Energy Use from Scope 3 Sources at POS Maritime 2005 - 2021

			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**	**2015***	**2016**	**2017***	**2018***	**2019***	**2020***	**2021**	
CONTROL	**Staff Business Travel**	Regional Flights	8,169	8,169	8,169	8,169	11,168	11,168	16,216	16,216	258	2,394	seat-miles/gal Jet A Fuel
		Medium (intra-US) Haul Flights	631,281	631,281	631,281	631,281	532,852	532,852	750,716	750,716	96,567	62,654	seat-miles/gal Jet A Fuel
		Long Haul Flights	118,050	118,050	118,050	118,050	109,186	109,186	181,773	181,773	19,277	-	seat-miles/gal Jet A Fuel
GUIDE	**Tenant Natural Gas**	Multiple locations	-	-	-	-	-	-	-	-		-	**therms**
	Tenant Steam (1)	Pier 66	-	-	-	-	-	-	-	-		-	**klbs**
	Tenant Electricity	Fishermen's Terminal (2)	2,672,519	3,355,174	2,957,506	2,508,794	2,485,026	2,730,594	2,699,000	2,598,150	2,059,581	2,233,681	kWh
		Marine Maintenance							-	-	-	-	kWh
		Marine Maintenance - Parks							-	-	-	-	kWh
		Maritime Industrial Center (3)	614,958	1,000,984	829,272	721,780	532,927	512,629	475,484	413,465	300,180	356,247	kWh
		Pier 2 Uplands & CEM							-	-	-	-	kWh
		Pier 28							-	-	-	-	kWh
		Pier 48	-	54,240	-	-	-	-	-	-	-	-	kWh
		Pier 66 & Marina	1,045,051	977,233	915,369	1,090,915	1,050,376	1,081,585	1,182,750	1,165,074	745,452	1,106,172	kWh
		Pier 69	18,612	3,796	160,992	166,952	184,612	187,504	176,328	164,580	83,232	131,729	kWh
		Salmon Bay Marina	-	-	-	-	-	-	-	-	-	-	kWh
		Shilshole Bay Marina	3,728,173	3,541,512	3,210,450	3,101,025	3,147,752	4,387,781	3,312,374	3,240,445	3,200,956	3,383,048	kWh
		Terminal 5 Southeast							-	-	-	-	kWh
		Terminal 18							-	-	18,590	27,409	kWh
		Terminal 34							-	-	-	-	kWh
		Terminal 86 (4)	9,590,358	10,129,624	9,548,117	7,176,901	8,366,709	8,679,486	8,762,063	7,590,623	9,429,451	9,315,587	kWh
		Terminal 91 (5)	14,819,055	19,300,354	15,382,199	17,392,884	15,167,510	20,165,609	17,016,667	18,103,662	10,359,168	9,344,863	kWh
		T91 Cruise Shore Power (6)							2,076,982	4,281,856	-	2,498,115	kWh
		Terminal 102 & Marina, T104	206,111	214,889	120,857	106,014	88,672	113,857	95,430	97,666	107,034	86,899	kWh
		Terminal 106							-	-	-	-	kWh
		Terminal 108							-	-	-	-	kWh
		Terminal 117							-	-	-	-	kWh
		World Trade Center West									-	-	kWh
		Duwamish River Hub							-	-		-	kWh
		subtotal	**32,694,837**	**38,577,806**	**33,124,762**	**32,265,265**	**31,023,584**	**37,859,045**	**35,797,079**	**37,655,521**	**26,303,644**	**28,483,751**	**kWh**
INFLUENCE	**Employee Commute**	direct calculation of CO2	1,007	1,021	1,282	1,345	1,392	1,305	1,335	1,254	560	324	tonnes CO2
	Solid Waste Mgmt (1)	direct calculation of CO2	139	139	139	139	185	188	190	198	93	206	tonnes CO2
	Maritime Supply Chain (1, 7)	direct calculation of CO2	93,208	93,208	104,329	104,329	74,231	74,231	74,231	74,231	74,231	74,231	tonnes CO2
		subtotal	**94,354**	**94,368**	**105,749**	**105,813**	**75,808**	**75,724**	**75,756**	**75,683**	**74,884**	**74,761**	**tonnes CO2**

(1) Emissions from this category are expressed in tonnes CO2e; this is assumed proxy for CO2 value.
(2) FT 2005 Scope 3 kWh adjusted to 39% of total due to data anomalies.
(3) MIC 2005 Scope 2 kWh adjusted to 51% of total due to data anomalies.
(4) T86 values estimated based on 2017 actuals and annual cargo throughput.
(5) T91 Scope 3 kWh adjusted to 56% of total for 2005 and 87% of total for 2015 and 2018 due to data anomalies.
(6) T91 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.
(7) Proxy data used for Inventory years that are outside of the Puget Sound Maritime Air Emissions Inventory, which has been completed for 2005, 2011, and 2016. The 2021 Inventory will be completed in 2024. Data from 2016 is used for 2016-2021. Data for 2011 is used for 2015. Data for 2005 is used for 2007 Scope 3 baseline year.

CO_2 Emissions from Scope 3 Sources - POS Maritime 2005 - 2021

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	2015	2016	2017	2018	2019	2020	2021	
CONTROL	**Staff Business Travel**	Regional Flights	1	1	1	1	2	2	2	2	0	0.3	
		Medium (intra-US) Haul Flights	82	82	82	82	69	69	98	98	13	8	
		Long Haul Flights	16	16	16	16	15	15	25	25	3	-	
		subtotal	**100**	**100**	**100**	**100**	**86**	**86**	**125**	**125**	**15**	**8**	
GUIDE	**Tenant Natural Gas**	Multiple locations	-	-	-	-	-	-	-	-		-	
	Tenant Steam (1)	Pier 66	-	-	-	-	-	-	-	-		-	
	Tenant Electricity	Fishermen's Terminal (2)	55	69	18	60	35	39	39	38	39	42	
		Marine Maintenance							-	-	-	-	
		Marine Maintenance - Parks							-	-	-	-	
		Maritime Industrial Center (3)	13	21	5	17	8	7	7	6	6	7	
		Pier 2 Uplands & CEM							-	-	-	-	
		Pier 28							-	-	-	-	
		Pier 48	-	1	-	-	-	-	-	-	-	-	
		Pier 66 & Marina	22	20	6	26	15	15	17	17	14	21	
		Pier 69	0	0	1	4	3	3	3	2	2	2	
		Salmon Bay Marina	-	-	-	-	-	-	-	-	-	-	
		Shilshole Bay Marina	77	73	20	74	45	62	48	47	60	64	
		Terminal 5 Southeast							-	-	-	-	
		Terminal 18							-	-	0	1	
		Terminal 34							-	-	-	-	
		Terminal 86 (4)	198	209	60	171	118	123	127	110	178	176	
		Terminal 91 (5)	306	398	96	414	215	286	247	263	195	176	
		T91 Cruise Shore Power (6)	-	-	-	-	-	-	30	62	-	47	
		Terminal 102 & Marina	4	4	1	3	1	2	1	1	2	2	
		Terminal 106							-	-	-	-	
		Terminal 108							-	-	-	-	
		Terminal 117							-	-	-	-	
		World Trade Center West									-	-	
		Duwamish River Hub							-	-	-	-	
		subtotal	**676**	**797**	**207**	**767**	**439**	**536**	**520**	**547**	**496**	**537**	
INFLUENCE	**Employee Commute**	P69 and Maritime work locations	**1,007**	**1,021**	**1,282**	**1,345**	**1,392**	**1,305**	**1,335**	**1,254**	**560**	**324**	
	Solid Waste Mgmt (1)	Maritime solid waste off-site mgmt	**139**	**139**	**139**	**139**	**185**	**188**	**190**	**198**	**93**	**206**	
	Maritime Supply Chain (1)	Ocean-going vessels	70,890	70,890	87,090	87,090	58,539	58,539	58,539	58,539	58,539	58,539	Ocean-going vessels
		Commercial harbor vessels	2,967	2,967	3,726	3,726	4,083	4,083	4,083	4,083	4,083	4,083	Commercial harbor vessels
		Recreational vessels	7,867	7,867	6,854	6,854	6,701	6,701	6,701	6,701	6,701	6,701	Recreational vessels
		Locomotives	7,545	7,545	6,239	6,239	4,540	4,540	4,540	4,540	4,540	4,540	Locomotives
		Cargo-handling equipment	3,926	3,926	407	407	354	354	354	354	354	354	Cargo-handling equipment
		Cruise buses on terminals	13	13	13	13	15	15	15	15	15	15	Cruise buses on terminals
		subtotal	**93,208**	**93,208**	**104,329**	**104,329**	**74,231**	**74,231**	**74,231**	**74,231**	**74,231**	**74,231**	
		TOTAL	**95,130**	**95,265**	**106,056**	**106,680**	**76,334**	**76,346**	**76,402**	**76,355**	**75,395**	**75,306**	

(1) Emissions from this category are expressed in tonnes CO2e; this is assumed proxy for CO2 value.
(2) FT 2005 Scope 3 kWh adjusted to 39% of total due to data anomalies.
(3) MIC 2005 Scope 2 kWh adjusted to 51% of total due to data anomalies.
(4) T86 values estimated based on 2017 actuals and annual cargo throughput.
(5) T91 Scope 3 kWh adjusted to 56% of total for 2005 and 87% of total for 2015 and 2018 due to data anomalies.
(6) T91 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.
(7) Proxy data used for Inventory years that are outside of the Puget Sound Maritime Air Emissions Inventory, which has been completed for 2005, 2011, and 2016. The 2021 Inventory will be completed in 2024. Data from 2016 is used for 2016-2021. Data for 2011 is used for 2015. Data for 2005 is used for 2007 Scope 3 baseline year.

EMISSION FACTORS USED FOR POS MARITIME GHG INVENTORY: 2021

Updated: 8/8/2022

Scope 1 &2 Emission Factors

Scope	Year	Fuel	Emission Factor	Original Units	Converted Emission Factor	Converted Units	Citation	Notes
1	All	Natural Gas in Boilers	53.0600	kg CO2/MMBTU	0.00530600	tonnes CO2/therm	https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf	
	All	Gasoline in Vehicles	8.7800	kg CO2/gallon	0.00878000	tonnes CO2/gallon	https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf	
	All	Diesel in Vehicles (1)	10.2100	kg CO2/gallon	0.01021000	tonnes CO2/gallon	https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.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://theclimateregistry.org/wp-content/uploads/2022/11/2022-Default-Emission-Factors-Final.pdf	
	2005-2011	Steam (2)	156	Lbs. CO2e/MMBtu	0.069084097	tonnes CO2e/klb	Calculations: http://collab.portseattle.org/sites/SEP_Air/climate/_layouts/xlviewer.aspx?id=/sites/SEP_Air/climate/Shared%20Documents/GHG%20Accounting%202018/Electricity-Natural%20Gas-Steam/Steam/steam%20calcs.xlsx&Source=http%3A%2F%2Fcollab%2Eportseattle%2Eorg%2Fsites%2FSEP%5FAir%2Fclimate%2FShared%2520Documents%2FForms%2FAllItems%2Easpx%3FRootFolder%3D%252Fsites%252FSEP%255FAir%252Fclimate%252FShared%2520Documents%252FGHG%2520Accounting%25202018%252FElectricity%252DNatural%2520Gas%252DSteam%252FSteam&DefaultItemOpen=1	
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	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=4b45d122237&mc_eid=5f138d1baa	
	2019	SCL Retail Electricity (3)	41.57	lb CO2/MWh (2)	0.00001886	tonnes CO2/kWh	SCL retail factor for 2019, found at: https://www.theclimateregistry.org/our-members/cris-public-reports/	2019-2021 electricity use uses 2019 SCL retail electricity emissions factor as the most recent published emissions factor

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.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf
	All	Diesel in Vehicles	10.2100	kg CO2/gallon	0.01021000	tonnes CO2/gallon	https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf
	All	Propane	5.72	kg CO2/gallon	0.00572000	tonnes CO2/gallon	https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf
	All	Natural Gas in Boilers	53.0600	kg CO2/MMBTU	0.00530600	tonnes CO2/therm	https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.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/2021/05/2021-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/2021/05/2021-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% B100 in Tab 4 - Biogenic Fuel Use.