

2010 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 2010 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: 2010

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: 24.8 (16-GFNMS, 6.4-FMSA, 2.4-IFR)

2010 Highlights

- Net staff increase of 1.8 (+3.7 @ GFNMS, -.3 @ FMSA, -1.6 @ IFR)
- Sanctuary acquired an additional building that was included in this inventory (Residence/Officer in Charge Quarters)
- Emissions rose when the sanctuary took occupancy of the Residence in Oct 2010
- Since 2008 baseline inventory:
 - Natural gas usage has risen 30%
 - Electricity has remained steady despite new building and more staff
 - Transportation emissions declined
 - Auto and boat use about the same level
 - Air travel declined 50% (budget driven)
 - Public transportation declined 50% (Muni#29 discontinued)
 - Wastewater increased slightly with new building.
 - Refuse collection declined 50%.

Per capita emissions declined 1.24 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: 4660 Therms of natural gas used in 2010
Conversion: 1Therm = 100 cubic feet.
Input: 466,000 cubic feet. (30% increase since 2008)

Purchased Electricity:

The stationary combustion numbers were derived from Presidio Trust utility statements:
Bldg 1901 – \$630.55
Bldg 1903 - \$7016.16

Electricity: GFNMS paid \$7646.71 in 2010
The Presidio Trust utility rate is \$0.141 per kWh.
Input: 54,232 kWh. (marginal decrease)

Mobile Combustion - Ground & Sea Transportation:

A survey was conducted of all staff to determine the method in which they commuted 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 each year.

Total staff: 24.8 (Net staff increase of 1.8; +3.7 @ GFNMS, -.3 @ FMSA, -1.6 @ IFR)
Primary transportation: 20.9 car, 2.4 bike, 1.5 bus (Autos went up as primary)
Government vehicles on-site: 2 (1-Van, 1-Hybrid; assumed average 22mpg per auto)
Input: Autos, fueled with gasoline – 163,794 miles (negligible decrease)
Input: Buses, fueled by diesel – 8,320 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: 48002 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: 6.8 metric tons of CO₂ equivalent.

Wastewater Treatment:

Sewer charges are derived from water consumption. Because GFNMS is located in a Mediterranean climate, rain is seasonal and predictable. It typically rains from October to

March, and is dry from April to September. For this estimate we assumed no irrigation was required in wet months. This estimate includes both potable water consumed by the buildings tenants, and that used for irrigation.

Total Sewer

Based on the 2010 Presidio Trust utility statements for sewer, GFNMS generated:

Building 1901 – 9,660 gallons (Oct – Dec only)

Building 1903 – 177,300 gallons

Total: 186,960 gallons.

Building-only Sewer

Based on the sewage gallons for wet months (Jan-Mar, Oct-Dec).

Building 1901 – 8,400

Building 1903 – 76,050

Building-only Total: 84,450 gallons for 6 months, or 168,900 gal. rate for 12 months.

Input: Building only – 168,900 gallons (90% of total)

Irrigation-only Sewer

Subtract building-only sewer from total gallons sewer to determine

Irrigation-only total: 18,060 gallons (10% of total)

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.

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.

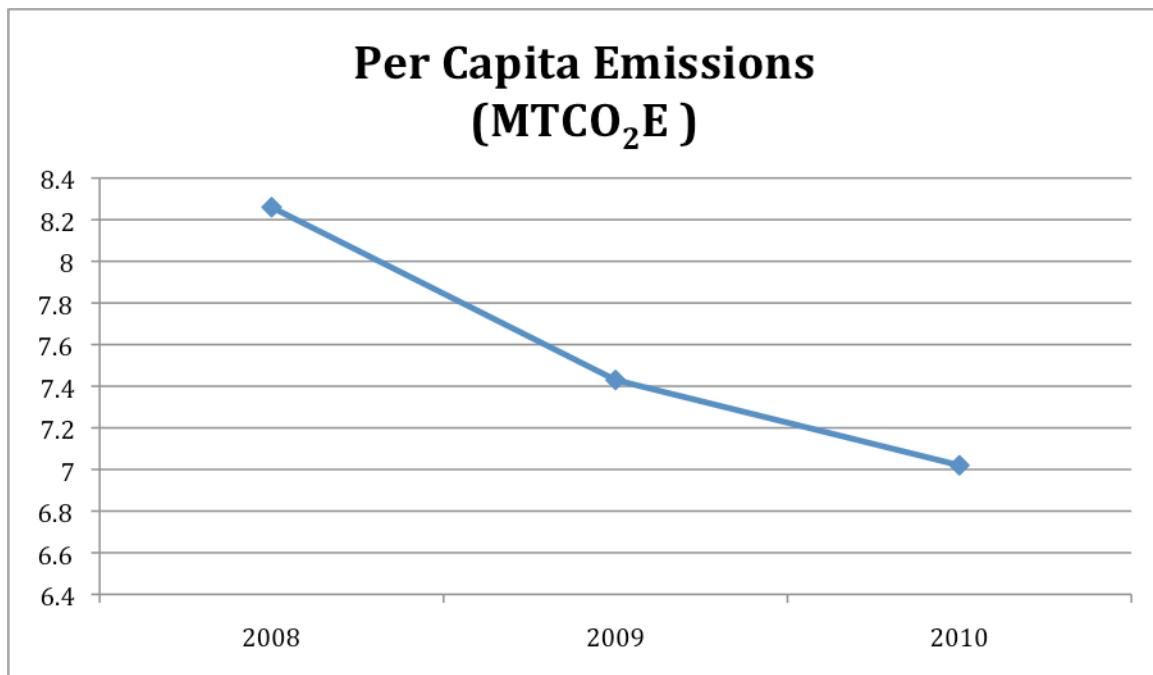
The final numbers were used to generate graphs and charts below. More detailed results are available in the CLIP Tool, such as emissions of each greenhouse gas CO₂, CH₄, N₂O, and HFC. The 2008 results are used as the baseline for all future analyses.

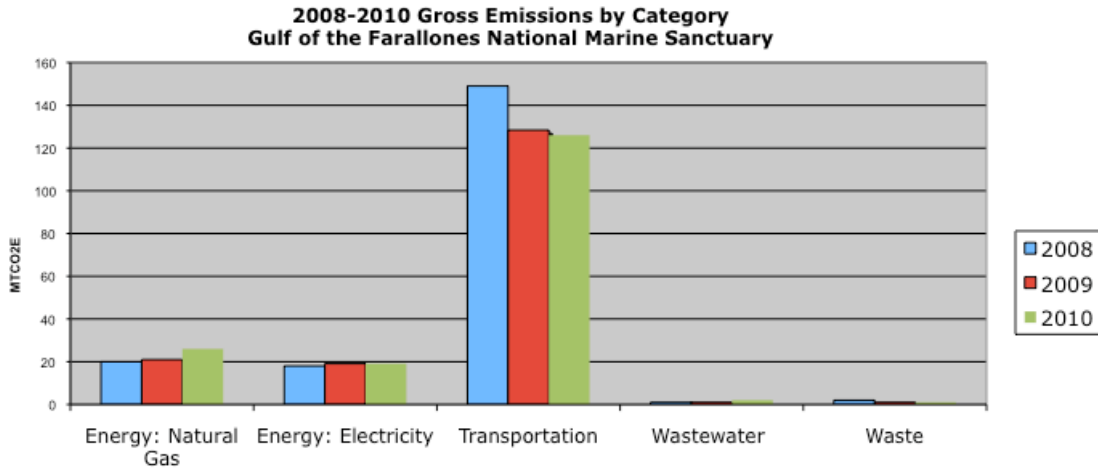
Gross Emissions by Sector (MTCO₂E)

| GFNMS Operations | 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 |

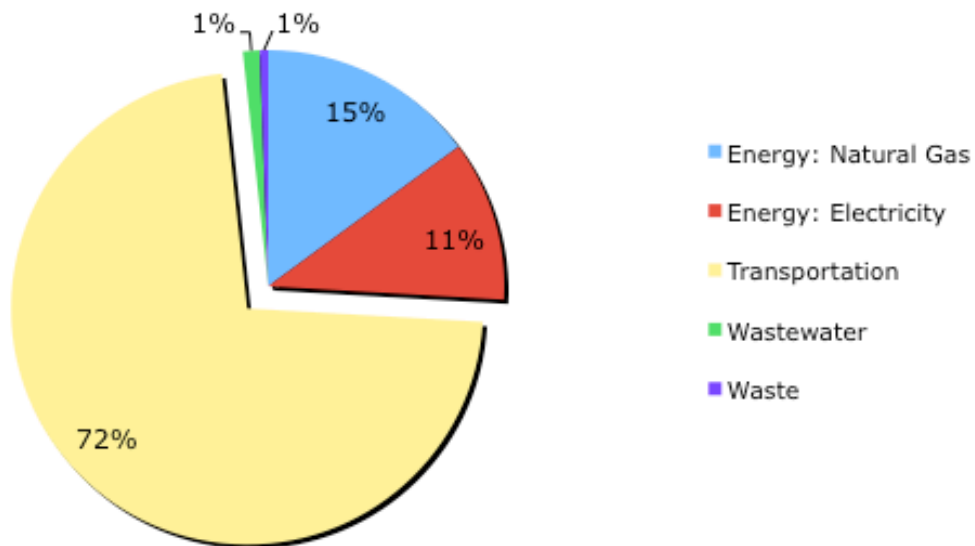
Reduced emissions by 1.24 MTCO₂E per capita since 2008

Emission Results Tables





2010 Emissions by Category Gulf of the Farallones National Marine Sanctuary



Transportation: Breakdown of Emissions (2010)

