

**2019 (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 2019 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 2019 were essentially the same as 2018, and per capita emissions have remained relatively flat since 2014. A 4-week government shutdown at the beginning of the calendar year also contributed to lowering office heating and transportation emissions. Despite lowering our gross and per capita emissions since 2008, the site is not going to meet its 2020 reduction targets without drastic cuts to transportation and facility-based energy needs.

The demand for natural gas was flat in 2019, but electricity demand continued to increase. These sources of energy contributed approximately 35% of the site's total emissions for the year. Until the site can procure 100% green energy, and upgrade its heating system to electric, these emissions will continue. Wastewater and solid waste disposal have remained steady since 2008, and contributed only 1% of the site's total 2019 emissions.

Transportation remains the highest source of emissions, contributing 63% of the site's total in 2019. Auto transportation emits 68%, and the research vessel FULMAR 25%, of the total transportation emissions. Commuting to the office makes up 73% of the automobile miles traveled (a proxy for emissions). However, staff converting from gasoline powered automobiles and truck/SUVs to electric and hybrid vehicles helped to reduce our transportation emissions in 2019. The site is procuring an EV charging station to incentivize this trend, and to prepare the site to lease EV government vehicles.

Highlights

- Per capita emissions were 4.87 Metric Tons Carbon Dioxide Equivalent (MTCO₂E). This is a reduction of 3.39 MTCO₂E since 2008, but only a .02 reduction since 2018.
- The United States federal government shutdown from December 22, 2018, until January 25, 2019 (35 days). This resulted in lower utility usage and travel emissions for the month of January.
- Natural gas emissions were flat.
- Electricity use increased 10% in 2019. There is no option to purchase 100% renewable electricity from the Presidio Trust.
- Electric vehicle mileage increasing, SUV/truck mileage decreasing. Total transportation mileage decreased 8%.
- Wastewater was 12% lower than 2018.
- Solid waste estimates remained flat.

EMISSION INVENTORY INPUTS

General Information:

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

Year Inventoried: 2019

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: 26.4

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: 4680 Therms of natural gas used

Conversion: 1Therm = 100 cubic feet.

Input: 468,000 cubic feet (no change from 2018)

Purchased Electricity:

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

Bldg 1901: 15,960 kWh (7% increase from 2018)

Bldg 1903: 40,480 kWh (11% increase from 2018)

Input: 56,440 kWh (10% increase from 2018)

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)
No Input Option: Bus, electric – 600 miles
No Input Option: Autos, electric – 12,700 miles (59% increase from 2018)
Input: Autos, hybrid – 34,753 miles (used 40 MPG for CLIP input, 21% decrease)
Input: Autos, gasoline – 79,965 miles (18% increase from 2018)
Input: Autos, truck/SUV – 27,496 (44% decrease from 2018)
Total Auto Miles: 155,514 (8% decrease since 2018)
Input: Boats – 2000 gallons of diesel (same as 2018)

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: 41,974 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: 5.94 metric tons of CO₂ equivalent. (4% increase since 2018)

Wastewater Treatment:

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

1901 – 6.17 Kgal
1903 – 40.47 Kgal
Input: 46,640 gallons (12% decrease from 2018)

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 approx. 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 2018)

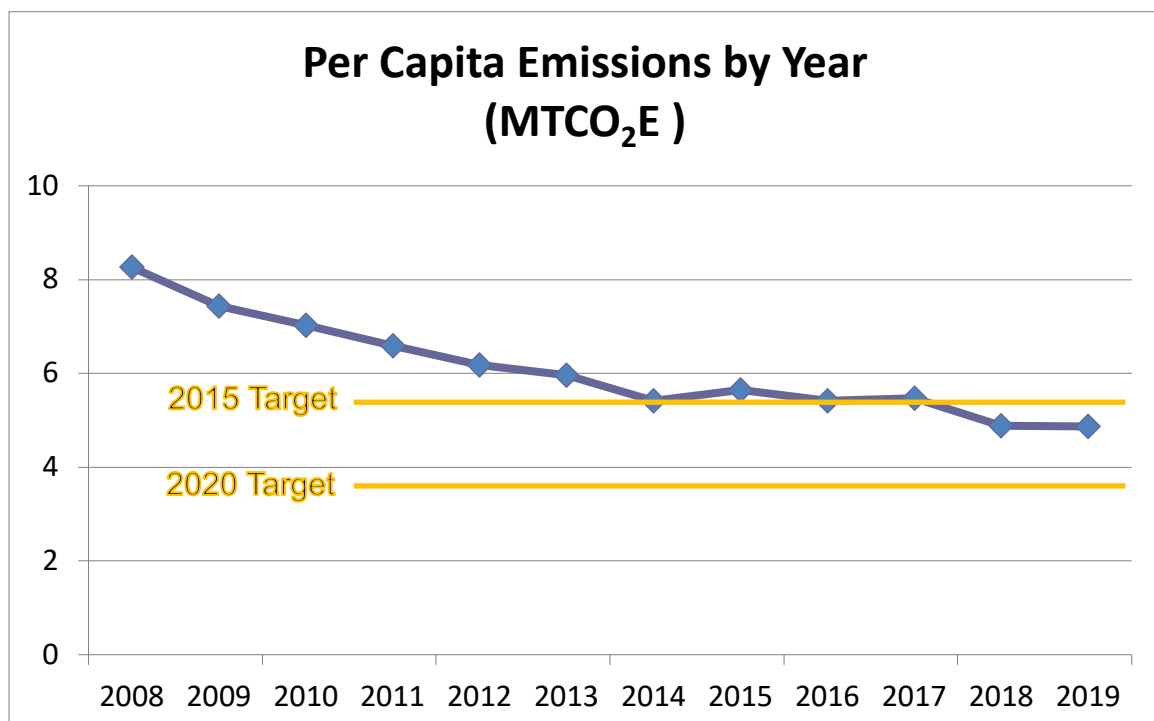
EMISSION INVENTORY RESULTS

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

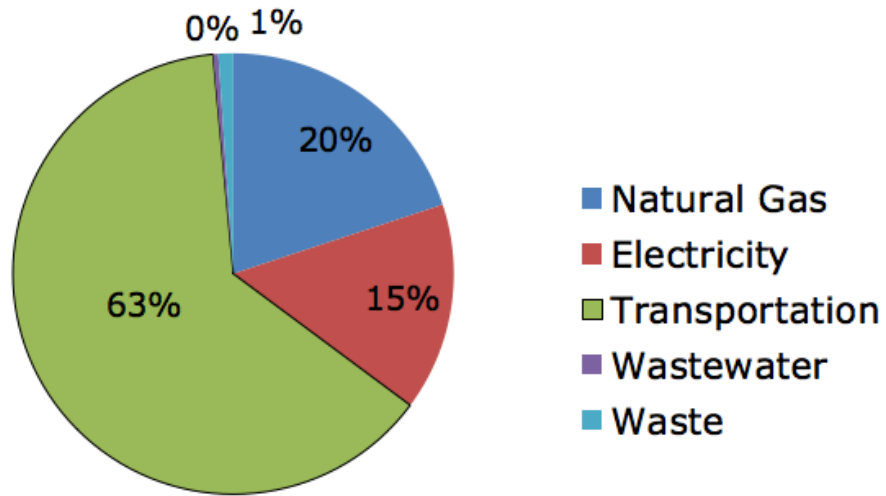
CLIP Tool, such as emissions of each greenhouse gas CO₂, CH₄, N₂O, and HFC. The 2008 results are used as the baseline for all subsequent analyses.

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

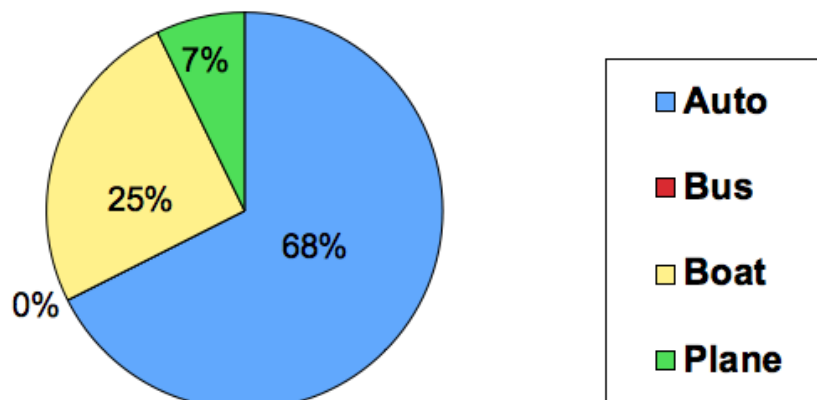
| Year | Stationary Combustion | Purchased Electricity | Mobile Combustion | Wastewater Treatment | Solid Waste | Gross Emissions | Number of Staff | Per Capita Emissions |
|------|-----------------------|-----------------------|-------------------|----------------------|-------------|-----------------|-----------------|----------------------|
| 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 |
| 2019 | 25.6 | 19.6 | 81.4 | 0.5 | 1.4 | 128.5 | 26.4 | 4.87 |



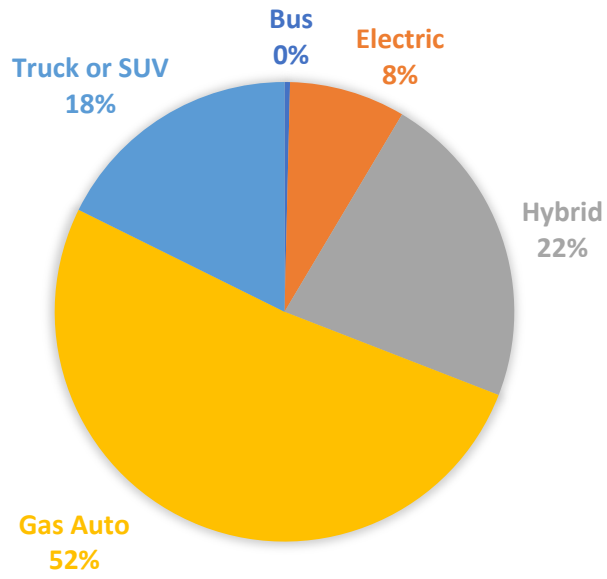
2019 Percent of Total Emission by Sector



2019 Percent of Total Transportation Emission by Transportation Mode



2019 MILES BY TRANSPORTATION MODE



2019 MILES BY PURPOSE

