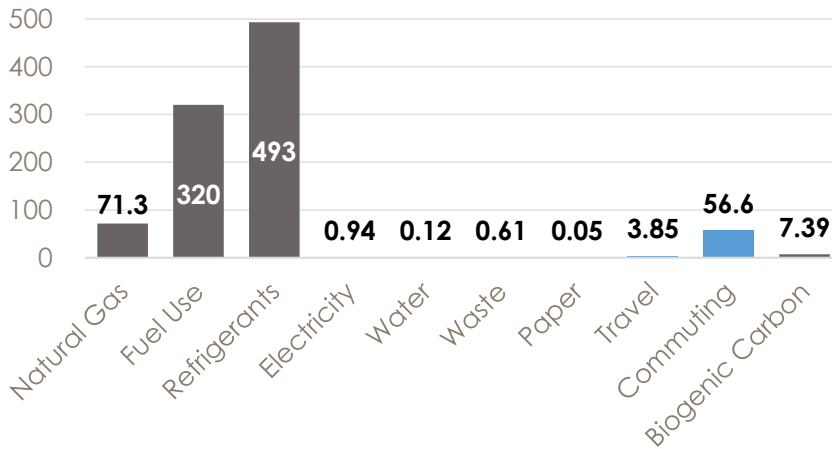
## Carbon Footprint by Scope

	tCO <sub>2</sub> e	
Scope 1 (Direct)	<b>885</b>	93% of total footprint
Scope 2 (Indirect)	<b>0.94</b>	0% of total footprint
Scope 3 (Indirect)	<b>61.2</b>	6% of total footprint
Biogenic Carbon	<b>7.39</b>	of total footprint
<b>TOTAL EMISSIONS</b>	<b>955</b>	



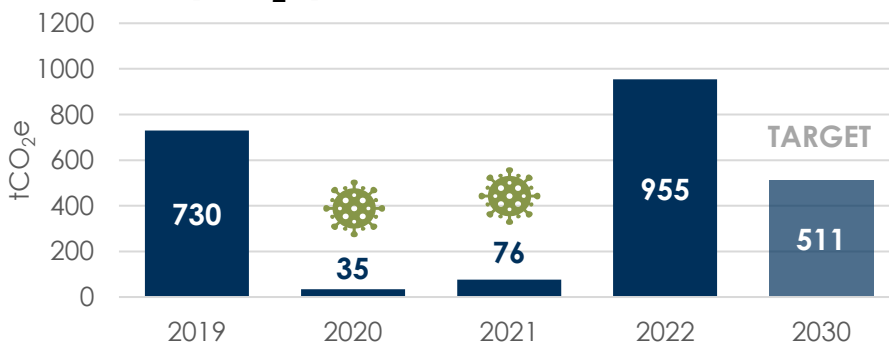
## Carbon Footprint By Activity

### Emissions by Activity (tCO<sub>2</sub>e)



## Carbon Footprint Year Over Year

### Emissions (tCO<sub>2</sub>e)



	Combined tCO <sub>2</sub> e	Change since Baseline	
		tCO <sub>2</sub> e	Percent
2019	730		
2020	34.5	696	-95%
2021	75.8	654	-90%
2022	955	-224	31%
TARGET	511	219	-30%




Years affected by COVID-19

# Emission Reduction Targets

Reduction Target	
<b>30%</b> by 2026	<b>50%</b> by 2030

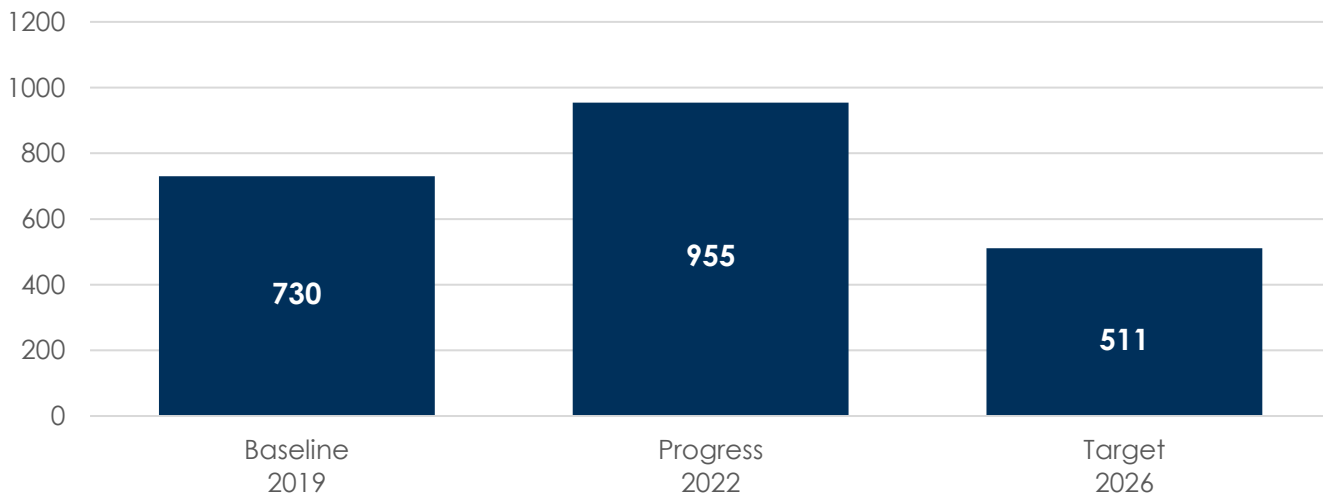
Actual	
% Increase	<b>31%</b> 2022

PNWTS has committed to reduce their total footprint (scope 1, 2 and 3 emissions) 30% by 2026 and 50% by 2030, from their 2019 baseline level. In 2022, emissions increased 31%.

Top Emission Source	Baseline (2019)	2022 Actual	% Difference
 Refrigerants	tCO <sub>2</sub> e <b>110</b>	tCO <sub>2</sub> e <b>493</b>	Increase <b>347%</b>
 Fuel Use	tCO <sub>2</sub> e <b>615</b>	tCO <sub>2</sub> e <b>320</b>	Decrease <b>-48%</b>
 Natural Gas	tCO <sub>2</sub> e <b>4.08</b>	tCO <sub>2</sub> e <b>71.3</b>	Increase <b>1648%</b>

## Overall Progress

### Emissions (tCO<sub>2</sub>e)

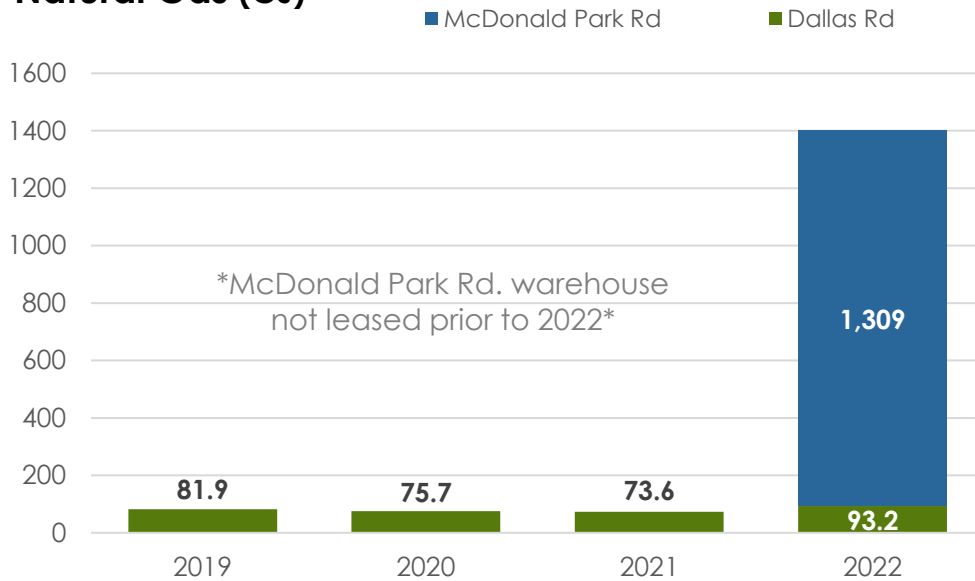


## Notes on Targets

PNWTS has committed to reducing their total footprint 30% by 2026 and 50% by 2030 over their 2019 baseline. However, with the lease of a new warehouse heated by natural gas, and the need to replace refrigerants in the buses' A/C units, 2022 resulted in higher than usual emissions for PNWTS. Refrigerants are a very high emission source that only need to be replaced when there is a leak. PNWTS plans to upgrade their fleet, so this should not be a reoccurring emission source. The second highest emissions source was fuel use, which decreased 48% compared to the 2019 baseline! PNWTS is exploring zero-emission bus technology, which will be instrumental in further reducing fuel emissions.

# Natural Gas

## Natural Gas (GJ)



### Analysis

Natural gas use for 2022 totaled 71.3 tCO<sub>2</sub>e, 7.47% of PNWTS' footprint.

Consumption increased 27% at the primary office on Dallas Road. The majority of consumption came from PNWTS' new warehouse.

Warehouses are notoriously difficult to heat due to their large spatial volumes and bay doors. To lower future emissions, PNWTS could secure renewable natural gas or switch to electric powered heating.

tCO<sub>2</sub>e **71.3**

% of Total **7.5%**

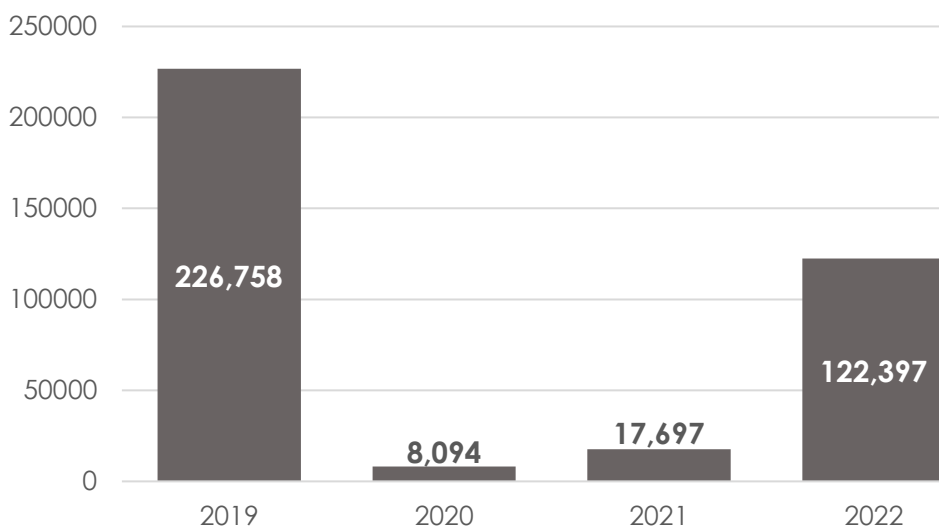
GJ/ft<sup>2</sup> **0.41**



**15.9**  
Houses

# Diesel

## Diesel (L)



### Analysis

Diesel consumption in PNWTS buses decreased by 48% compared to the 2019 baseline with a total of 122,397 L and 320 tCO<sub>2</sub>e.

Fuel consumption was lower as the cruise activity was not back to pre-pandemic levels in 2022, so fewer bus trips were required. PNWTS has been upgrading their fleet, and switching to double decker buses notably decreased the amount of fuel required per passenger-movement.

tCO<sub>2</sub>e **320**

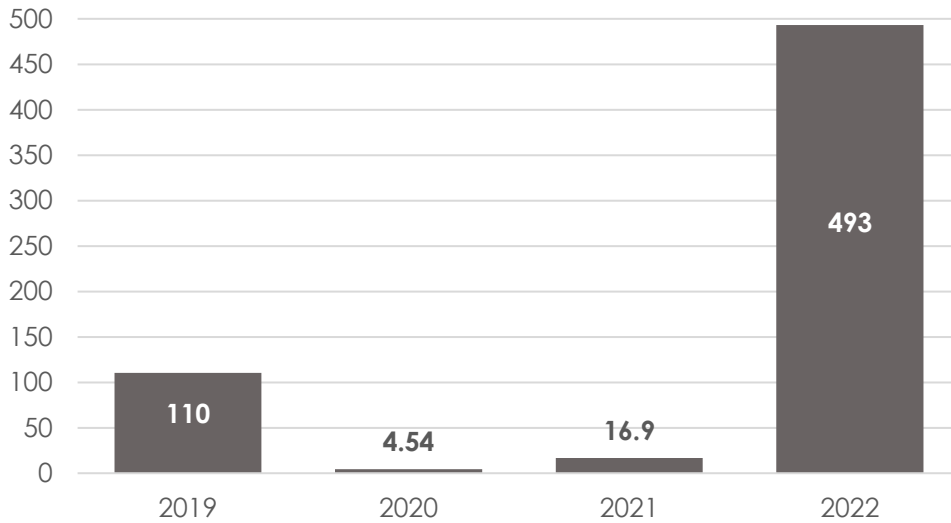
% of Total **34%**



**91.2**  
Cars / Year

# Refrigerants

## Refrigerants (tCO<sub>2</sub>e)



### Analysis

Refrigerant use in 2022 totaled 345 lbs, a 347% increase over the 2019 baseline.

Refrigerant levels needed replacing after COVID-19, as buses not in use leaked refrigerants. During repairs, mechanics also needed to release refrigerants for leak testing purposes. This can be avoided in the future by ensuring all A/C units are properly sealed.

tCO<sub>2</sub>e **493**

% of Total **52%**

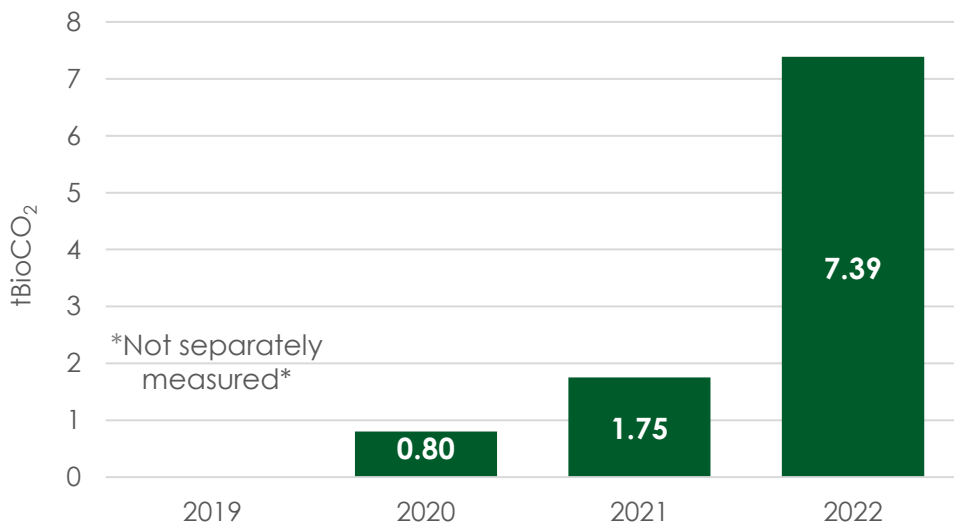
kg/ Bus **7.8**



**1,556**  
Barrels of Oil

# Biogenic CO<sub>2</sub>

## Biogenic Carbon (tBioCO<sub>2</sub>)



### Analysis

Biogenic emissions occur as a result of mandatory renewable fuel content in all diesel sold in B.C. (4% minimum).

PNWTS 2022 biogenic carbon emissions totaled 7.39 tBioCO<sub>2</sub>, 0.77% of the total footprint.

Biogenic emissions are reported outside of Scopes 1-3 and do not need to be offset.

\* Note: Changes in reporting requirements for biogenic carbon mean that these emissions are now reported separately. 2019 biogenic emissions were included in total scope 1 fuel emissions.

tBio-CO<sub>2</sub> **7.39**

% of Total **0.8%**

tBioCO<sub>2</sub>/ Bus **0.17**

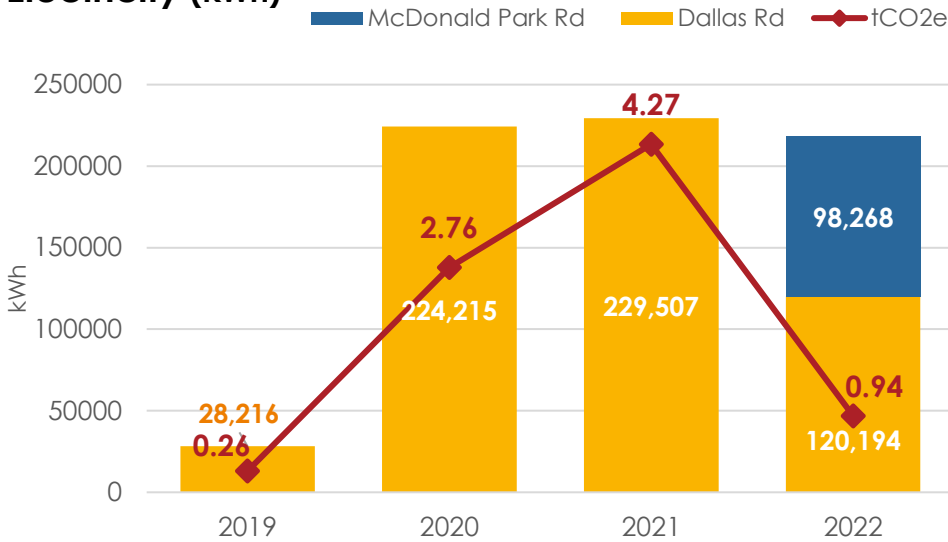


**2.1**  
Cars / Year



# Electricity

## Electricity (kWh)



## Analysis

Overall electricity consumption for PNWTS in 2022 decreased by 5% compared to 2021 levels, despite the additional of the McDonald Park warehouse. At the main office building on Dallas Road, consumption decreased an impressive 48%! This due to PNWTS having a separate meter as of 2022, as well as behavioural changes with heating and cooling appliances.

\*Note: Electricity consumption increased substantially in 2020, compared to 2019, due to PNWTS taking over the entire Dallas Rd. building, where in 2019 they only leased an office. In 2022 they installed a separate meter for their offices, improving the accuracy of electricity usage.

tCO<sub>2</sub>e **0.94**

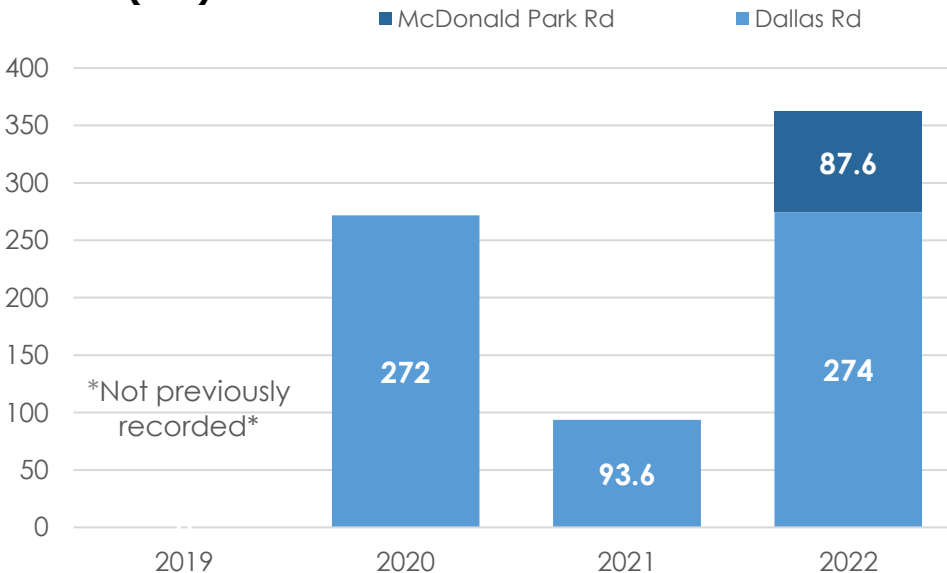
% of Total **0.1%**

kWh / ft<sup>2</sup> **35.5**

 **10.8**  
Houses

# Water

## Water (m3)



## Analysis

PNWTS' water consumption for 2022 totaled 362 m<sup>3</sup>, equivalent to 361,600 L and 0.12 tCO<sub>2</sub>e.

Water does not carry a large carbon footprint, however water conservation is an important sustainability initiative and should continue to be measured and reduced.

tCO<sub>2</sub>e **0.12**

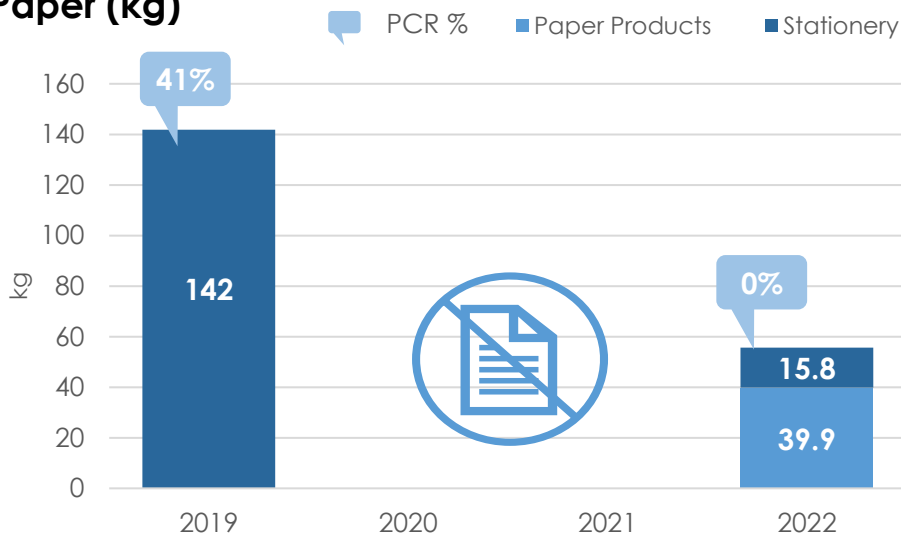
% of Total **0.01%**

m<sup>3</sup> / ft<sup>2</sup> **0.08**

 **1,250**  
Baths (50gal)

# Paper

## Paper (kg)



## Analysis

2022 saw the lowest paper consumption since first measuring in 2019. Emissions totaled 0.05 tCO<sub>2</sub>e, 0.01% of the total footprint.

Paper purchased in 2022 did not contain any post-consumer recycled materials (PCR). By ensuring paper products purchased are PCR or tree free, PNWTS could save 0.2 trees.

\* Note: Improved factors have been applied to calculate the emissions from paper. These improved factors may cause a decrease in emissions per kg of paper used.

tCO<sub>2</sub>e **0.05**

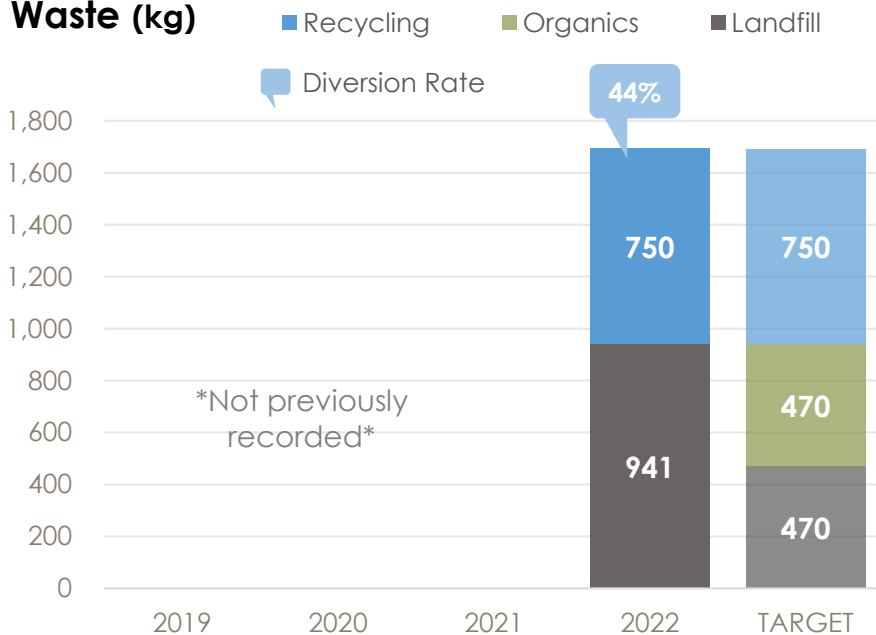
% of Total **0.01%**

Treeless Content **0%**

 **0.2**  
Trees / Year

# Waste

## Waste (kg)



## Analysis

2022 marks the first year PNWTS has measured and reported waste.

PNWTS waste totaled 1,691 kg, resulting in 0.6 tCO<sub>2</sub>e, equivalent to 4.63 kg per day.

44% of waste was diverted from the landfill through recycling. In March, 2023, PNWTS implemented composting in the offices, which will increase their diversion rate for 2023.

tCO<sub>2</sub>e **0.61**

% of Total **0.1%**

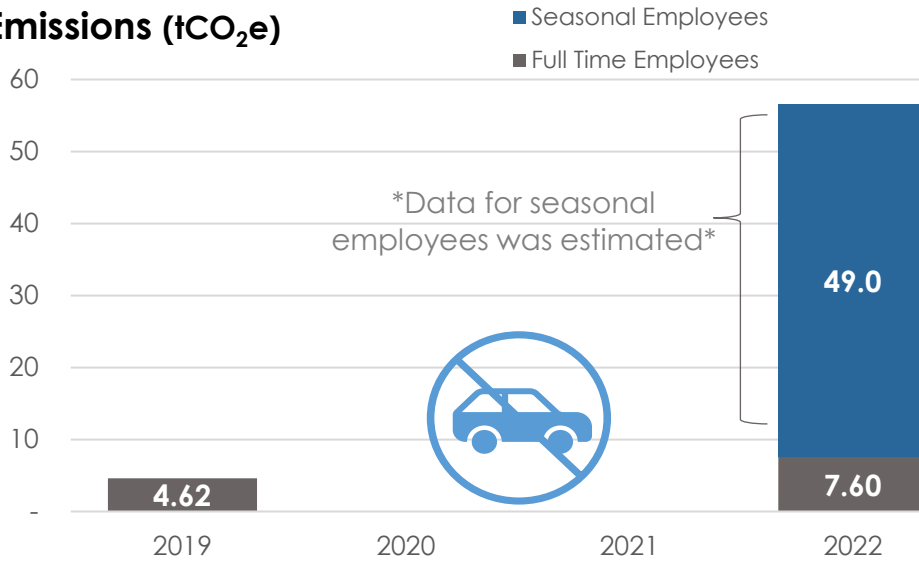
kg / Day **4.63**

 **44%**  
Diversion Rate



# Commuting

## Emissions (tCO<sub>2</sub>e)



## Analysis

Commuting in 2022 was the highest emissions source of scope 3, totaling 56.6 tCO<sub>2</sub>e, 5.93% of the total footprint and 92.5% of scope 3 emissions. PNWTS employees often finish work late at night after public transit has stopped, making it difficult to use this commuting method. To lower future emissions, PNWTS can encourage carpooling.

\*Note: 2022 commuting data was estimated based on limited results from a 2019 survey. PNWTS plans to redo the survey in 2023 when seasonal staff are available to improve data collection.

tCO<sub>2</sub>e **56.6**

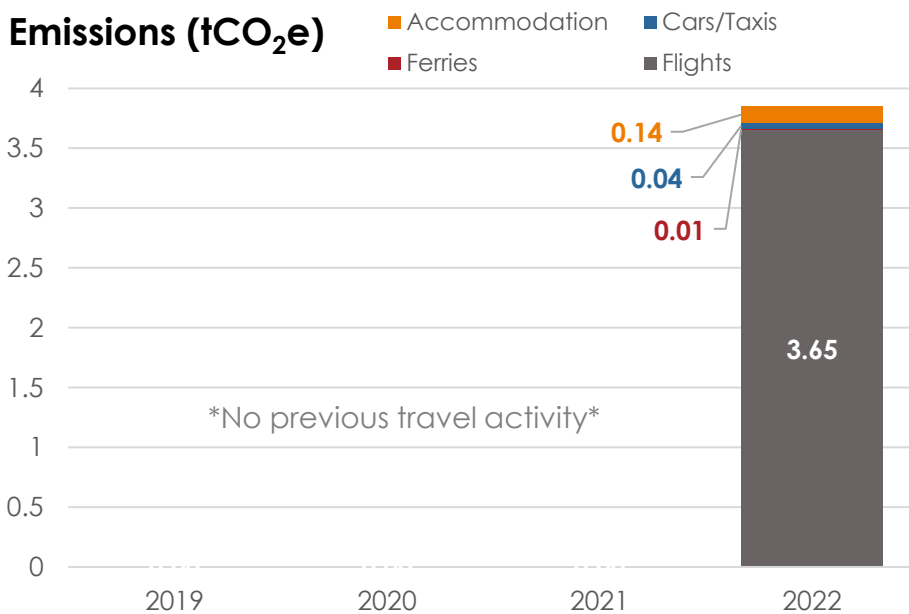
% of Total **5.9%**

tCO<sub>2</sub>e / employee **0.64**

 **16.1**  
Cars / Year

# Travel

## Emissions (tCO<sub>2</sub>e)



## Analysis

2022 marks the first year PNWTS has had company travel.

PNWTS had four, 2-way flights in 2022, resulting in 3.65 tCO<sub>2</sub>e, 0.40% of the total footprint.

Accommodation was the second highest travel source, producing 0.14 tCO<sub>2</sub>e from a total of 9 nights in hotels outside of BC.

tCO<sub>2</sub>e **3.85**

% of Total **0.4%**

tCO<sub>2</sub>e / FTE **0.55**

 **1.1**  
Cars / Year

# Carbon Reduction Strategy

2022 marks the fourth year that PNWTS has measured, reported, and offset their carbon emissions.

Overall emissions in 2022 totaled 955 tCO<sub>2</sub>e, 31% higher than the 2019 baseline. This was largely due to refrigerant consumption at 493 tCO<sub>2</sub>e (51.7% of total). Diesel, previously PNWTS' largest source, was the second largest source at 320 tCO<sub>2</sub>e (33.6%), and 48% lower than the 2019 baseline. Natural gas was the third highest source, at 71.3 tCO<sub>2</sub>e (7.47%). Scope 3 emissions combined contributed 6.41% of the total footprint.

To reduce future emissions, PNWTS should ensure all A/C units in buses are sealed to prevent refrigerant leakage and look to secure renewable natural gas or electric heating at the new warehouse building.

## Achievements

- Measured, reported, and offset their emissions for the fourth year
- Lowered fuel emissions by 48% compared to 2019 baseline
- Lowered overall electricity consumption by 5%, despite adding a second location.
- Lowered paper consumption by 61% compared to 2019 baseline

## Moving Forward

- Continue to measure and report carbon emissions
- Ensure refrigerants in A/C units are sealed and buses are maintained
- Secure renewable natural gas or electric heating for warehouse location
- Consider scope 3 reductions, such as lowering water usage and implementing composting.

## Information on Inventory Uncertainty

\* Staff commuting emissions are estimated based on a survey conducted in 2019, which only received 6 responses. PNWTS should complete a new staff survey before the 2023 GHG inventory is completed, to improve the accuracy of results.

# Emissions References

1. 2020 B.C. Best Practices Methodology for Quantifying Greenhouse Gas Emissions  
<https://www2.gov.bc.ca/assets/gov/environment/climate-change/cng/methodology/2018-psomethodology.Pdf>

2. Environment Canada's National Inventory Report (1990-2019); Part 2 & 3.  
<https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/inventory.html>

3. Department for Environment, Food & Rural Affairs (UK) Carbon Factors 2021  
<https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors->

4. Intergovernmental Panel on Climate Change (Global Warming Potentials)  
[http://www.ipcc.ch/publications\\_and\\_data/ar4/wg1/en/ch2s2-10-2.html](http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html)

All emissions factors are reviewed and approved by Ostrom Climate Solutions (<https://ostromclimate.com/>) on an annual basis.

## Policy for Base Year Recalculation:

Base year emissions, and other previous emissions, shall be retroactively recalculated if a change in organizational structure or data quality is expected to exceed a significance threshold of 10% of base year emissions. These changes may arise from structural changes such as mergers, acquisitions, divestments, outsourcing or insourcing, changes in calculation methodology and improvements in accuracy, or discovery of significant errors.

# Glossary of Terms

Term	Description
Carbon Neutral	Companies are carbon neutral when they remove GHG emissions equivalent to all their scope 1, 2 and material (>5%) scope 3 emissions, usually by purchasing carbon offsets.
Biogenic	Carbon emissions generated from sources naturally occurring in the carbon cycle (i.e. organic matter), rather than the result of fossil fuel combustion.
Emissions Factor	The volume of emissions created by an emissions producing activity (i.e. fuel combustion), calculated based on the amount of the activity (volume, distance, etc.).
GHG	<b>Greenhouse Gas (emissions):</b> Atmospheric gasses contributing to the greenhouse effect, including Carbon Dioxide (CO <sub>2</sub> ), Methane (CH <sub>4</sub> ), Nitrous Oxide (N <sub>2</sub> O), etc.
GJ	<b>Gigajoule:</b> Unit of natural gas equal to 26.137 m <sup>3</sup> or 0.947 MMBtu
kWh	<b>Kilowatt-Hour:</b> Common unit for measuring electrical consumption
m <sup>3</sup>	<b>Cubic Meter:</b> Unit of measurement equal to 1,000 Litres
Net-Zero	Companies with a zero-emission carbon footprint, usually achieved by minimizing outputs and negating the remaining emissions through carbon removal activities.
PCR%	<b>Post-Consumer Recycled Content</b> (as a percentage)
psg-km	<b>Passenger-Kilometer:</b> Unit separating total emissions between passengers per km
tCO <sub>2</sub> e	<b>Tonnes of Carbon Dioxide Equivalent:</b> a combined term capturing the emissions from various GHGs.
t-km	<b>Tonne-kilometer:</b> A unit of measurement used in shipping

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