

2016 (Calendar Year) Greenhouse Gas Emission Inventory for the Greater Farallones National Marine Sanctuary

The Greater Farallones National Marine Sanctuary (GFNMS) used the National Park Service's (NPS) [Climate Leadership In Parks \(CLIP\) Tool](#) to complete an inventory of 2016 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 inventory, 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 2016 decreased slightly over the last year. The demand for natural gas and electricity has essentially remained level since 2014. These sources of energy contributed approximately 23% of the site's total emissions for the year. Wastewater and solid waste disposal have remained steady since 2008, and contributed 2% of the sites total 2016 emissions.

Transportation remains the highest portion of emissions, contributing 75% of the site's total in 2016. Automobile transportation (commuting & government vehicles) makes up over 70% of that. However, fewer staff commuting to the office and for official travel in 2016 resulted in lower transportation emissions than last year. Transportation remains the most volatile emission, while other sectors have remained essentially unchanged for the last 3 years.

Highlights

- Per capita emissions have declined by 2.84 Metric Tons Carbon Dioxide Equivalent (MTCO₂E) since 2008
- Sanctuary staff travelled to the expansion area to discuss and implement programs
- Installed new Internet and VOIP equipment
- Air Travel higher
- Wastewater treatment estimates refined by irrigation meter installation

EMISSION INVENTORY INPUTS

General Information:

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

Year Inventoried: 2016

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: 25.3

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: 3112 Therms of natural gas used

Conversion: 1Therm = 100 cubic feet.

Input: 311,200 cubic feet (3% increase from 2015)

Purchased Electricity:

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

Bldg 1901 kWh – 12,129 (11% increase from 2015; new internet & VOIP)

Bldg 1903 kWh – 30,880 (2% decrease from 2015)

Input: 43,009 kWh (1% increase from 2015)

Mobile Combustion - Ground & Sea Transportation:

All staff were surveyed to determine their primary mode of transportation used to commute to work. They could choose from auto, 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: Auto (100% of staff)

Government vehicles on-site: 4 (1-Van, 1-hybrid SUV, 2 hybrid sedans)

Input: Autos, fueled with gasoline – 183,843 miles (7% decrease from 2015)

Input: Buses, fueled by diesel – 0 miles (100% decrease from 2015)

Input: Boats – 2000 gallons of diesel (same as 2015)

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: 58,926 miles (28% increase since 2015)

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: 8.34 metric tons of CO₂ equivalent.

Wastewater Treatment:

In the past, it was difficult to estimate total sewage because potable water consumption was combined with irrigation. In 2015, the site constructed dedicated and metered irrigation lines, and also greatly reduced irrigation due to state-wide drought conditions. With consumption and irrigation decoupled, it was possible to derive accurate total sewage from Presidio Trust sewer bills.

1901 – 4.6289 Kgal

1903 – 54.9123 Kgal

Input: 59,541 gallons (63% decrease from 2015)

Solid Waste:

These numbers were derived from the on-site refuse collection bin. The site has two 64-gallon trash bins, picked up once per week.

Conversions: A 64-gallon bin holds on average approximately 100 pounds of waste. 200 pounds x 52 weeks = 10,400 pounds/year. 1 pound = 0.0005 short tons.

Input: 5.2 short tons (same as 2015)

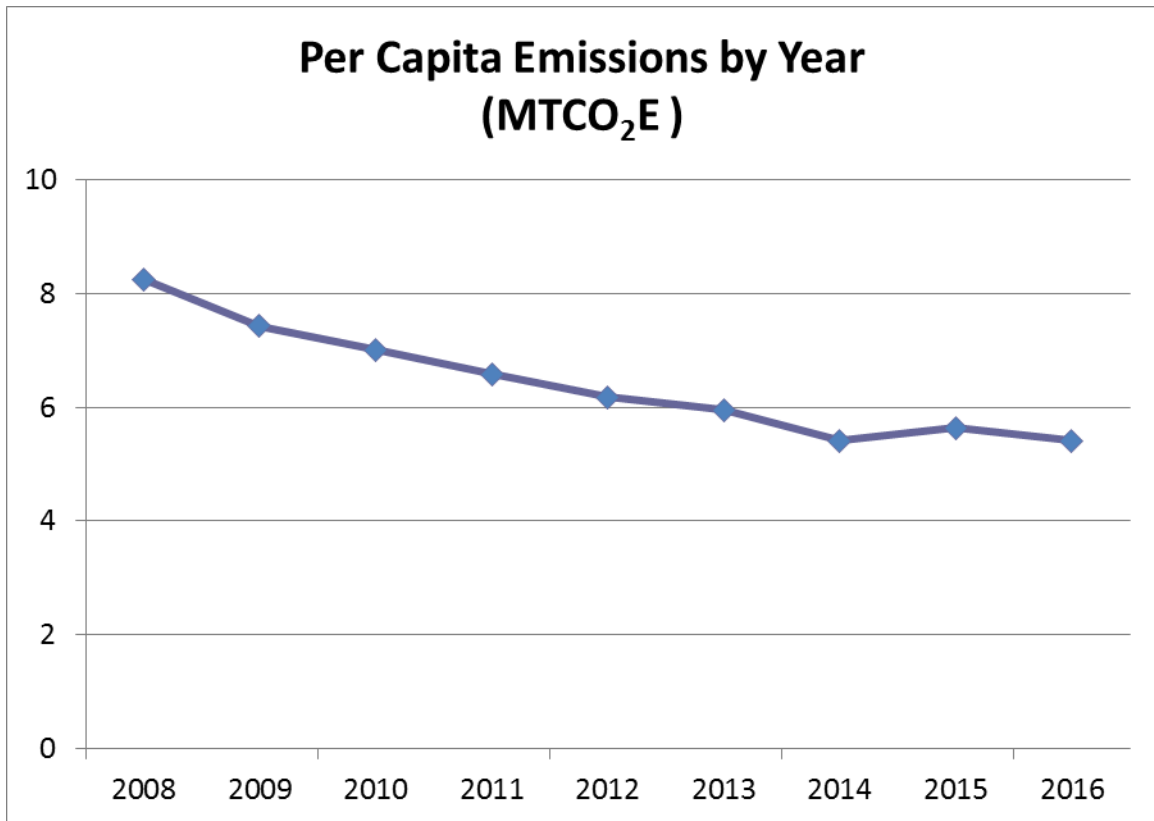
EMISSION INVENTORY RESULTS

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 subsequent analyses.

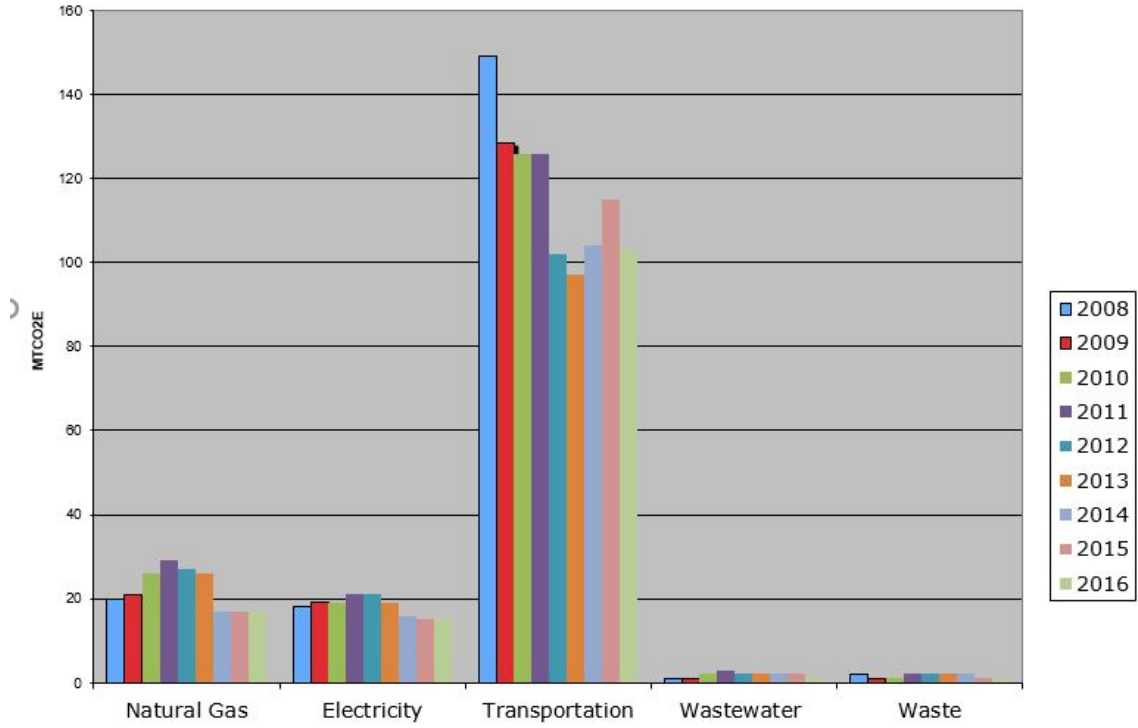
Gross Emissions by Year, Sector, and Per Capita (MTCO₂E)

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
2013	26	19	97	2	2	145	24.3	5.96
2014	17	16	104	2	2	141	26	5.42
2015	17	15	115	2	1	149	26.4	5.64
2016	17	15	103	1	1	137	25.3	5.42

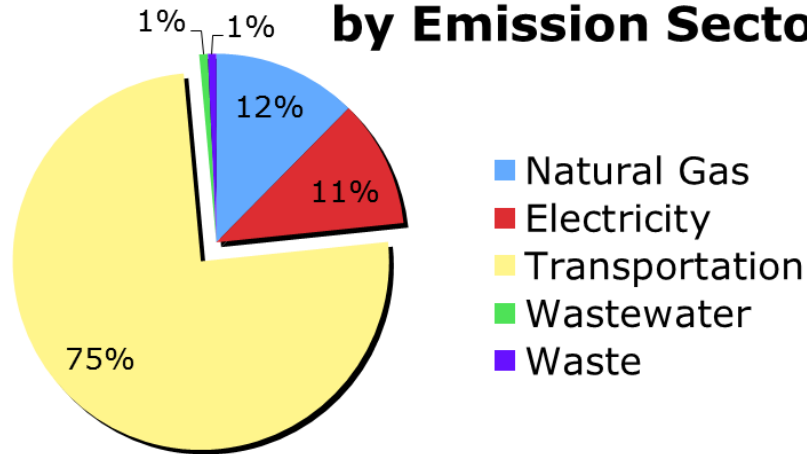
EMISSION INVENTORY GRAPHS



2008-2016 Gross Emissions by Sector



2016 Percent of Total by Emission Sector



2016 Transportation Mode as Percent of Total Transportation Emission

