CO_2 Emissions from Scope 3 Sources - POS Maritime 2005 - 2020

All units in tonnes

			Puget Sound Maritime Emissions Inventory Year	*Scope 3 baseline year*	*Puget Sound Maritime Emissions Inventory Year*	*Puget Sound Maritime Emissions Inventory Year*		
			2005	**2007**	**2011**	**2016**	**2019**	**2020**
CONTROL	**Staff Business Travel**	Regional Flights	1	1	1	2	2	0
		Medium (intra-US) Haul Flights	82	82	82	69	98	13
		Long Haul Flights	16	16	16	15	25	3
		subtotal	**100**	**100**	**100**	**86**	**125**	**15**
GUIDE	**Tenant Natural Gas**	Multiple locations	-	-	-	-	-	-
	Tenant Steam (1)	Pier 66	-	-	-	-	-	-
	Tenant Electricity	Fishermen's Terminal (2)	55	69	18	35	38	30
		Marine Maintenance					-	-
		Marine Maintenance - Parks					-	-
		Maritime Industrial Center (3)	13	21	5	8	6	4
		Pier 2 Uplands & CEM					-	-
		Pier 28					-	-
		Pier 48	-	1	-	-	-	-
		Pier 66 & Marina	22	20	6	15	17	11
		Pier 69	0	0	1	3	2	1
		Salmon Bay Marina	-	-	-	-	-	-
		Shilshole Bay Marina	77	73	20	45	47	47
		Terminal 5 Southeast					-	-
		Terminal 18					-	0
		Terminal 34					-	-
		Terminal 86 (4)	198	209	60	118	110	137
		Terminal 91 (5)	306	398	96	215	263	151
		T91 Cruise Shore Power (6)	-	-	-	-	62	-
		Terminal 102 & Marina	4	4	1	1	1	2
		Terminal 106					-	-
		Terminal 108					-	-
		Terminal 117					-	-
		World Trade Center West					-	-
		subtotal	**676**	**797**	**207**	**439**	**547**	**382**
INFLUENCE	**Employee Commute**	P69 and Maritime work locations	**1,007**	**1,021**	**1,282**	**1,392**	**1,254**	**560**
	Solid Waste Mgmt (1)	Maritime solid waste off-site mgmt	**139**	**139**	**139**	**185**	**198**	**93**
	Maritime Supply Chain (1)	Ocean-going vessels	70,890	70,890	87,090	58,539	58,539	58,539
		Commercial harbor vessels	2,967	2,967	3,726	4,083	4,083	4,083
		Recreational vessels	7,867	7,867	6,854	6,701	6,701	6,701
		Locomotives	7,545	7,545	6,239	4,540	4,540	4,540
		Cargo-handling equipment	3,926	3,926	407	354	354	354
		Cruise buses on terminals	13	13	13	15	15	15
		subtotal	**93,208**	**93,208**	**104,329**	**74,231**	**74,231**	**74,231**
		TOTAL	**95,130**	**95,265**	**106,056**	**76,334**	**76,355**	**75,282**

Blue shading indicates Puget Sound Maritime Air Emissions Inventory (PSEI) years. The PSEI is only conducted every 5 years and quantifies emissions for maritime supply chain sources. For other inventory years, the Port uses the most recent year where PSEI data is available as a proxy. Following this methodology, the 2019 and 2020 Scope 3 total use 2016 PSEI data for ocean-going vessels, commerical harbor vessels, locomotives, cargo-handling equipment, and cruise buses on terminals.

(1) Emissions from this category are expressed in tonnes CO2e; this is assumed proxy for CO2 value.

(2) Fishermen's Terminal 2005 Scope 3 kWh adjusted to 39% of total due to data anomalies.

(3) Maritime Industrial Center 2005 Scope 2 kWh adjusted to 51% of total due to data anomalies.

(4) Terminal 86 values estimated based on 2017 actuals and annual cargo throughput.

(5) Terminal 91 Scope 3 kWh adjusted to 56% of total for 2005 and 87% of total for 2015 and 2018 due to data anomalies.

(6) Terminal 91 Cruise Shore Power - 2018 and 2019 are the only year for which data is available. There was no cruise season in 2020 due to COVID-19 restrictions.

EMISSION FACTORS USED FOR POS MARITIME GHG INVENTORY

Updated: 6/30/2021

Scope 1 &2 Emission Factors

Scope	Year	Fuel	Emission Factor	Original Units	Converted Emission Factor	Converted Units	Citation
1	All	Natural Gas in Boilers	53.0600	kg CO2/MMBTU	0.00530600	tonnes CO2/therm	https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
	All	Gasoline in Vehicles	8.7800	kg CO2/gallon	0.00878000	tonnes CO2/gallon	https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
	All	Diesel in Vehicles (1)	10.2100	kg CO2/gallon	0.01021000	tonnes CO2/gallon	https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
	All	Natural Gas in Vehicles	0.0545	kg CO2/scf	0.00690352	tonnes CO2/GGE	https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
	All	Propane	5.72	kg CO2/gallon	0.00572000	tonnes CO2/gallon	https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
	2005-2017	Steam (2)	156	Lbs. CO2e/MMBtu	0.069084097	tonnes CO2e/klb	provided by EnWave
2	2010	SCL Retail Electricity	45.57	lb CO2/MWh (2)	0.00002066	tonnes CO2/kWh	SCL correspondence & SCL retail factors found at https://www.theclimateregistry.org/our-members/cris-public-reports/
	2011	SCL Retail Electricity	13.77	lb CO2/MWh (2)	0.00000625	tonnes CO2/kWh	SCL correspondence & SCL retail factors found at https://www.theclimateregistry.org/our-members/cris-public-reports/
	2012	SCL Retail Electricity	25.62	lb CO2/MWh (2)	0.00001162	tonnes CO2/kWh	SCL correspondence & SCL retail factors found at https://www.theclimateregistry.org/our-members/cris-public-reports/
	2013	SCL Retail Electricity	33.23	lb CO2/MWh (2)	0.00001507	tonnes CO2/kWh	SCL correspondence & SCL retail factors found at https://www.theclimateregistry.org/our-members/cris-public-reports/
	2014	SCL Retail Electricity	20.08	lb CO2/MWh (2)	0.00000911	tonnes CO2/kWh	SCL correspondence & SCL retail factors found at https://www.theclimateregistry.org/our-members/cris-public-reports/
	2015	SCL Retail Electricity	52.44	lb CO2/MWh (2)	0.00002379	tonnes CO2/kWh	SCL correspondence & SCL retail factors found at https://www.theclimateregistry.org/our-members/cris-public-reports/
	2016	SCL Retail Electricity	31.22	lb CO2/MWh (2)	0.00001416	tonnes CO2/kWh	SCL correspondence & SCL retail factors found at https://www.theclimateregistry.org/our-members/cris-public-reports/
	2017	SCL Retail Electricity	46.37	lb CO2/MWh (2)	0.00002103	tonnes CO2/kWh	SCL retail factors found at https://www.theclimateregistry.org/our-members/cris-public-reports/
	2018	SCL Retail Electricity (3)	32.05	lb CO2/MWh (2)	0.00001454	tonnes CO2/kWh	SCL retail factors found at https://www.theclimateregistry.org/our-members/cris-public-reports/. 2018 EF found at https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf?mc_cid=4b45d12237&mc_eid=5f138d1baa

Notes:

(1) The emission factor for Renewable Diesel as a vehicle fuel is 0 because combustion of the fuel is considered to produce biogenic CO2 emissions.
These emissions and are not included in the total emissions estimate, because they are considered to be part of the natural carbon cycle and so are excluded under UNFCCC guidelines.
(2) Enwave Seattle provides an emission factor for CO2e, not CO2.
(3) SCL emissions factors converted from lb CO2/Mwh to tonnes CO2 as follows: (lb CO2/MWh)(0.0004536 MT/lb)*1 MWH/1000KWh) or value*0.000454/1000*

Scope 3 Emission Factors

Scope	Year	Fuel	Emission Factor	Original Units	Converted Emission Factor	Converted Units	Citation
3	2015	Jet-A in Regional Flights	70.0000	seat-mile/gallon	0.000139286	tonnes CO2/seat-mile	https://en.wikipedia.org/wiki/Fuel_economy_in_aircraft
	2015	Jet-A in Medium Haul Flight	75.0000	seat-mile/gallon	0.00013	tonnes CO2/seat-mile	http://www.wsj.com/articles/SB10001424052748704901104575423261677748380
	2015	Jet-A in Long Haul Flights	70.0000	seat-mile/gallon	0.000139286	tonnes CO2/seat-mile	https://en.wikipedia.org/wiki/Fuel_economy_in_aircraft
	All	Gasoline in Vehicles	8.7800	kg CO2/gallon	0.00878000	tonnes CO2/gallon	https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
	All	Diesel in Vehicles	10.2100	kg CO2/gallon	0.01021000	tonnes CO2/gallon	https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
	All	Propane	5.72	kg CO2/gallon	0.00572000	tonnes CO2/gallon	https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf
	All	Natural Gas in Boilers	53.0600	kg CO2/MMBTU	0.00530600	tonnes CO2/therm	https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf

Biogenic Emission Factors

Scope	Year	Fuel	Emission Factor	Original Units	Converted Emission Factor	Converted Units	Citation
1	All	Renewable Diesel (2)	10.2100	kg CO2/gallon	0.01021000	tonnes CO2/gallon	https://www.theclimateregistry.org/wp-content/uploads/2018/06/The-Climate-Registry-2018-Default-Emission-Factor-Document.pdf
	All	B100 Diesel in Vehicles (1)	9.4500	kg CO2/gallon	0.00945000	tonnes CO2/gallon	https://www.theclimateregistry.org/wp-content/uploads/2018/06/The-Climate-Registry-2018-Default-Emission-Factor-Document.pdf

Notes:

(1) B100 is not currently used by POS Maritime. When biofuel blends are used, a composite emission factor calculation will be performed in the applicable worksheet. For example, B20 used in fleet vehicles is accounted for as 80% Diesel in Tab 3-Mobile Fleet Fossil Fuel Use and 20%