



APPENDIX C  
**GREENHOUSE GAS (GHG)  
INVENTORY METHODOLOGY**



## ***Appendix C: Greenhouse Gas (GHG) Inventory Methodology***

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### **GHG Emissions Inventory**

The purpose of a Greenhouse Gas (GHG) emissions inventory is to quantify GHG emissions emitted into the atmosphere from the sources within the organizational and operational boundaries described above. This information can be used to achieve several tasks:

- Identify the sources and activities within the Airport's jurisdiction responsible for GHG emissions;
- Establish a basis for developing a GHG reduction plan; and
- Establish a basis to track GHG emissions.

### **Methodology**

The GHG emissions inventory uses the Airport Carbon and Emissions Reporting Tool Version 2.0 (ACERT) developed by the Airports Council International (ACI). ACERT inputs include the following information and relevant emissions factors to quantify GHGs:

- Total aircraft, passenger, and cargo operations;
- Fuel use by airport and tenant vehicles, buildings, emergency generators and fire training;
- Electricity (and heat) purchased by the Airport operator and tenants;
- Aircraft taxi and APU usage times and engine run-ups;
- Glycol (deicing fluid) use; and
- Landside traffic estimates of passenger and staff ground access.

Based on the inputs above, ACERT outputs GHG emissions totals categorized by the previously discussed GHG protocol Scopes (direct, indirect, indirect and optional). For the purposes of this analysis, input totals for calendar year 2013 were used, as discussed below. Information was collected through interviews with airport staff and tenants.

## Aircraft Operations

**Table C-1** on the following page summarizes the annualized fleet mix for PWM. These totals are based on the consolidated flight schedule for commercial operations and a review of FAA's Air Traffic Activity System (ATADS) for general aviation operations. ACERT includes emissions factors that include all phases of operation (run up, taxi, takeoff and landing) for 136 types of fixed wing and helicopter aircraft. Of the available aircraft, 127 are current aircraft in the U.S. fleet such as the Boeing 737, Learjet 45, and Cessna 182. For cases when an aircraft is not available in ACERT, ACI recommends selecting a comparable aircraft. Additionally, nine generic aircraft, examples include one engine helicopter or two-engine piston, are available to the user. The number of operations (one takeoff or one landing) is multiplied by the corresponding emission factor to calculate the GHG emissions associated with aircraft operations.

## Non-Aviation Fuel Use

Non-aviation fuel use includes fuels available at PWM for vehicles that are primarily used on the Jetport, such as those used for airport maintenance and airline service. This fuel is not available for commercial sale and does not include fuel purchased for vehicle trips to or from the Jetport. Based on responses from airport staff and tenants, three types of fuel are available at PWM: gasoline, diesel, and propane. Non-aviation fuel also includes natural gas and fuel oil used for heating buildings.

It should be noted that the Jetport holds an Air Emission License issued by the Maine Bureau of Air Quality. The License covers stationary equipment such as backup generators, boilers, and water heaters and quantifies the total annual emissions for this equipment. The license also outlines best practical treatment for the maintenance and operation of this equipment and requires annual reporting of emissions to the State of Maine.

**Table C-2** on the following page summarizes the non-aviation fuel use assumptions for calendar year 2013. For fuel types where calendar year 2013 usage was not available (airport gasoline and diesel), budgeted 2015 amounts were used.

**TABLE C-1**  
**Baseline Operational Fleet Mix**  
**Portland International Jetport**

Aircraft	Number of Operations	Aircraft (con't)	Number of Operations (con't)
Airbus 300	8	Eclipse 500	178
Airbus 310	4	EMB 120	2
Airbus 319	776	EMB 135/145	3,644
Airbus 320	624	EMB 170	5,112
Airbus 321	8	EMB 190	2,608
ATR-42-300	18	Falcon 2000	180
Beech 1900D	788	Falcon 50	204
Beech 300	8	Falcon 900EX	64
Beech Super King 200B	254	GLEX	32
Beech Super King 350	546	Global 5000	8
Beech T-6A Texan	8	Gulfstream G200	332
Bell 206B	440	Gulfstream V	216
Bell 407/MDD 600N	406	Hawker 800	1,068
Boeing 717	506	Hawker Horizon	166
Boeing 737 (300-500)	554	Learjet 45	158
Boeing 737 (600-900)	988	Learjet 60	98
Boeing 757	590	MD83 (80-87)	1,288
Boeing 767-300	2	MD95	4
Cessna 172	24	Piaggio P180	14
Cessna 182	120	Pilatus PC-12	92
Cessna 208B	1,990	Piper PA31 Cheyenne	12
Cessna 402	16	Piper PA32 Saratoga	2
Cessna 525	324	Piper PA34 Seneca	2
Cessna 560XL	920	Piper PA46 Malibu	126
Cessna 680	396	Shorts 360	2
Cessna 750	228	TBM 700	48
Cessna Citation	146	Generic Aircraft	
CL300	112	1-engine helicopter	50
CL604	70	2-engine helicopter	12
CRJ200	5,054	1-eng piston aircraft	9,828
CRJ700	3,408	2-eng piston aircraft	5,634
CRJ900	8	2-engine business jet	36
Dash 8-400	1,644	2 turboprop aircraft	618
Subtotal	20,988	Subtotal	31,838
<b>Grand Total: 52,826</b>			

Source: Consolidated flight schedule; FAA Air Traffic Activity System (Calendar Year 2013); Coffman Associates analysis

**TABLE C-2**  
**Non-Aviation Fuel Source**  
**Portland International Jetport**

	Airport	Tenant	Total
Gasoline (liters)	55,456	37,864	93,320
Diesel (liters)	78,737	106,760	185,497
Propane (liters)	69,553	6,719	76,272
Natural Gas (m <sub>3</sub> )	567,481	149,422	716,903
Fuel oil (liters)	111,726	9,433	121,159

Source: PWM records and tenant questionnaire responses

## Electricity

Electrical use is reported at PWM in three segments: electricity purchased by the Jetport for airport use, purchased by the Jetport for tenant use, and electricity purchased directly by tenants. Electricity purchased by the Jetport for airport use includes the administrative and common portions of the terminal, airside and landside lighting, and maintenance areas. Electricity purchased by the Jetport for tenant use primarily includes in-terminal tenants, such as retailers and terminal gate areas. Finally, airport tenants located outside of the terminal, such as the fixed base operator and cargo operations based at the Jetport, purchase electricity directly from the electric company. **Table C-3** summarizes electrical use from each of these segments.

**TABLE C-3**  
**2013 Electricity use (KWh)**  
**Portland International Jetport**

Airport	Airport Resold to Tenant	Tenant	Total
2,766,632	3,045,876	3,677,503	9,490,011

Source: PWM records and tenant questionnaire responses

## Deicing Fluid Use

Propylene glycol, commonly referred to as glycol or deicing fluid, is a liquid that is combined with water and applied during winter months at airports to remove ice or snow from aircraft or airport pavement surfaces to enhance operational safety. Due to the potential for environmental contamination associated with the use of deicing fluids, the FAA has developed several guidance documents for developing fluid containment systems at airports. In 2010, PWM established a glycol recycling program to minimize potential environmental impacts associated with deicing fluids.

ACERT includes an emissions factor for GHG emitted through the deicing process. This is calculated in accordance with the quantity of glycol dispensed at the Jetport during a year. Based on information collected from airport tenants, a total of 153,056 liters were dispensed during 2013. It is also noted that PWM uses potassium acetate fluid for deicing runway surfaces; however, ACERT does not include this as part of the GHG calculation.

## Landside Traffic Estimates

Within ACERT, landside traffic estimates are based on the number of airport and tenant employees and the estimated number of deliveries per day to each tenant. Based on the Jetport's organizational chart, the number of airport employees used for this analysis is 50. The total number of tenants (airside and landside) is 23. Based on PWM security badge records, there are 1,054 badges issued to persons not employed by the City of Portland at the airport; this includes commercial and cargo airlines, airfield based companies, tenants, and federal and state employees. Additionally, based on a 24-hour sample retrieved from the Jetport's parking system, a total of 282 airport visits occurred. ACERT accepts input

expressed as visits per tenant per day. Based on the information provided, an average of 13 visits per tenant per day was assumed.

### **Summary**

The results of the GHG inventory are summarized Table 3-5 of Chapter Three – Sustainability Baseline Assessment.