

2017 (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 calendar year 2017 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 2017 increased slightly over the last year. The demand for natural gas rose following repairs to the HVAC system in Building 1903, which meant it actually heated the facility for the entire year (in past years it has been broken and turned off for weeks at a time). Demand for electricity has decreased since 2012 but has leveled off with the completion of most electrical conservation measures. These sources of energy contributed approximately 27% 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 2017 emissions.

Transportation remains the highest portion of emissions, contributing 71% of the site's total in 2017. Automobile transportation (commuting & government vehicles) makes up 76% of that. We began tracking miles driven by vehicle type in 2017, with the following results: 50% - automobile (gas), 24% automobile (hybrid), 24% - truck or SUV, and 2% electric vehicle. We hope to use these data to measure and incentivize modes of transportation that emit fewer emissions.

Highlights

- Per capita emissions have declined by 2.79 Metric Tons Carbon Dioxide Equivalent (MTCO₂E) since 2008. This is a .05 increase over 2016.
- Repaired Building 1903 HVAC air handler and installed digital controls (Sep 2017 – Feb 2018). Electricity and natural gas demand was low during repairs (Sep-Oct), then increased when the system was operating again (Nov-Dec). We

anticipate an increase in electricity and natural gas consumption now that the system is operating 100%. Natural gas consumption was up 62% from 2016.

- We began recording the type of auto used to commute to the office and conduct programs. Total miles traveled was essentially flat.
- Air travel lower (likely due to budget constraints).

EMISSION INVENTORY INPUTS

General Information:

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

Year Inventoried: 2017

Inventories completed by: Brian Johnson, Deputy Superintendent

Inventories 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: 27.5

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: 5056 Therms of natural gas used

Conversion: 1Therm = 100 cubic feet.

Input: 505,600 cubic feet (62% increase from 2016)

Purchased Electricity:

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

Bldg 1901: 13,819 kWh (14% increase from 2016)

Bldg 1903: 27,153 kWh (13% decrease from 2016)

Input: 40,972 kWh (5% decrease from 2016)

Mobile Combustion - Ground & Sea Transportation:

All staff were surveyed to determine their mileage and primary mode of transportation used to commute to work: auto (electric, hybrid, gas or truck/SUV), carpool, bus, train, bicycle, or walk. All travel to and from the Crissy Field Headquarters office was counted, including use of government vehicles and use of personal travel for work meetings. 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, electric – 3000 miles (no emissions!)

Input: Autos, hybrid – 46,723 miles

Input: Autos, gasoline – 94,800 miles

Input: Autos, truck/SUV – 46,625 miles (Total auto mileage up 4% from 2016)

Input: Boats – 2000 gallons of diesel (same as 2016)

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: 33,850 miles

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: 4.79 metric tons of CO₂ equivalent. (26% decrease since 2016)

Wastewater Treatment:

The wastewater treatment numbers were derived from Presidio Trust sewer bills.

1901 – 7.99 Kgal

1903 – 44.53 Kgal

Input: 52,520 gallons (13% decrease from 2016)

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 2016)

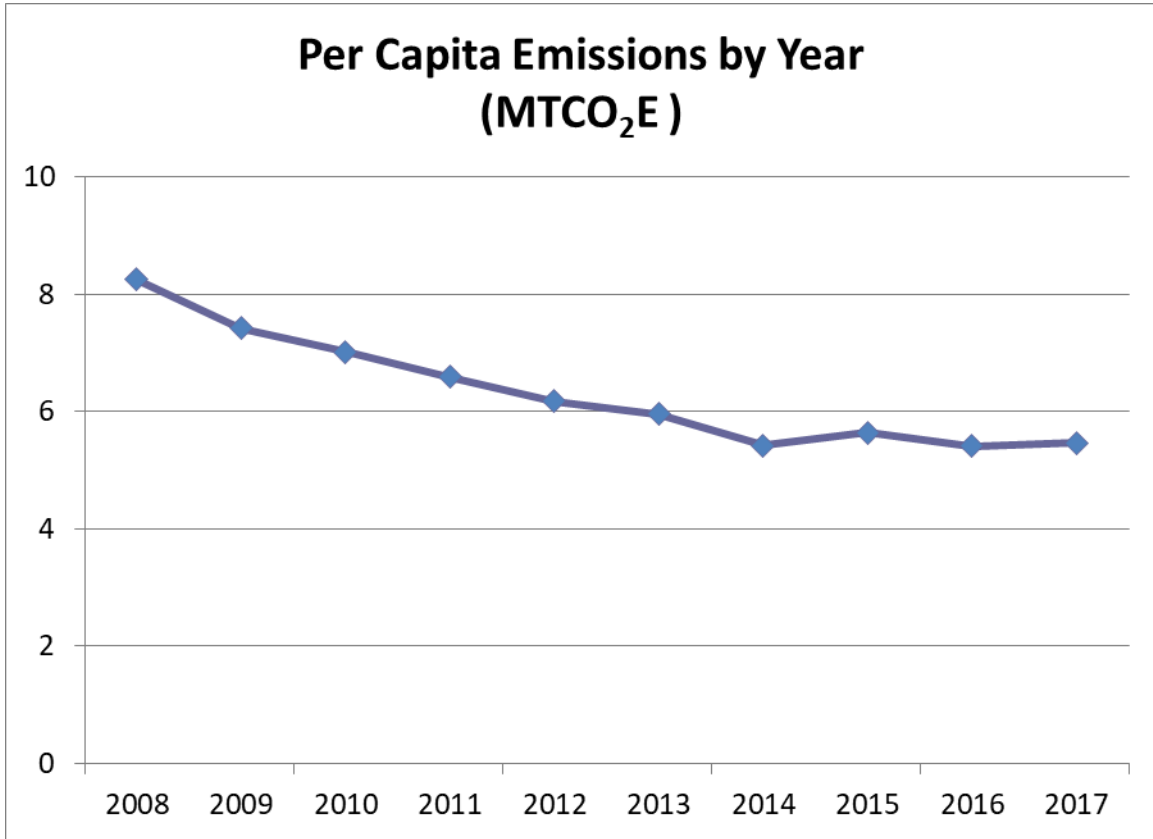
EMISSION INVENTORY RESULTS

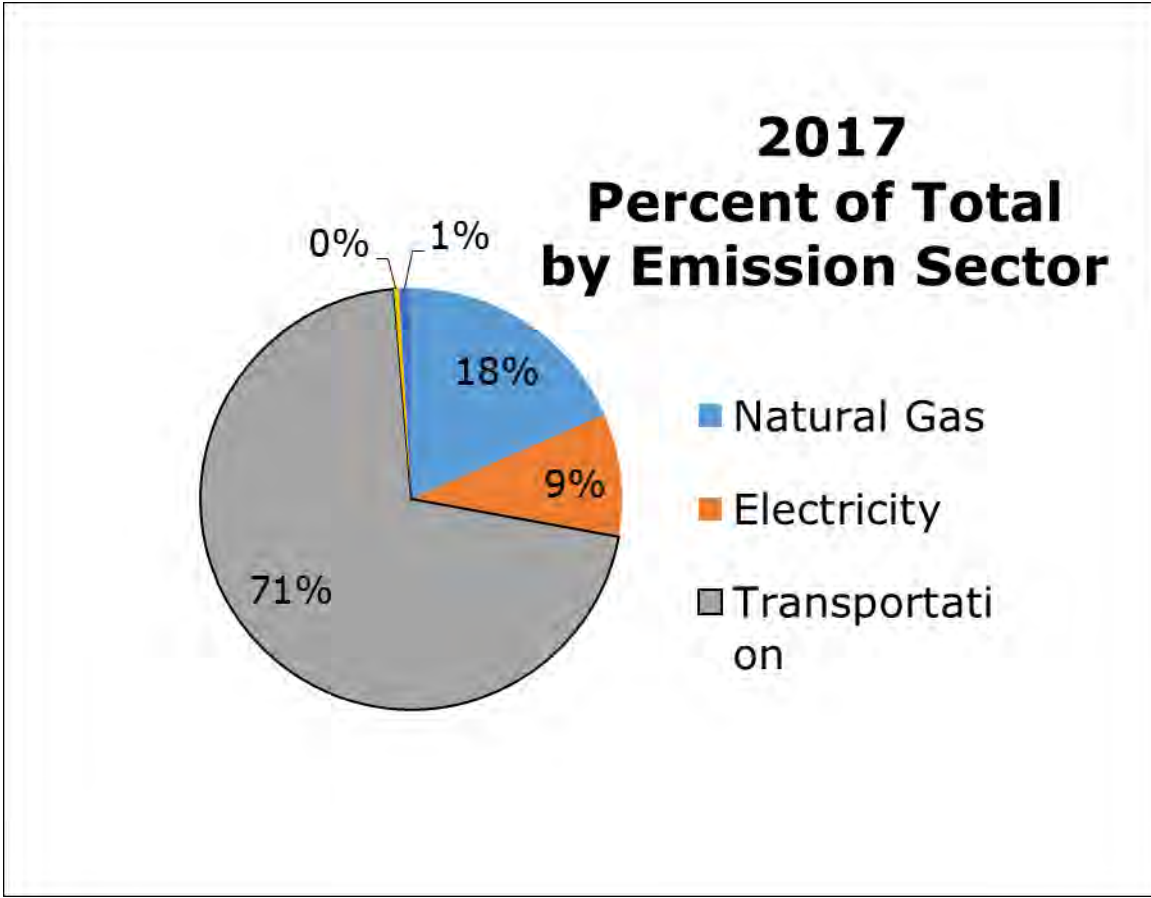
The NPS CLIP Tool derives the total Metric Tons Carbon Dioxide Equivalent (MTCO₂E) based on each input. For long-term tracking purposes, and because staff fluctuate year to year, per capita emissions were also measured. More detailed results are available in the CLIP Tool, such as emissions of each greenhouse 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
2017	27.7	14.2	106.4	0.6	1.4	150.3	27.5	5.47

EMISSION INVENTORY GRAPHS





2017 Percent of Total Transportation Emission by Transportation Mode

