



Greenhouse Gas Emissions Inventory Trend and Wedge Analysis for the Puget Sound Region

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ABOUT US

- Oversee outdoor air quality in four counties
- Work on improving air quality through various projects, provide air quality forecasts and education
- Long history with large industry
- Added focus on transportation and wood smoke (recently wildfire smoke)
- In addition to enforcement, we promote partnerships and incentives to improve air quality

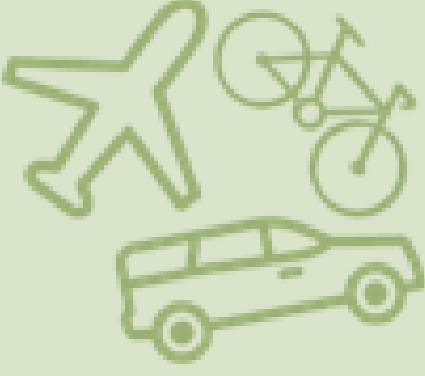

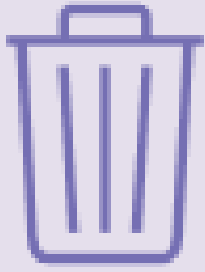

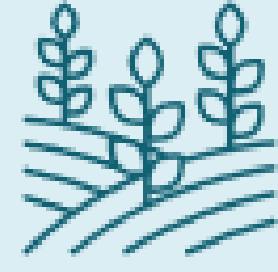



PSREA Project

- Puget sound Regional Emissions Analysis Project
- Done in partnership with
 - King County
 - King County-Cities Climate Collaboration (K4C)
 - Snohomish County
 - Kitsap County
 - Pierce County
 - Snohomish County
 - Puget Sound Regional Council
 - City of Seattle

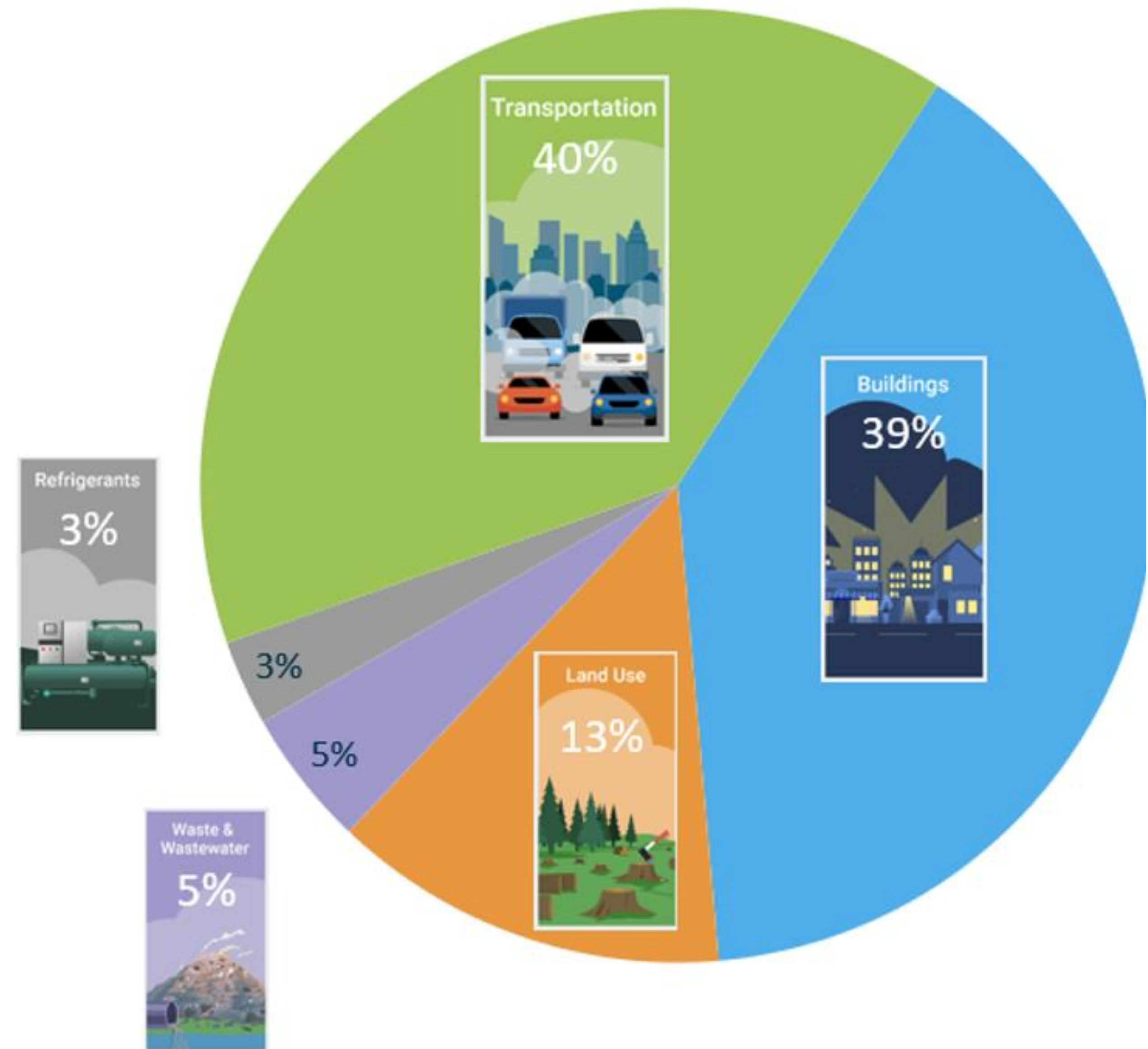


Emission Inventory Methodology

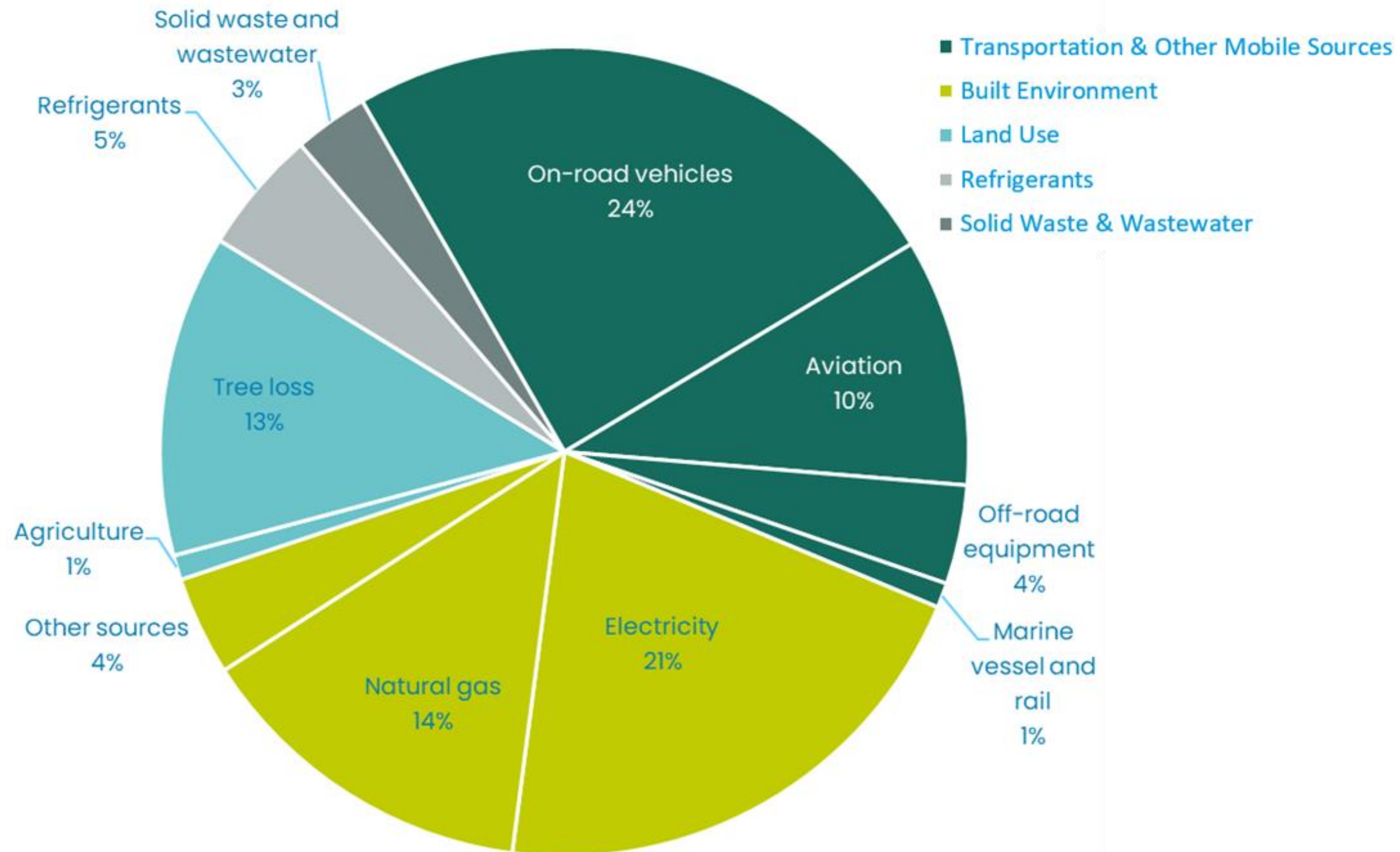
Geographic Inventory Sectors & What's Included			
Transportation		Building Energy	
	Driving within the counties, flights from county travelers, maritime/rail travel, non-road vehicle and equipment use		Residential, commercial, and industrial electricity and natural gas use and associated loss and leakage, residential fuel oil and propane, and industrial processes
Solid Waste & Wastewater		Refrigerants	
	Solid waste generation and disposal and wastewater processes		Fugitive emissions of high GWP refrigerants (chemicals) used in air conditioners, refrigerators, and heat pumps.
Land Use		Sequestration	
	Agriculture and tree cover loss		Solid waste disposal sequestration and sequestration from trees and forests

Geographic Emissions

- In 2019, 48 million metric tons of CO₂ equivalent (MMTCO₂e) was produced in PSCAA's four-county area
- Roughly 11.4 MTCO₂e per capita in 2019
- Total GHG emissions increased 12% compared to 2015
- Per-capita GHG emissions increased 3.6% compared to 2015.

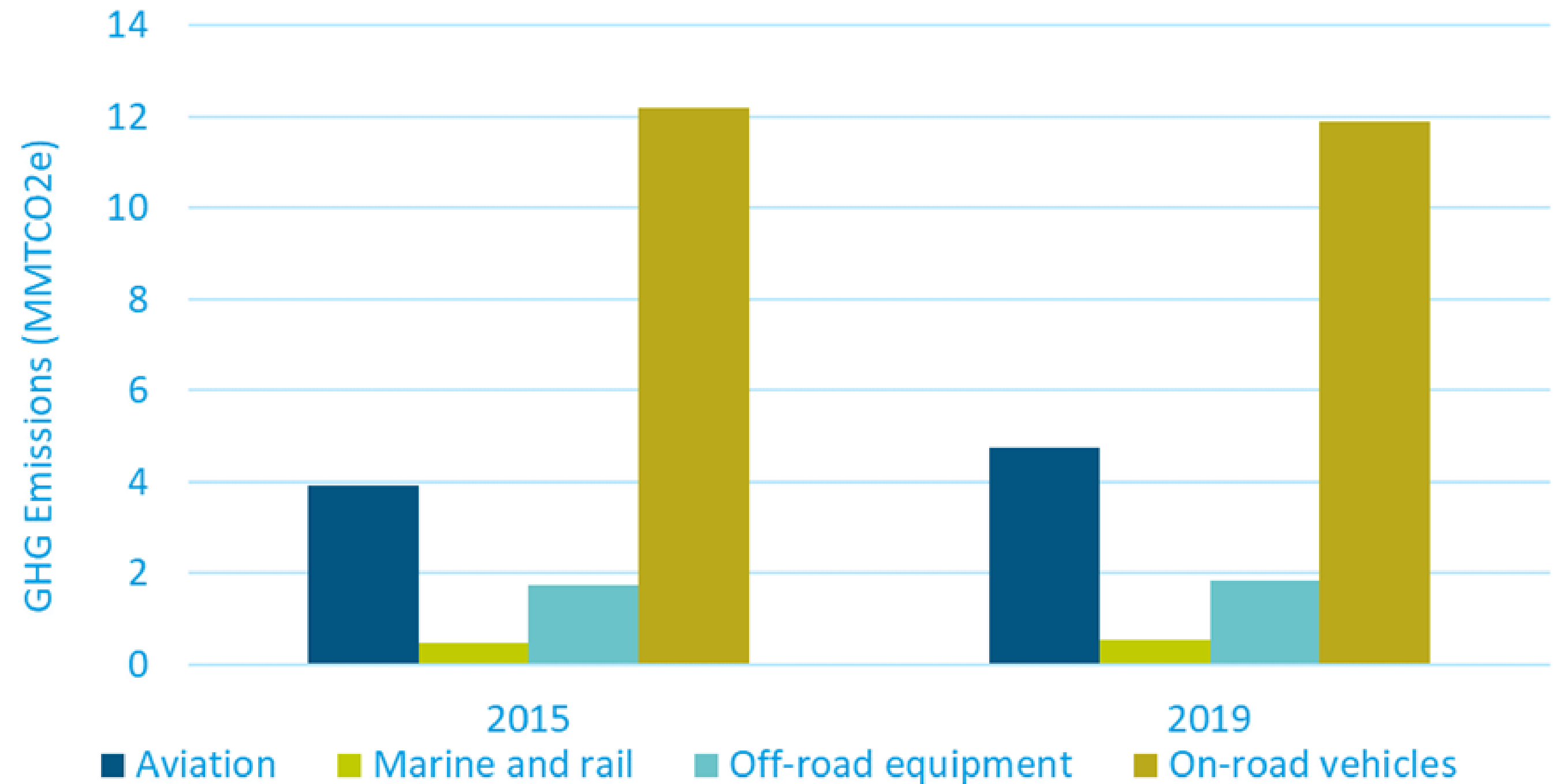


GHG Emissions by sub-sectors



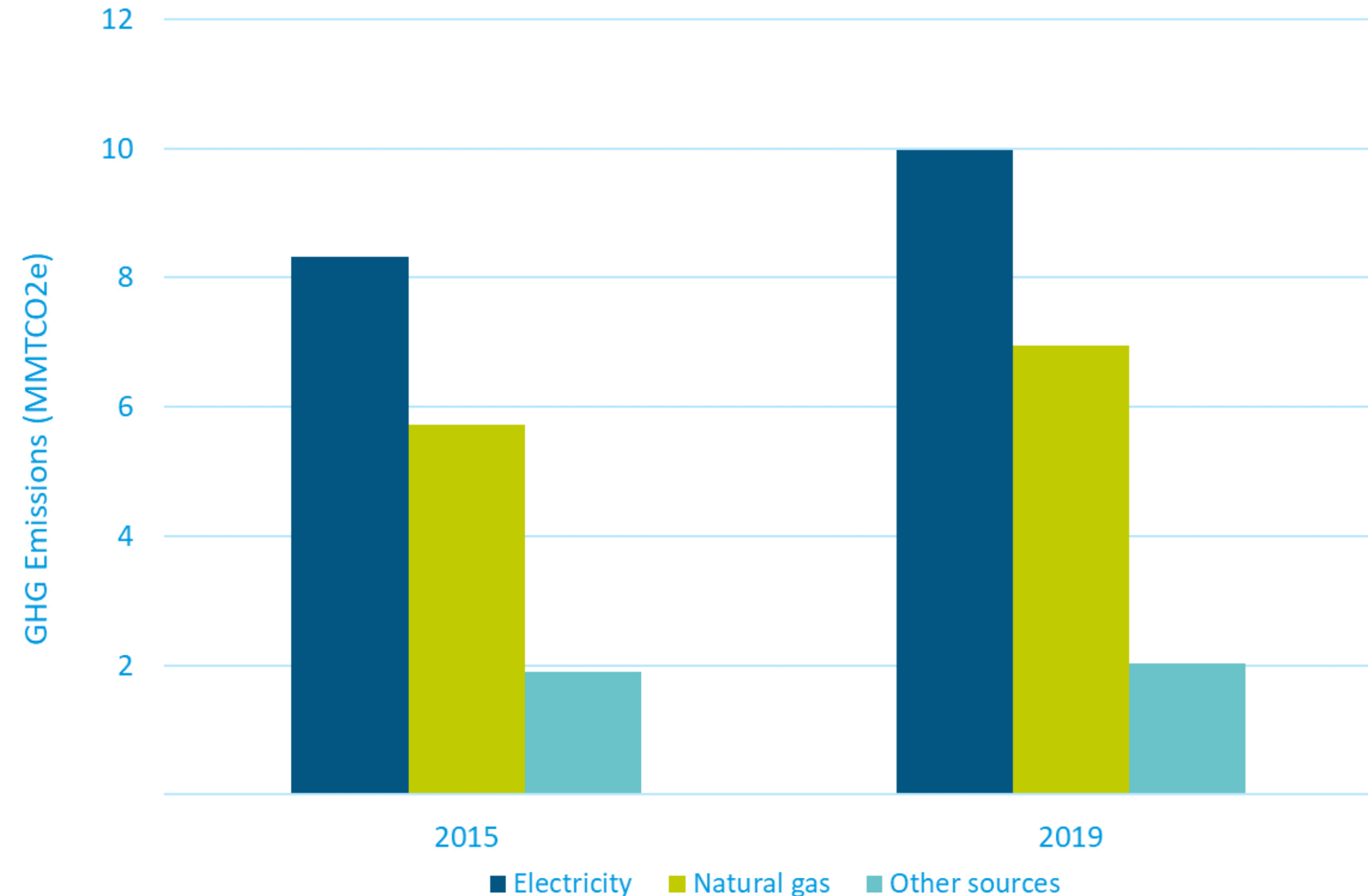
Transportation

- Total on-road passenger vehicle decreased 3% since 2015.
- Transportation emissions in 2019 increased 3.6% since 2015.
- Aviation emissions increased 20% since 2015.
- Emissions from marine vessels and rail have increase 14% since 2015.



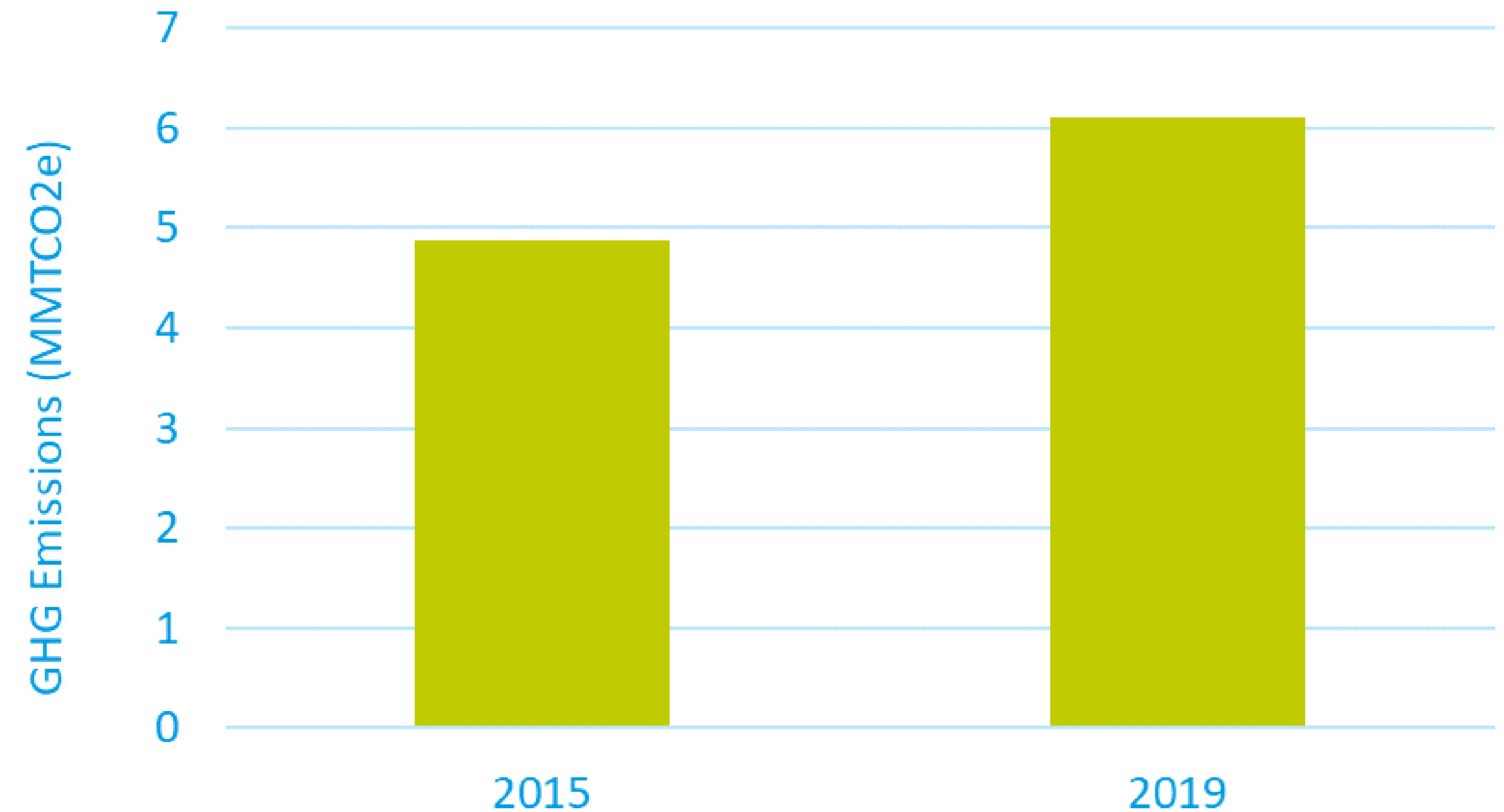
Built Environment

- Emissions from electricity and natural gas accounted for 90% of built environment emissions or 35% of all emissions in 2019.
- Built environment emissions increased 19% since 2015.
- Industrial process emissions increased 19% since 2015



Land Use

- Land use emissions stem from tree cover loss and from agriculture.
- Land use emissions have increased 23% since 2015, due mainly to an increase in acres of tree loss.
- Tree cover loss emissions in 2019 increased 25% compared to 2015.
- In addition to deforestation due to development, tree cover loss can be driven by a number of factors, including harvesting, fire, disease, or storm damage.



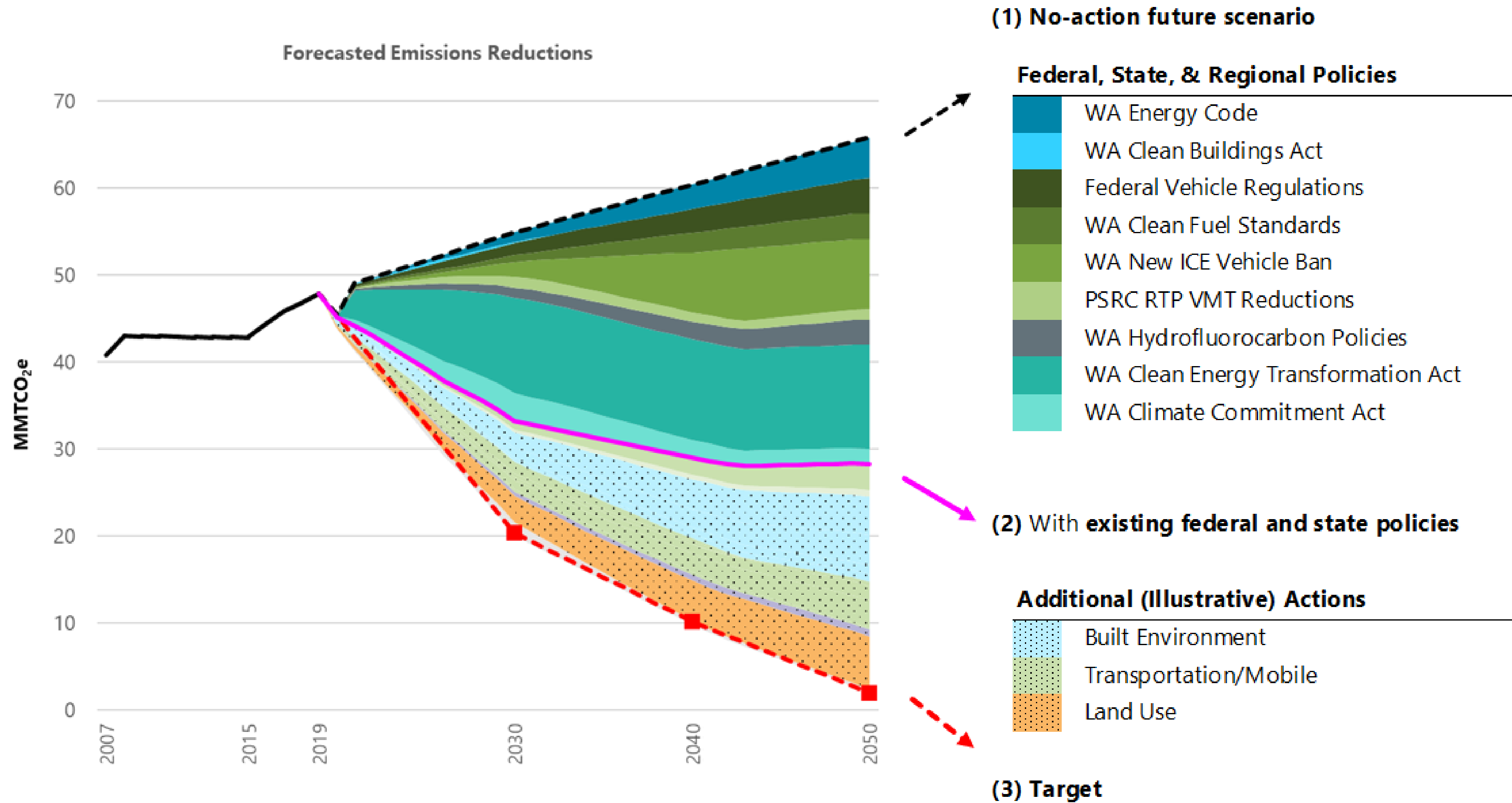
Solid Waste & Wastewater

- . In 2019, solid waste & wastewater accounted for 3% of regional emissions.
- . Emissions from landfill accounted for just under 2% of all emissions.
- . Solid waste emissions decreased 3% compared to 2015.
- . Contributors to this change include an increase in waste diversion and reduction in overall organic waste generation.
- . Wastewater emissions increased 7% between 2015 and 2019.
- . This increase is tied primarily to a growing population in all four counties.

Refrigerants

- Refrigerant emissions stem primarily from the release of hydrofluorocarbons (HFCs), which are a substitution for CFCs which are ozone depleting substances (ODSs). HFCs, which are greenhouse gases, are mainly used for air conditioning, heat pumps, and refrigeration equipment
- In 2019, refrigerants accounted for 5% of communitywide emissions.
- Refrigerant emissions have increased 9% since 2015.
- Refrigerant emissions are estimated by downscaling national-level refrigerant emission data to the local level based on population. Therefore, changes in this source are a product of both national-level refrigerant trends and local population growth

GHG Emissions History & Forecast





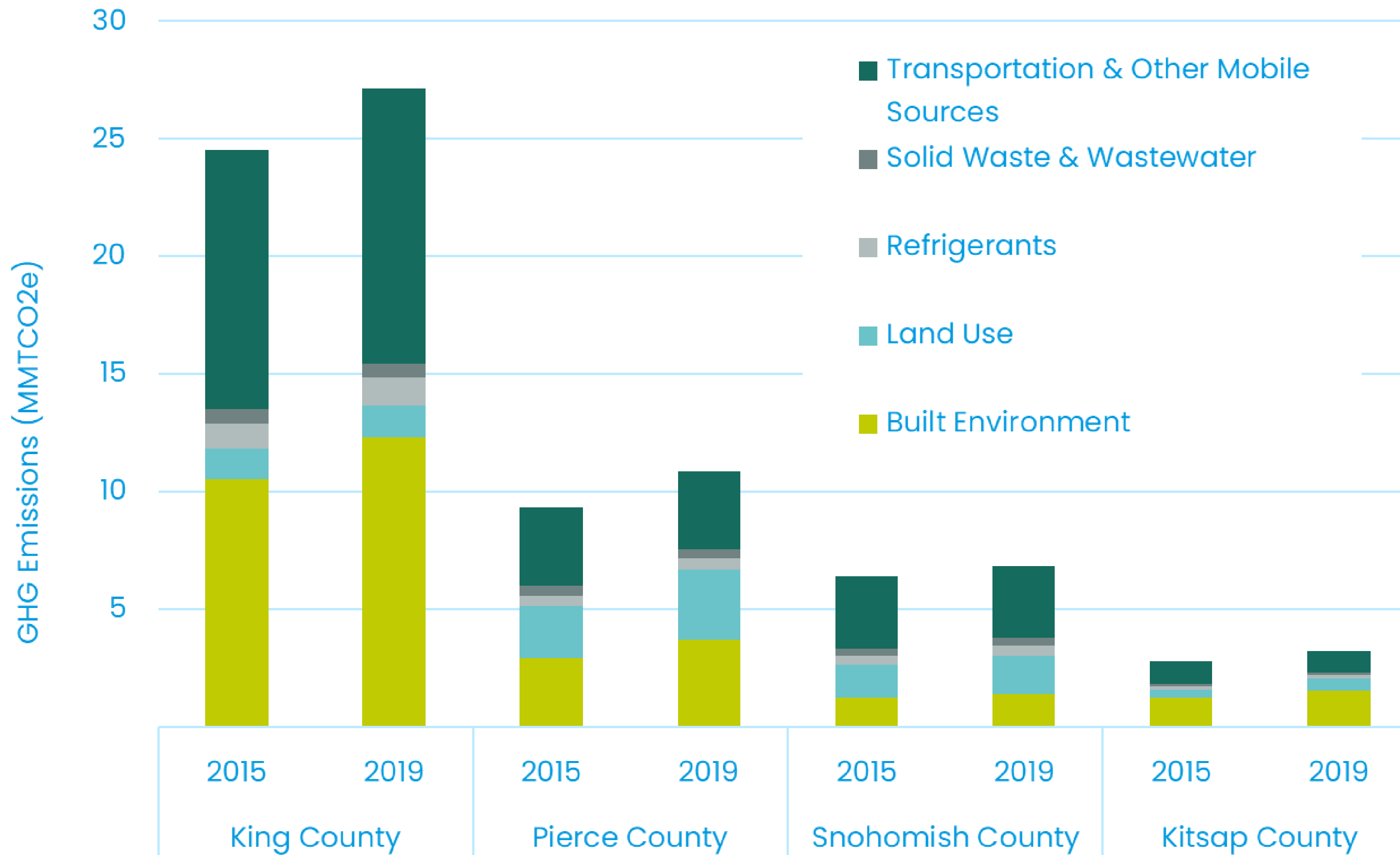
High-Level Take-Aways

- The current Big 5:
 1. On-road vehicles
 2. Electricity
 3. Residential & Commercial NG
 4. Tree Loss
 5. Aviation
- By ~2040 (with on-the books):
 1. On-road vehicles
 2. Residential & Commercial NG
 3. Aviation
 4. Tree Loss
 5. Refrigerants

Thank you!

For more info about our work, please visit our website:
<https://www.pscleanair.gov>

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GHG Emissions Table Breakout

Table 1. PSCAA Counties GHG emissions, by county and sector (MTCO_{2e}).

GHG Emissions by Sector (MTCO _{2e})	King County	Pierce County	Snohomish County	Kitsap County	Total
Built Environment	12,336,188	3,697,758	1,406,787	1,517,808	18,958,541
Electricity	7,109,886	1,551,948	147,356	1,175,620	9,984,810
Commercial	3,608,823	580,325	51,522	424,904	4,665,574
Industrial	641,667	220,406	13,916	5,689	881,678
Residential	2,859,396	751,217	81,918	745,027	4,437,558
Natural gas	4,110,659	1,514,712	1,064,127	258,151	6,947,649
Commercial	1,441,544	447,907	324,877	134,934	2,349,262
Industrial	701,922	422,019	138,607	4,985	1,267,533
Residential	1,967,193	644,786	600,643	118,232	3,330,854
Other sources	1,115,643	631,098	195,304	84,037	2,026,082
Fuel oil	334,738	62,535	56,763	27,917	481,953
Industrial processes	668,383	519,097	37,885	1,377	1,226,742
Residential propane	112,522	49,466	100,656	54,743	317,387
Transportation & Other Mobile Sources	11,683,116	3,333,435	3,052,659	920,711	18,989,921
On-road vehicles	6,470,836	2,506,507	2,294,251	619,457	11,891,051
Passenger vehicles	5,119,314	2,070,016	1,874,559	538,664	9,602,553
Freight & service vehicles	1,201,724	416,807	408,960	75,040	2,102,531
Transit vehicles	149,798	19,684	10,732	5,753	185,967
Aviation	3,998,546	304,802	327,239	100,672	4,731,259
Off-road equipment	1,016,406	378,224	335,284	99,071	1,828,985
Marine vessels and rail	197,328	143,902	95,885	101,511	538,626
Solid Waste & Wastewater	564,503	388,415	338,755	105,831	1,397,504
Solid waste generation & disposal	513,096	338,607	254,433	86,781	1,192,917
Landfill	465,699	301,296	228,881	83,496	1,079,372
Compost	47,397	37,311	25,552	3,285	113,545
Wastewater process emissions	51,407	49,808	84,322	19,050	204,587
Refrigerants	1,185,036	472,512	435,490	143,674	2,236,712
Refrigerants	1,185,036	472,512	435,490	143,674	2,236,712
Land Use	1,341,477	2,974,912	1,611,977	544,333	6,472,699
Tree Loss	1,220,000	2,930,000	1,410,000	538,000	6,098,000
Agriculture	121,477	44,912	201,977	6,333	374,699
Total Emissions	27,110,320	10,867,032	6,845,668	3,232,357	48,055,377

Method	Summary	Total Emissions (MTCO ₂ e)			
		King	Pierce	Snohomish	Kitsap
Landing and takeoff only	Local emissions associated with airplane takeoff and landing (10% of total dispensed)	678,000	486	**	**
Passenger-based	Total attributable to County residents, employees, and visitors	3,999,000	305,000	327,000	101,000
All fuels	All fuels dispensed at local airports	6,783,000	4,860	**	**
Consumption-based	Personal air travel by County residents	1,700,000	464,000	471,000	152,000

** indicates no data were obtained from local airports so these values are unknown. See the appendix for the list of airports included.