

**2011 (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 2011 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.

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. Each input is described in greater detail below, with a per capita emission estimate provided at the end of this document.

General Information:

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

Year Inventoried: 2011

Inventory completed by: Brian Johnson, Deputy Superintendent

Inventoried Operations: Stationary Combustion, 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: 27.3 (18.3-GFNMS, 6.6-FMSA, 2.4-IFR)

2011 Highlights

- Net staff increase of 2.5 from 2010 (+2.3 @ GFNMS, +.2 @ FMSA)
- Sanctuary occupied an additional building (Residence/Ocean Climate Center) for 12 months; only 3 months of occupancy was included in 2010 inventory
- Since 2008 baseline inventory:
 - Building occupants: increased 20%
 - Number of buildings: increased 100%
 - Natural gas: increased 50%
 - Electricity: increased 17%
 - Transportation emissions decreased
 - Auto and boat: same level
 - Air travel: decreased 50% (budget driven)
 - Public transportation: decreased 50% (Muni#29 discontinued)
 - Wastewater: increased 100% (highly variable)
 - Refuse: collection decreased 50%

Per capita emissions have declined by 1.67 Metric Tons Carbon Dioxide Equivalent (MTCO₂E) since 2008

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: 5372 Therms of natural gas used in 2011

Conversion: 1Therm = 100 cubic feet.

Input: 537,200 cubic feet. (15% increase from 2010, 50% increase since 2008)

Purchased Electricity:

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

Bldg 1901 – \$2438.87

Bldg 1903 - \$6686.48

Electricity: \$9125.35 total paid in 2011

The Presidio Trust utility rate is \$0.154 per kWh.

Input: 59,256 kWh. (10% increase from 2010)

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 two government vehicles. This estimate also accounts for the use of the R/V FULMAR, the sanctuary's research vessel, for 37 days per year.

Total staff: 27.3 (18.3-GFNMS, 6.6-FMSA, 2.4-IFR)

Primary mode: 22.1 car, 2.9 bike, 2.3 bus (similar to past years)

Government vehicles on-site: 2 (1-Van,1-Hybrid; assumed average 22mpg per auto)

Input: Autos, fueled with gasoline – 158,860 miles (negligible decrease from 2010)

Input: Buses, fueled by diesel – 8,840 miles (50% decrease since 2008)

Input: Boats – 4000 gallons of diesel (same as past years)

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: 51,200 miles (50% decrease since 2008)

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: 7.2 metric tons of CO₂ equivalent.

Wastewater Treatment:

Sewer charges are derived from water consumption. GFNMS is located in a Mediterranean climate where rain is seasonal, so irrigation needs vary accordingly. It typically rains from October to March, and is dry from April to September (when irrigation is needed). From prior year analyses, we have determined that approximately 10% of our water consumption is used for irrigation. However, in 2011, we had a very dry winter with rains coming late in the season.

Total Sewer

Based on the 2011 Presidio Trust utility statements for sewer, GFNMS generated:

Building 1901 – 54,613 gallons (full year)

Building 1903 – 239,557 gallons

Total: 294,170 gallons.

Irrigation-only Sewer

Use 10% of total sewer charges

Irrigation-only total: 29,417 gallons

Building-only Sewer

Use 90% of total sewer charges

Input: Building only – 264,753 gallons

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 RESULTS

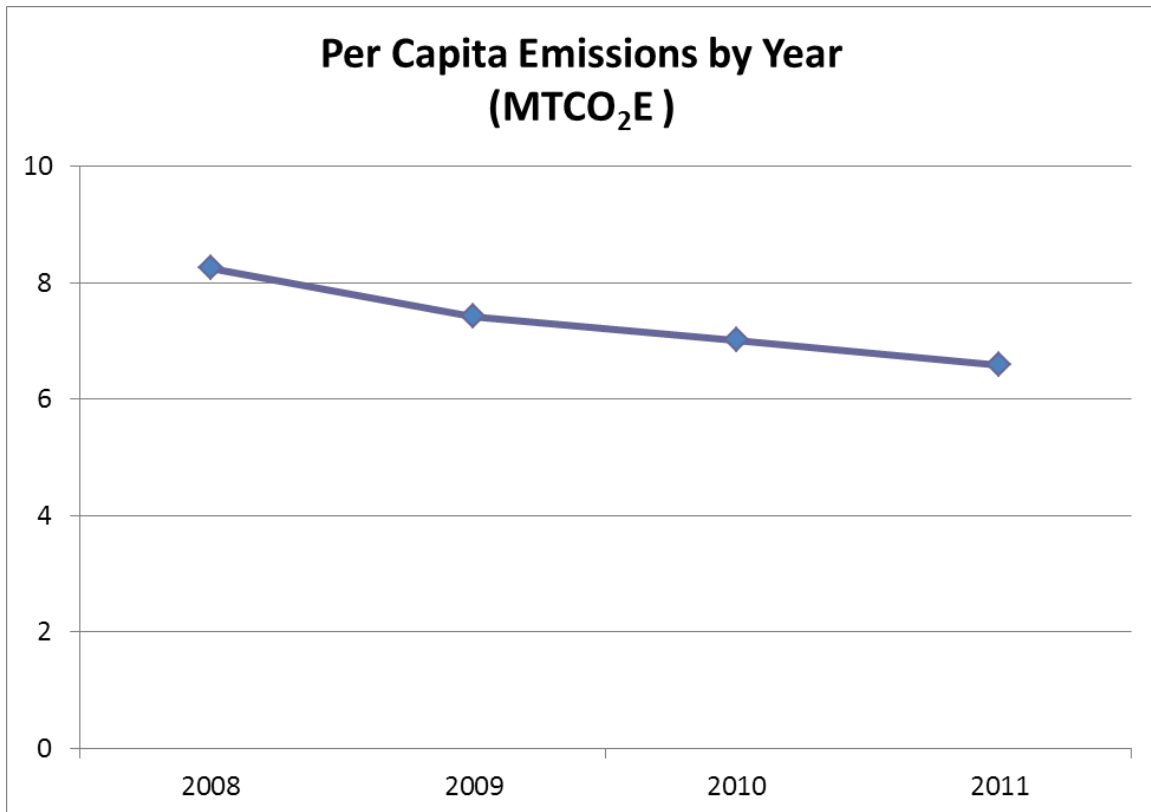
After plugging in the above estimates, the NPS CLIP Tool derives the total Metric Tons Carbon Dioxide Equivalent (MTCO₂E) based on each input. For long-term tracking purposes, and because staff fluctuate year to year, this number was converted into a per capita total.

The final numbers were used to generate graphs and charts below. 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 future analyses.

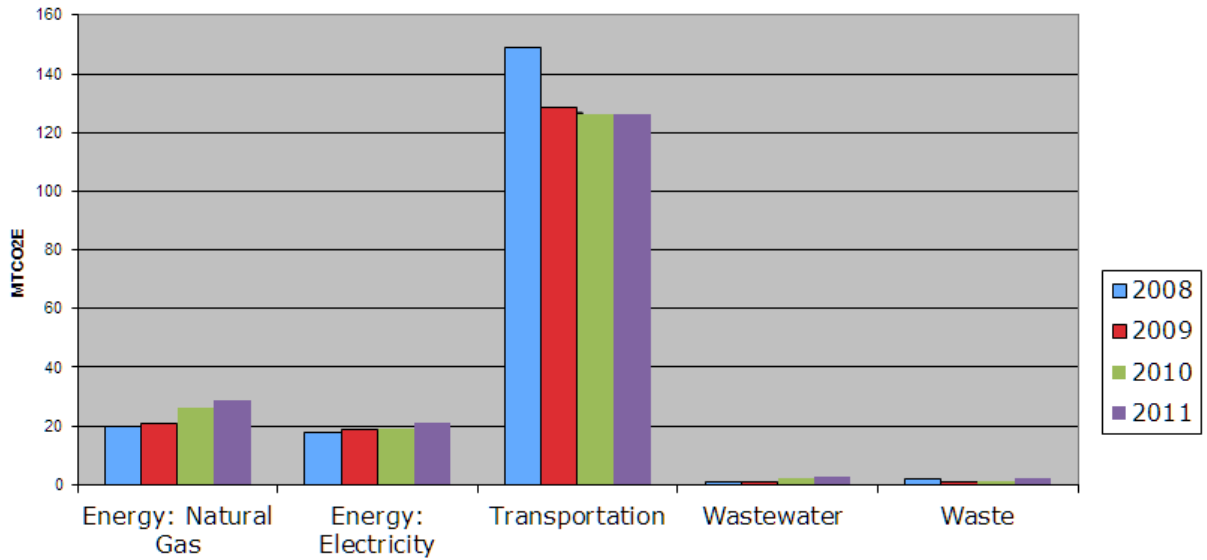
Gross Emissions by Year, Sector, and Per Capita (MTCO₂E)

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

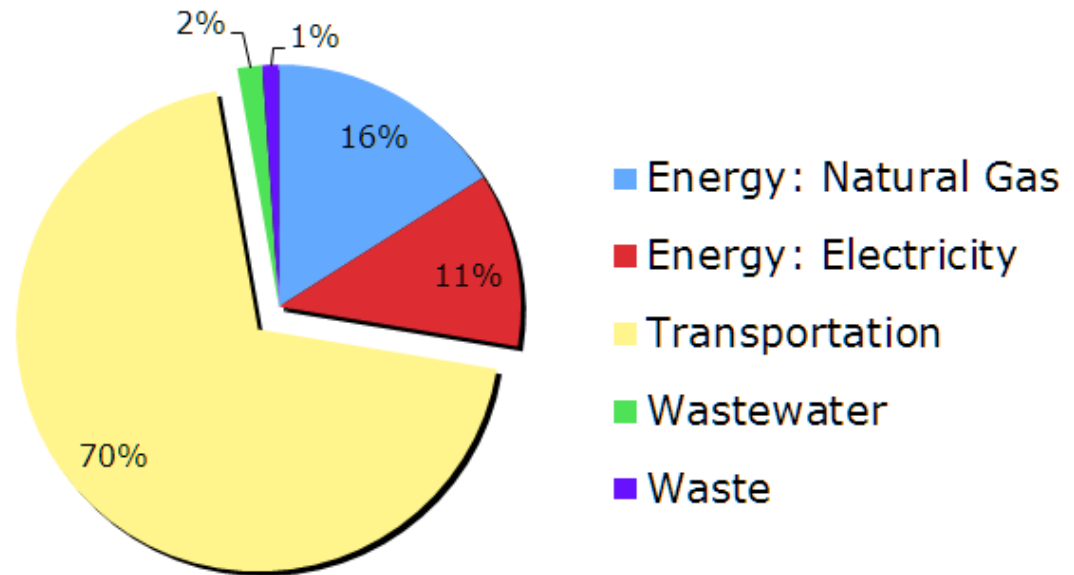
Emission Results Tables



**2008-2011
Gross Emissions by Sector
Gulf of the Farallones National Marine Sanctuary**



**2011
Emissions as Percent of Total
Gulf of the Farallones National Marine Sanctuary**



2011 Transportation Emissions as Percent of Total

