

2018 (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 2018 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 2018 decreased over the last year. The demand for natural gas decreased due to better HVAC controls installed in early 2018, but electricity demand increased to run the air handlers that circulate and moderate temperature in the main office building and Visitor Center. These sources of energy contributed approximately 32% of the site's total emissions for the year.

Transportation remains the highest source of emissions, contributing 66% of the site's total in 2018. Auto transportation emits 71%, and the research vessel FULMAR 23%, of the total transportation emissions. Commuting to the office makes up 75% of the automobile emissions. However, staff converting to electric and hybrid vehicles reduced our transportation emissions in 2018, despite an uptick in air travel.

Wastewater and solid waste disposal have remained steady since 2008, and contributed about 2% of the site's total 2018 emissions. We have failed to meet reduction targets for waste and water, but given their low percentage of overall emissions, time and resources are best spent lowering emissions from transportation and energy.

Highlights

- Per capita emissions – 4.89 Metric Tons Carbon Dioxide Equivalent (MTCO₂E)
This is a reduction of 3.37 MTCO₂E since 2008
- Repaired Building 1903 HVAC air handler and installed digital controls (Sep 2017 – Feb 2018). Electricity consumption has increased due to the air handlers

constantly circulating air during work hours. Natural gas consumption has decreased slightly due to lower temperature set points and zone controls.

- There is still no option to purchase 100% renewable electricity from the Presidio Trust.
- Air travel 19% higher than 2017.
- Total auto mileage reduced by 27,625 miles from 2017. Number of electric and hybrid modes of transportation increased.
- Entering auto miles traveled as hybrid, gas, and truck instead of gas and truck reduced emission totals. Will continue to track transportation emissions in these categories.
- Wastewater and solid waste estimates remained flat.

EMISSION INVENTORY INPUTS

General Information:

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

Year Inventoried: 2018

Inventories 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: 27.6

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: 4,711 Therms of natural gas used

Conversion: 1 Therm = 100 cubic feet.

Input: 471,100 cubic feet (7% decrease from 2017)

Purchased Electricity:

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

Bldg 1901: 14,981 kWh (8% increase from 2017)

Bldg 1903: 36,560 kWh (35% increase from 2017)

Input: 51,541 kWh (26% increase from 2017)

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 (~nearly 100% of staff)
Government vehicles on-site: 4 (1-Van, 1-hybrid SUV, 2 hybrid sedans)
Input: Autos, electric – 8000 miles (260% increase!)
Input: Autos, hybrid – 43,985 miles (used 40 MPG for hybrid input)
Input: Autos, gasoline – 68,040 miles (35% decrease from 2017)
Input: Autos, truck/SUV – 48,498
Input: Boats – 2000 gallons of diesel (same as 2017)

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: 40,251 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: 5.7 metric tons of CO₂ equivalent. (19% increase since 2017)

Wastewater Treatment:

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

1901 – 5.40 Kgal
1903 – 47.60 Kgal
Input: 53,000 gallons (1% increase from 2017)

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.

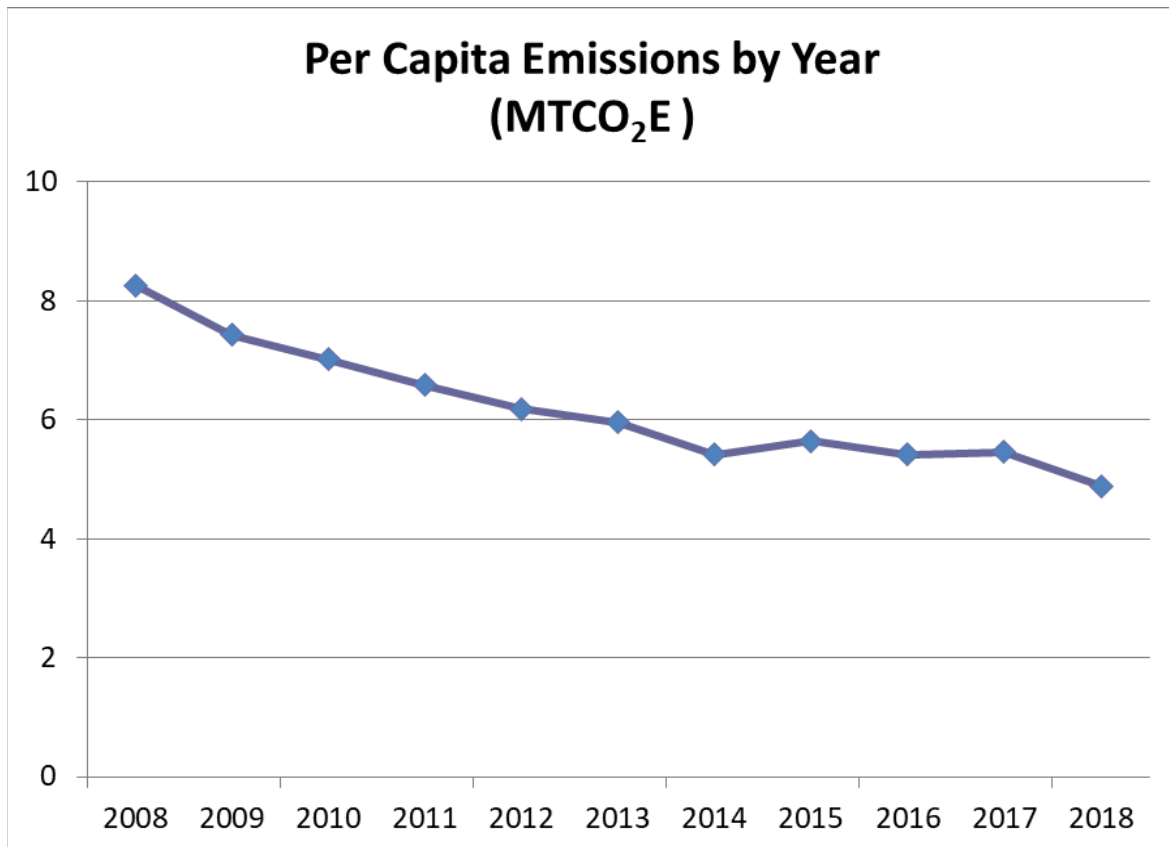
Conversions: A 64-gallon bin holds on average approximately 100 pounds of waste. 200 pounds x 52 weeks = 10,400 pounds/year. 1 pound = 0.0005 short tons.
Input: 5.2 short tons (same as 2017)

EMISSION INVENTORY RESULTS

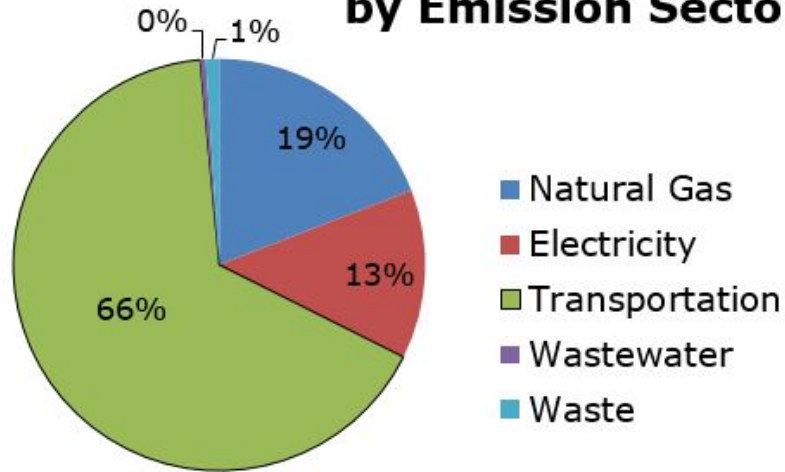
The NPS CLIP Tool derives the total Metric Tons Carbon Dioxide Equivalent (MTCO₂E) based on each input. For long-term tracking purposes, and because staff fluctuate year to year, per capita emissions were also measured. More detailed results are available in the CLIP Tool, such as emissions of each greenhouse 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
2018	25.8	17.9	89.2	0.6	1.4	134.9	27.6	4.89



2018 Percent of Total by Emission Sector



2018 Percent of Total Transportation Emission by Transportation Mode

