

2012 (Calendar Year)
Greenhouse Gas Emission Inventory for the
Gulf of Farallones National Marine Sanctuary

The Gulf of the Farallones National Marine Sanctuary (GFNMS) used the National Park Service's (NPS) [Climate Leadership In Parks \(CLIP\) Tool](#) to complete an inventory of 2012 greenhouse gas emissions generated from facility use, operations, and transportation activities at the sanctuary's headquarters. This information was compared to data collected since the 2008 baseline inventory to measure performance in meeting reduction goals.

Data were gathered from utility statements, internal records, and an employee transportation survey. The Greenhouse Gas (GHG) inventory includes totals for stationary combustion fuel (natural gas for heating), purchased electricity, mobile combustion (auto, public, boat and air transportation), wastewater treatment, and municipal solid waste and disposal. Each input is described in greater detail below.

For the purpose of this audit, emissions were measured only for internal staff at the headquarters facility on Crissy Field, and not for visitors to the sanctuary.

Executive Summary

Total and per capita emissions in calendar year 2012 were the lowest since the site began measuring greenhouse gasses five years ago. Despite this downward trend, there are troubling details upon closer examination of the data. The demand for natural gas and electricity has essentially remained level year after year, with an increase observed when a new building was added to this survey in 2010. Together, these sources of energy contribute approximately 30% of the site's total emissions. Wastewater and solid waste have also remained steady since 2008, and continue to contribute less than 3% of the sites total emissions.

Transportation remains the highest portion of emissions, contributing nearly 70% of the site's total. Automobile transportation (commuting & government vehicles) makes up 75% of that, but has remained essentially unchanged since 2008. The only reason transportation emissions have decreased over the past few years is due to decreased air travel and at-sea research; both due to budget reductions. It is anticipated that these emissions would take an upward turn should discretionary travel and research funds become available.

Highlights

- *Per capita emissions have declined by 2.08 Metric Tons Carbon Dioxide Equivalent (MTCO2E) since 2008*
- Net staff decrease of 2.4 from 2011 (-1.9 @ GFNMS, -.5 @ FMSA)
- Sanctuary added an additional government vehicle (transferred after Half Moon Bay office closure)

EMISSION INVENTORY INPUTS

General Information:

Unit Evaluated: GFNMS Crissy Field Headquarters, San Francisco, CA

Year Inventoried: 2012

Inventory completed by: Brian Johnson, Deputy Superintendent

Inventoried Operations: Stationary Combustion (Natural Gas), Purchased Electricity, Mobile Combustion, Wastewater Treatment, Municipal Solid Waste and Disposal

Number of buildings: 2 (Bldg 1901 – Residence, Bldg 1903 – Lifeboat Station)

Number of Full-Time Staff Equivalents: 24.9 (16.4-GFNMS, 6.1-FMSA, 2.4-IFR)

Stationary Combustion:

The stationary combustion (natural gas used for heat and hot water) numbers were derived from Pacific Gas & Electric statements. PG&E is the local utility provider.

Natural Gas: 4861 Therms of natural gas used

Conversion: 1Therm = 100 cubic feet.

Input: 486,100 cubic feet (negligible decrease from 2011)

Purchased Electricity:

The stationary combustion numbers were derived from Presidio Trust utility statements:

Bldg 1901 kWh – 17,077

Bldg 1903 kWh – 43,280

Input: 60,357 kWh (negligible increase from 2011)

Mobile Combustion - Ground & Sea Transportation:

A survey was conducted of all staff to determine the primary mode of transportation used to commute to work. They could choose from car, carpool, bus, train, bicycle, or walk. All travel to and from the Crissy Field Headquarters office was counted, including use of government vehicles. This estimate also accounts for the use of the R/V FULMAR, the sanctuary's research vessel.

Primary mode of staff commuting: 21.1 car, 2.3 bike, 1.5 bus (similar to past years)

Government vehicles on-site: 3 (2-Vans,1-Hybrid SUV; assumed 22mpg avg. per auto)

Input: Autos, fueled with gasoline – 164,535 miles (slight increase from 2011)

Input: Buses, fueled by diesel – 7800 miles (50% decrease since 2008)

Input: Boats – 2000 gallons of diesel (50% decrease from 2011)

Mobile Combustion - Air Transportation

The transportation survey also asked all staff to estimate the total miles they flew on work-related travel in the past year.

Total airplane miles: 33,000 miles (35% decrease since 2011)

Conversions: Greenhouse Gas Protocol Initiative calculation for long haul, economy class air travel = 0.1416 kg CO₂ per passenger mile; 1kg = 0.001 metric tons.

Input: 4.67 metric tons of CO₂ equivalent.

Wastewater Treatment:

Sewer charges are calculated at 90% of water consumption. GFNMS is located in a Mediterranean climate where rain is seasonal, so irrigation needs vary accordingly. It typically rains from October thru April, and is dry from May thru September (when irrigation is needed).

Total Sewer

Based on the 2012 Presidio Trust utility statements for sewer, GFNMS generated:

Building 1901 – 69,500 gallons water x .9 = 62,550

Building 1903 – 479,000 gallons water x .9 = 431,100 (includes irrigation)

Building 1903 – 120,000 gallons water x .9 = 108,000 (excluding irrigation)*

Total: 493,650 gallons of sewer (with irrigation)

Total: 170,550 gallons of sewer (excluding irrigation)

Input: 170,550 gallons

*We can approximate water used solely for irrigation by determining our average consumption in Building 1903 in the wet months at 10,000 gallons per month; annualized at 120,000 gallons per year.

Solid Waste:

These numbers were derived from the on-site refuse collection bin.

GFNMS has one 1-cubic yard container for waste, picked up once a week. At pick up, the container is usually at 50% capacity.

Conversions: 1 cubic yard = 500 pounds; 1 pound = 0.0005 short tons.

Input: 6.5 short tons (no change)

EMISSION INVENTORY RESULTS

The NPS CLIP Tool derives the total Metric Tons Carbon Dioxide Equivalent (MTCO₂E) based on each input. For long-term tracking purposes, and because staff fluctuate year to year, per capita emissions were also measured. More detailed results are available in the CLIP Tool, such as emissions of each greenhouse gas CO₂, CH₄, N₂O, and HFC. The 2008 results are used as the baseline for all analyses.

Gross Emissions by Year, Sector, and Per Capita (MTCO₂E)

Year	Stationary Combustion	Purchased Electricity	Mobile Combustion	Wastewater Treatment	Solid Waste	Gross Emissions	Number of Staff	Per Capita Emissions
2008	20	18	149	1	2	190	23	8.26
2009	21	19	128	1	1	171	23	7.43
2010	26	19	126	2	1	174	24.8	7.02
2011	29	21	126	3	2	180	27.3	6.59
2012	27	21	102	2	2	154	24.9	6.18

EMISSION INVENTORY GRAPHS



