Puget Sound Maritime Air Emissions Inventory

2011 Inventory Overview

What is the 2011 inventory?

The 2011 Puget Sound Maritime Air Emissions Inventory will update the baseline inventory produced in 2005. The 2005 baseline inventory identified and quantified pollutants emitted from maritime-related diesel equipment operating within the greater Puget Sound region. It was conducted voluntarily and proactively to provide a strong technical foundation to support future policy decisions. The inventory update will measure maritime emissions for the calendar year 2011 as well as provide a comparison to the baseline 2005 inventory.

Why was the inventory developed?

The purpose of this emissions inventory is to provide scientifically valid data to improve understanding of the nature, location, and magnitude of emissions from maritime-related operations, which will aid in the planning and prioritization of pollution prevention investments in the region.

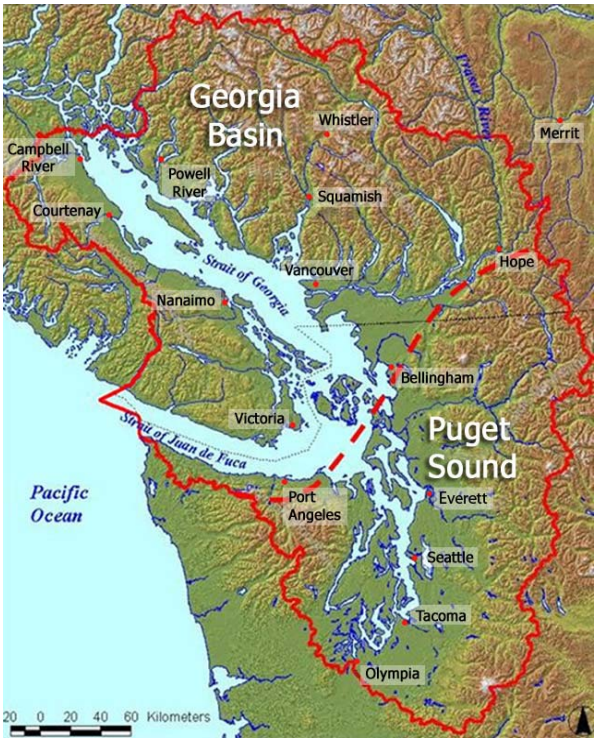
Who developed the emissions inventory methodology?

Starcrest Consulting Group, LLC, which developed the 2005 baseline inventory, will also produce the 2011 update in cooperation with members of the Puget Sound Maritime Air Forum (Forum), a voluntary association of private and public maritime organizations, ports, air agencies, environmental, public health advocacy groups, and other parties with operational or regulatory responsibilities related to the maritime industry. The Forum is committed to accurately quantifying and voluntarily reducing air emissions associated with the maritime transportation of freight and passengers. The 2005 emissions inventory was the first major product of this collaboration. The 2011 inventory update will also be produced in collaboration with the Forum.

What does it measure?

This emissions inventory estimates tons per year of emissions from maritime-related activities within the U.S. portion of the Puget Sound / Georgia Basin International Airshed (see Figure 1). This area spans approximately 140 miles south to north and 160 miles west to east, at its extremities. The projects have been closely coordinated with Environment Canada, the BC Chamber of Shipping and others who prepared similar emissions inventories in 2005 and 2010 for Georgia Basin.

Pollutants in the inventories include relevant U.S. Environmental Protection Agency (EPA) criteria pollutants and precursors (carbon monoxide, nitrogen oxides, sulfur dioxides, volatile organic compounds and particulate matter); greenhouse gases (carbon dioxide, methane and nitrous oxide); and diesel particulate matter. The 2005 baseline inventory was the first emissions inventory in the United States to include a detailed, activity-based inventory of greenhouse gases for maritime related sources. The 2011 inventory update also will be an activity-based inventory following the same methodology as the 2005 baseline inventory. Data were gathered for the following six major source categories associated with marine activities: ocean-going vessels (such as cargo and cruise ships, tankers); harbor vessels (tugs, ferries, recreational vessels, etc); cargo-handling equipment (cranes, straddle carriers, forklifts, etc.); on-road heavy-duty vehicles (trucks, buses, etc.); on-terminal fleet vehicles (passenger cars and trucks); and rail operations. Military operations and equipment were not included due to security considerations.



Why does the inventory focus on diesel engines?

Marine diesel engines, like all diesel engines, are significant generators of fine particles and toxic emissions. Exposure to these pollutants can contribute to increased rates of lung cancer, chronic respiratory and cardiovascular disease, and other health effects. Diesel emissions also contribute to acid deposition, climate change and impaired visibility. Given these implications for public health and the environment, reducing and minimizing these emissions are a top priority of the Forum. This inventory will help identify where pollution prevention efforts could provide the best public benefit.

While the EPA has not yet listed diesel exhaust emissions as a hazardous air pollutant, it is important to note that federal regulations are in place to require dramatically cleaner fuels and lower-emitting diesel engines in the future. In the meantime, Forum members are proactively working together to achieve early emissions reductions from maritime-related operations to protect public health and the environment.

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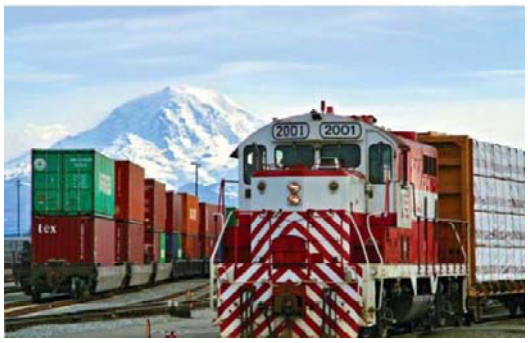

What were the 2005 Baseline Inventory findings?

Table 1: Puget Sound 2005 Maritime Air Emissions Inventory Summary, tons per year

Source Category	NOx	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	DPM	Greenhouse Gases, CO_2 eq
Ocean-going vessels:								
Hotelling	2,259	74	191	4,229	262	209	131	274,421
Maneuvering	313	24	33	191	22	17	21	12,481
Transiting	11,390	399	932	7,953	709	566	663	496,844
Harbor vessels	9,555	3,363	16,854	529	495	456	445	689,649
Rail, off-terminal	1,285	57	166	96	35	32	32	59,854
Rail, on-terminal	1,180	67	154	93	35	32	35	48,135
Cargo-handling equipment	1,155	103	918	80	74	72	74	111,592
Heavy-duty vehicles, off-terminal	1,120	58	307	35	45	39	39	156,242
Heavy-duty vehicles, on-terminal	203	18	148	4	4	4	4	17,845
Fleet vehicles	10	5	50	0	0	0	0	3,365
Total	**28,469**	**4,167**	**19,752**	**13,211**	**1,682**	**1,427**	**1,444**	**1,870,429**

Legend

Transiting:	Vessel is traveling within the study area
Hotelling :	Vessel is at berth or anchor
Maneuvering:	Slow speed vessel operations while in-ports
Rail off-terminal:	Maritime-related rail activity occurring away from the marine terminals but within the study area.
Rail on-terminal:	Rail activity occurring on or nearby a marine terminal
HDV off-terminal:	Port-related truck activities (i.e., drayage) occurring near marine terminals and within the boundary of the study area.
HDV on-terminal:	Truck activities occurring at or on marine or rail terminals, including idling at terminal gates, and idling and traveling within terminals.

Technical Approach

The 2011 inventory update will cover the same geographical extent as the 2005 baseline, and emissions will be divided and categorized the same way. Data and technical guidance will be collected from ports, and individuals, agencies and companies (or their representatives) that own, operate, maintain and/or charter the equipment and vessels. Contributors include ports, terminal owners, vessel captains and engineers, equipment operators and others having first-hand knowledge of either equipment details or operational parameters. Data also will be provided by regional clean air agencies, other government agencies and industry associations. Because of budget limitations, the 2011 inventory update relies more on in-kind contributions of data providers and less on consulting services to collect and collate data.

Who will fund the emissions inventory and how much did it cost?

The cost of the 2005 baseline inventory cost about $520,000, not including substantial in-kind contributions from project participants. Financial support was provided by the U.S. Environmental Protection Agency and members of the Forum's Steering Committee, which includes: American Lung Association of Washington and Idaho, BNSF Railway, Northwest Clean Air Agency, Northwest CruiseShip Association, Olympic Region Clean Air Agency, Pacific Merchant Shipping Association, Port of Everett, Port of Seattle, Port of Tacoma, Port of Olympia, Puget Sound Clean Air Agency, Northwest Clean Air Agency, Washington State Department of Ecology, Washington State Ferries and Western States Petroleum Association. Funding members and other Forum partners also have pledged in-kind contributions.

The 2011 inventory update is funded at $230,000 with contributions from BNSF Railway, Northwest CruiseShip Association, Pacific Merchant Shipping Association, Port of Anacortes, Port of Everett, Port of Seattle, Port of Tacoma, Puget Sound Clean Air Agency, Washington State Ferries and Western States Petroleum Association.

What's being done now to reduce maritime air pollution?

In addition to participating in the emissions inventory project, Forum partners are also working within their own organizations, in local initiatives, nationally and internationally on efforts to reduce emissions.

Forum partners also are switching to cleaner fuels, using shore power instead of ship engines when cruise and cargo ships are in port, replacing old engines with cleaner engines, retrofitting older engines with advanced pollution control devices, rebuilding engines, and implementing systems to use equipment more efficiently.

The voluntary reductions achieved to date by the maritime industry in the Puget Sound region and other West Coast ports are unprecedented among industrial sectors.

On March 26, 2010, the IMO officially designated waters off North American coasts as an emission control area in which stringent international emission standards will apply to ships. These standards will dramatically reduce air pollution from ships and deliver substantial air quality and public health benefits that extend hundreds of miles inland.

What's next?

This inventory provides the most complete picture to date of maritime-related emissions in the greater Puget Sound region. Review and assessment of this data will enable the maritime community to better design and implement cost-effective, fact-based air pollution control strategies to help maintain air quality standards, minimize health risks and protect the environment.