2014 (Calendar Year)
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 2014 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 audit, 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 2014 were the lowest since the site began measuring greenhouse gasses in 2008. Despite this downward trend, there are troubling details upon closer examination of the data. The demand for natural gas and electricity has essentially remained level year after year, with an increase observed when a new building was added to this survey in 2010. Natural Gas usage was lower in 2014 due to the site's heater being out of service for several weeks. Together, these sources of energy contribute approximately 25% of the site's total emissions. Wastewater and solid waste have also remained steady since 2008, and continue to contribute less than 3% of the sites total emissions.

Transportation remains the highest portion of emissions, contributing over 70% of the site's total. Automobile transportation (commuting & government vehicles) makes up nearly 70% of that, an increase since 2008. In 2014, the sanctuary underwent a public process to expand its boundary 100 miles to the north (to Pt Arena). Staff travelled more and father to these new sanctuary areas which resulted in an increase in mobile combustion.

Highlights

- *Per capita emissions have declined by 2.84 Metric Tons Carbon Dioxide Equivalent (MTCO2E) since 2008*
- Sanctuary staff travelled more and farther to support the site's public expansion process and hold meetings with constituents as far north as Pt Arena.

EMISSION INVENTORY INPUTS

General Information:

Unit Evaluated: GFNMS Crissy Field Headquarters, San Francisco, CA
Year Inventoried: 2014
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: 26

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: 3166 Therms of natural gas used
Conversion: 1Therm = 100 cubic feet.
Input: 316,600 cubic feet (35% decrease from 2013)

Purchased Electricity:

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

Bldg 1901 kWh – 13,565
Bldg 1903 kWh – 33,287
Input: 46,852 kWh (10% decrease from 2013)

Mobile Combustion - Ground & Sea Transportation:

A survey was conducted of all staff to determine the primary mode of transportation used to commute 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 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
Government vehicles on-site: 3 (1-Van,1-Hybrid SUV, 1-Hybrid sedan)
Input: Autos, fueled with gasoline – 170,531 miles (increase from 2013)
Input: Buses, fueled by diesel – 7904 miles (same as 2013)
Input: Boats – 2000 gallons of diesel (same as 2013)

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: 31,200 miles (same as 2013)
Conversions: Greenhouse Gas Protocol Initiative calculation for long haul, economy class air travel = 0.1416 kg CO_2 per passenger mile; 1kg = 0.001 metric tons.

Input: 4.42 metric tons of CO_2 equivalent.

Wastewater Treatment:
Sewer charges are calculated at 90% of water consumption. GFNMS is located in a Mediterranean climate where rain is seasonal, so irrigation needs vary accordingly. It typically rains from October thru April, and is dry from May thru September (when irrigation is needed). Potable water from Building 1903 was used for irrigation until Dec 2015. Note reduction in water consumption due to decreased irrigation beginning in CY2014.

Total Sewer
Based on the 2014 Presidio Trust utility statements for sewer, GFNMS generated:
Building 1901 – 58,460 gallons water x .9 = 52,614
Building 1903 – 158,190 gallons water x .9 = 142,371 (includes irrigation)
Building 1903 – 120,000 gallons water x .9 = 108,000 (excluding irrigation)*
Total: 194,985 gallons of sewer (with irrigation) Total: 160,614 gallons of sewer (excluding irrigation)
Input: 160,614 gallons

*We can approximate water used solely for irrigation by determining our average consumption in Building 1903 in the wet months at 10,000 gallons per month; annualized at 120,000 gallons per year.

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 (no change)

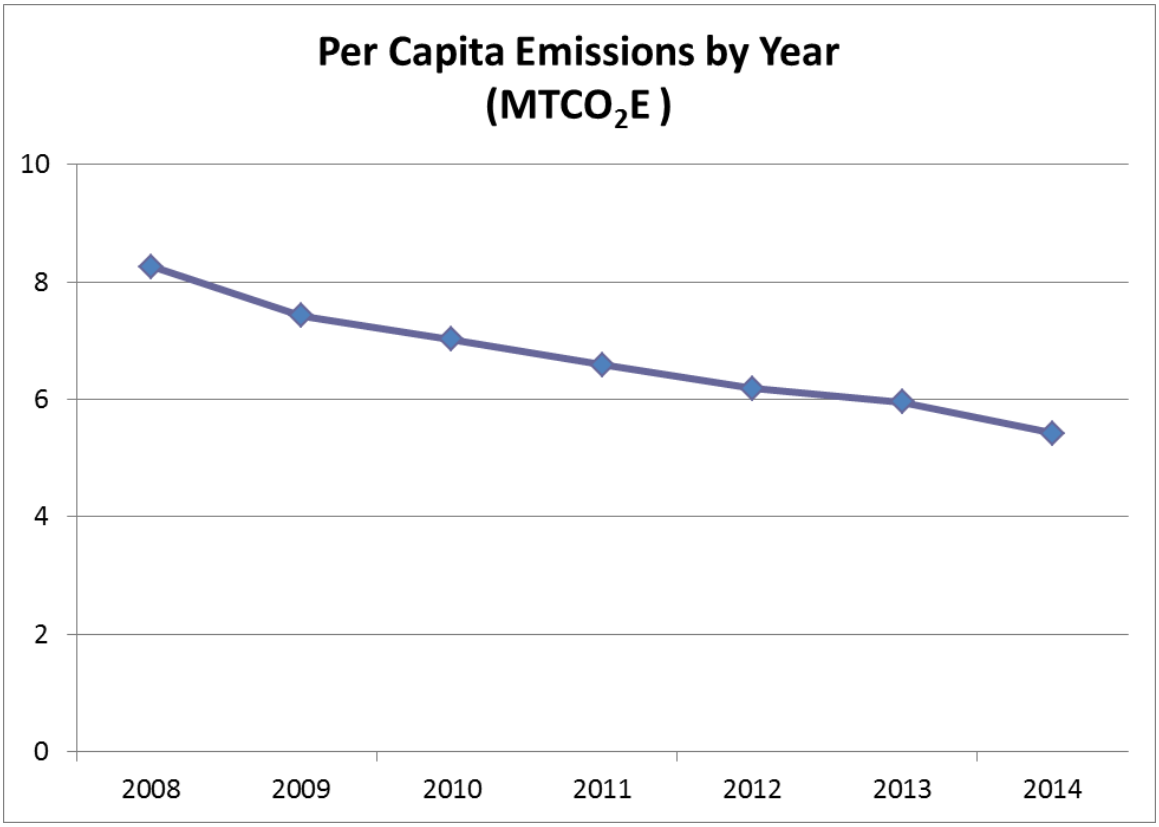
EMISSION INVENTORY RESULTS

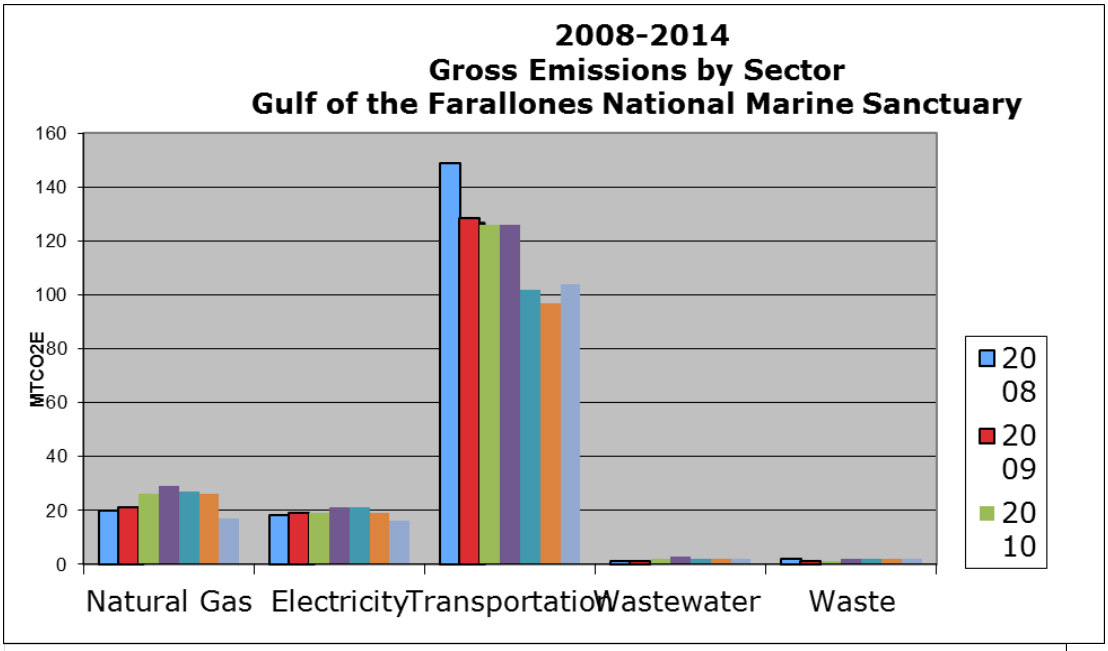
The NPS CLIP Tool derives the total Metric Tons Carbon Dioxide Equivalent ($MTCO_2E$) based on each input. For long-term tracking purposes, and because staff fluctuate year to year, per capita emissions were also measured. More detailed results are available in the CLIP Tool, such as emissions of each greenhouse gas CO_2, CH_4, N_20, and HFC. The 2008 results are used as the baseline for all subsequent analyses.

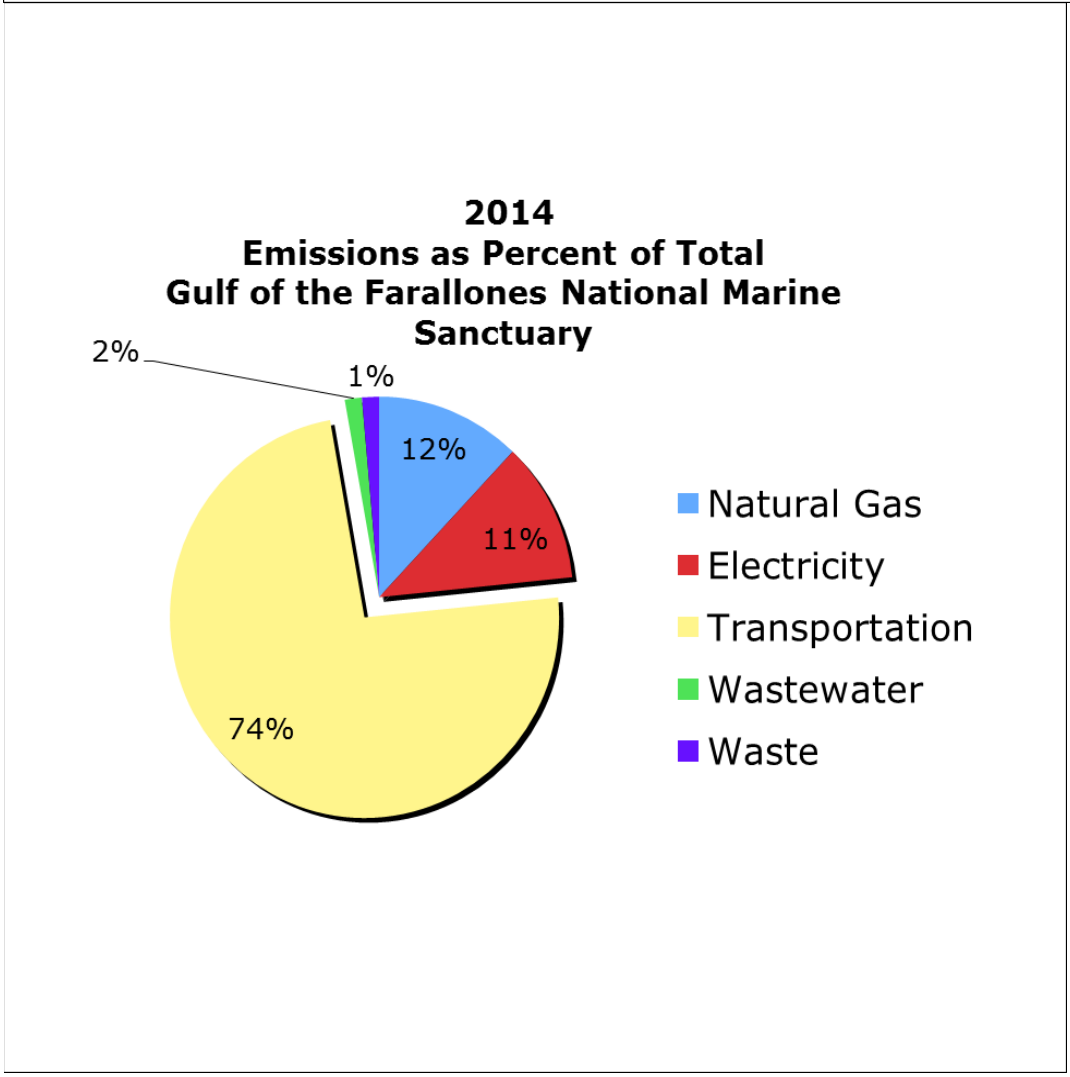
Gross Emissions by Year, Sector, and Per Capita ($MTCO_2E$)

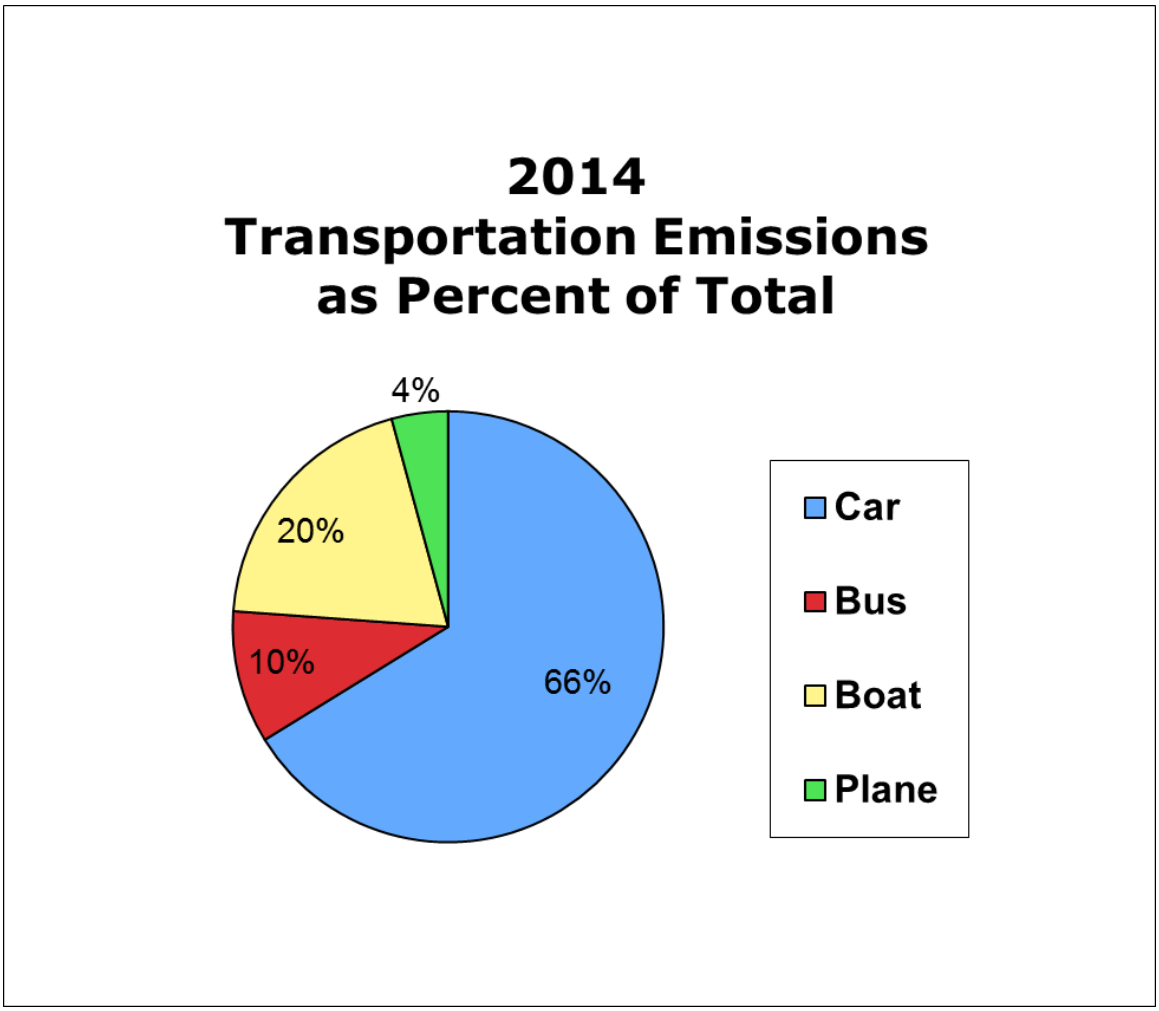
Year	Stationary Combustion	Purchased Electricity	Mobile Combustion	Wastewater Treatment	Solid Waste	Gross Emissions	Number of Staff	Per Capita Emissions
2008	20	18	149	1	2	190	23	8.26
2009	21	19	128	1	1	171	23	7.43
2010	26	19	126	2	1	174	24.8	7.02
2011	29	21	126	3	2	180	27.3	6.59
2012	27	21	102	2	2	154	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

EMISSION INVENTORY GRAPHS




2008-2014
Gross Emissions by Sector
Gulf of the Farallones National Marine Sanctuary
MTCO2E
160
140
120
100
80
60
40
20
0
Natural Gas
Electricity
Transportation
Wastewater
Waste
2008
2009
2010


2014
Emissions as Percent of Total
Gulf of the Farallones National Marine Sanctuary
2%
1%
12%
11%
74%
Natural Gas
Electricity
Transportation
Wastewater
Waste


2014
Transportation Emissions
as Percent of Total
4%
20%
10%
66%
Car
Bus
Boat
Plane