

Department of the Environment - CCSF

Municipal Greenhouse Gas Emissions Report

FY2011-2012

DRAFT

8/12/2013

Background

The Department of Environment collects data on municipal greenhouse gas (GHG) emissions for the City and County of San Francisco's municipal facilities and operations on a yearly basis. From 2005 to 2008, municipal GHG inventories were submitted to the California Climate Action Registry (CCAR). For FY2009-2010 and FY2011-2012, municipal GHG inventories were developed to meet the requirements of San Francisco Ordinance 81-08, which was approved in 2008 and requires each department to produce and update a Climate Action Plan annually. This report will discuss the findings of the FY2011-2012 inventory, assess the City's progress towards meeting its emissions reductions goals, and highlight opportunities for future emissions reductions.

Greenhouse Gas Reduction Goals

The Board of Supervisors and the Mayor of San Francisco have committed to reducing city-wide GHG emissions from 1990 levels by 20% by 2012, 25% by 2017, 40% by 2025 and 80% by 2050. To help achieve these goals, City government has committed to reducing municipal GHG emissions from a 2005 baseline using these milestones.

	Reduction Goal
2005	(baseline)
2012	20%
2017	25%
2025	40%
2050	80%

Emission Sources, Attributes and CCSF Suppliers

The Department of Environment collects data for the municipal GHG inventory from the following utility and fuel sources:

- Electricity: SFPUC (Hetch Hetch hydroelectric system)
- Natural Gas: PG&E, billed through the SFPUC
- Vehicle Fuels: Western States (now Golden Gate)
- Water: SFPUC

The following is a description of the greenhouse gas attributes of these emissions sources:

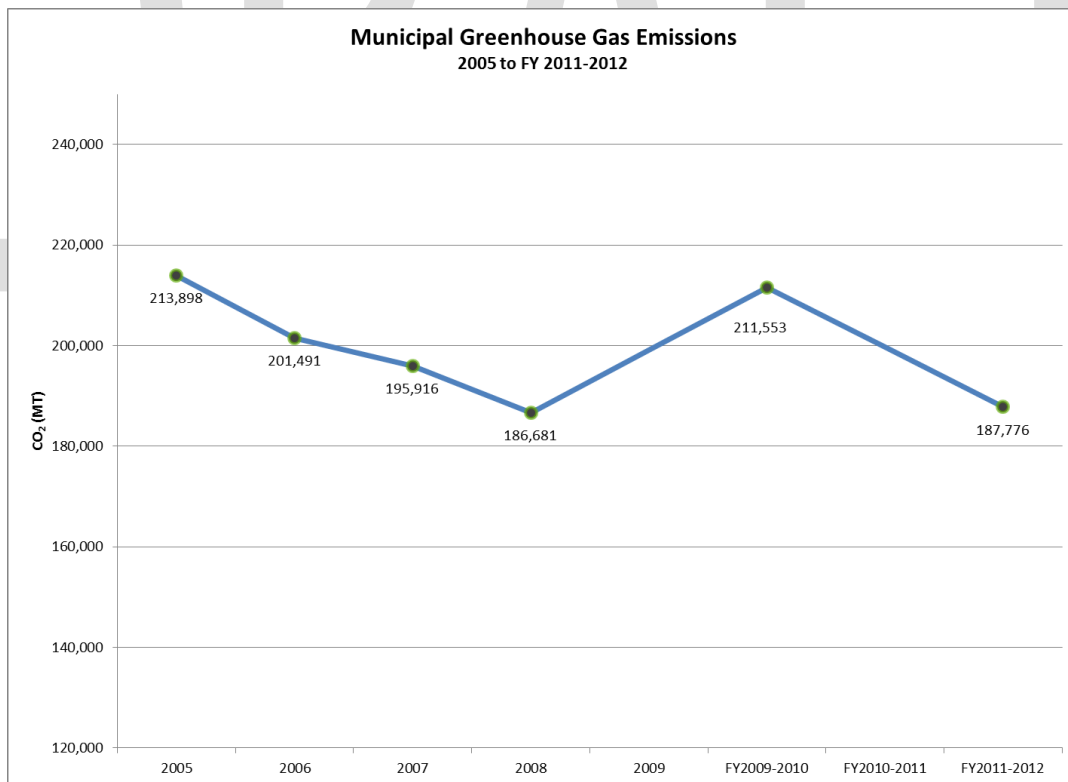
- **Electricity** – electricity provided by the Hetch Hetchy hydroelectric system, which is the primary source of the SFPUC's electricity supply to municipal facilities, is emissions free. The electricity emissions factor was 76.28 lbs CO₂/MWh in 2005 and is 0 lbs/MWh for FY2011-2012.
- **Natural Gas** – the emissions factor for natural gas is relatively stable at 11.7 lbs CO₂/therm, the value used by CCAR, the 2012 ICLEI Community Protocol and PG&E.
- **Water** – compared to the rest of the state, emissions from water supply and use in the City is very clean due to the Hetch Hetchy hydroelectric facility, which is predominantly gravity fed rather than needing an energy intensive pumping system. In addition, the electricity that is required for pumping between storage reservoirs is 100% carbon-free as of 2012.

- **Vehicle Fuels** – while the emissions factor for vehicle fuels are relatively constant, emissions from vehicle fuels are expected to decrease as a result of the **biodiesel ordinance, which requires non-emergency vehicles to utilize a minimum of 20% bio-diesel content in diesel vehicles.**

Greenhouse Gas Emissions 2005 – 2012

Emissions for the 2005 baseline year were 213,898 metric tonnes (MT) of CO₂e. Based on the most recent GHG inventory, emissions for FY2011-2012 are 187,776 MT of CO₂e. The following table and chart summarize municipal emissions from 2005 to FY2011-2012¹.

Emissions (MT CO ₂ e)	
2005 (baseline)	213,898
2006	201,491
2007	195,916
2008	186,681
FY2009-2010	211,553
FY2011-2012	187,776



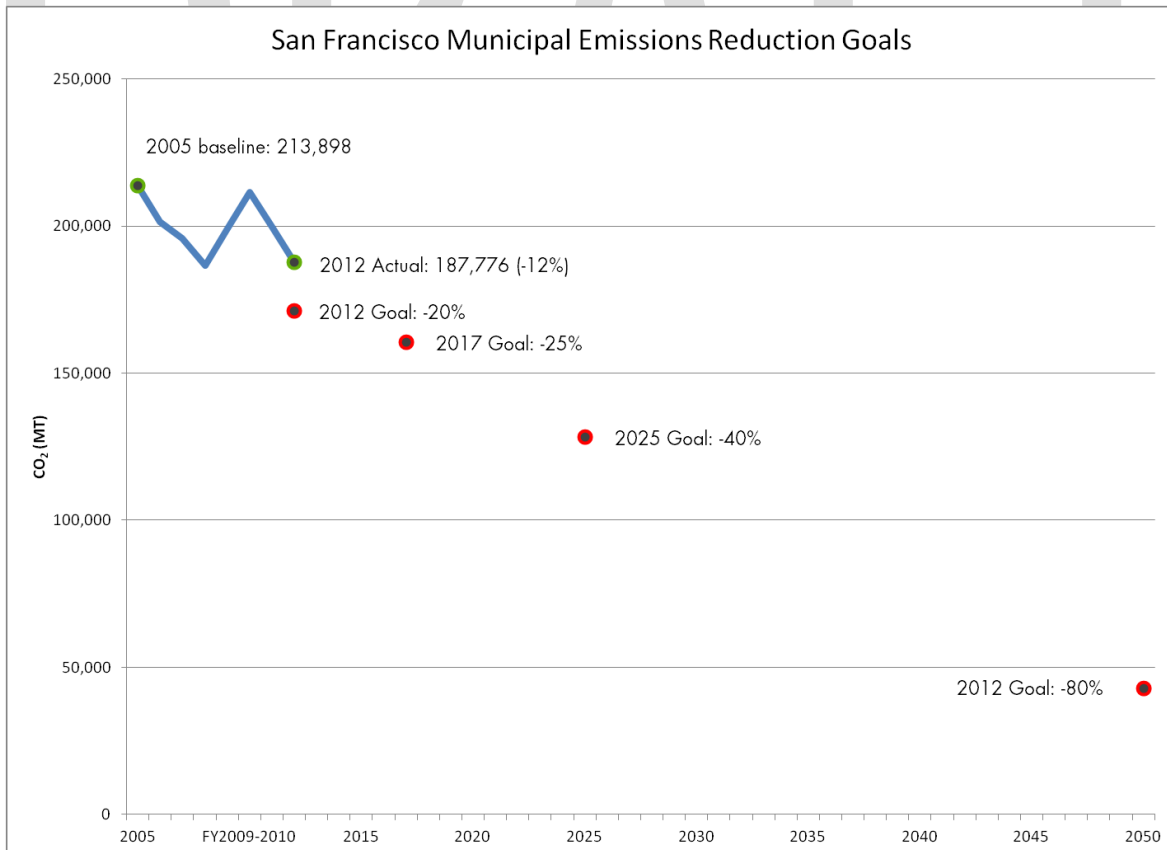
¹ The 2005 to 2008 inventories that were submitted to the California Climate Action Registry (CCAR) had some differences in boundary conditions from the FY 2009-2010 and FY 2011-2012 boundaries, primarily the exclusion of building energy use by tenants in the 2005 to 2008 inventories.

The spike in emissions in FY2009-2010 is due to a change in the GHG inventory boundaries, an increase in the SFPUC's electricity emissions factor, and an increase in natural gas use.

The city has decreased its greenhouse gas emissions by 26,122 MT CO₂e from the 2005 baseline emissions, a 12% decrease, but has fallen short of the 2012 20% reduction goal by 16,658 MT CO₂e. In order to meet future goals, the City will need to reduce 27,352 MT CO₂e by 2017 (a 15% decrease from FY2011-2012), 59,437 MT of CO₂e by 2025 (a 32% decrease from FY 2011-2012) and 144,996 MT of CO₂e by 2050 (a 77% decrease from FY 2011-2012).

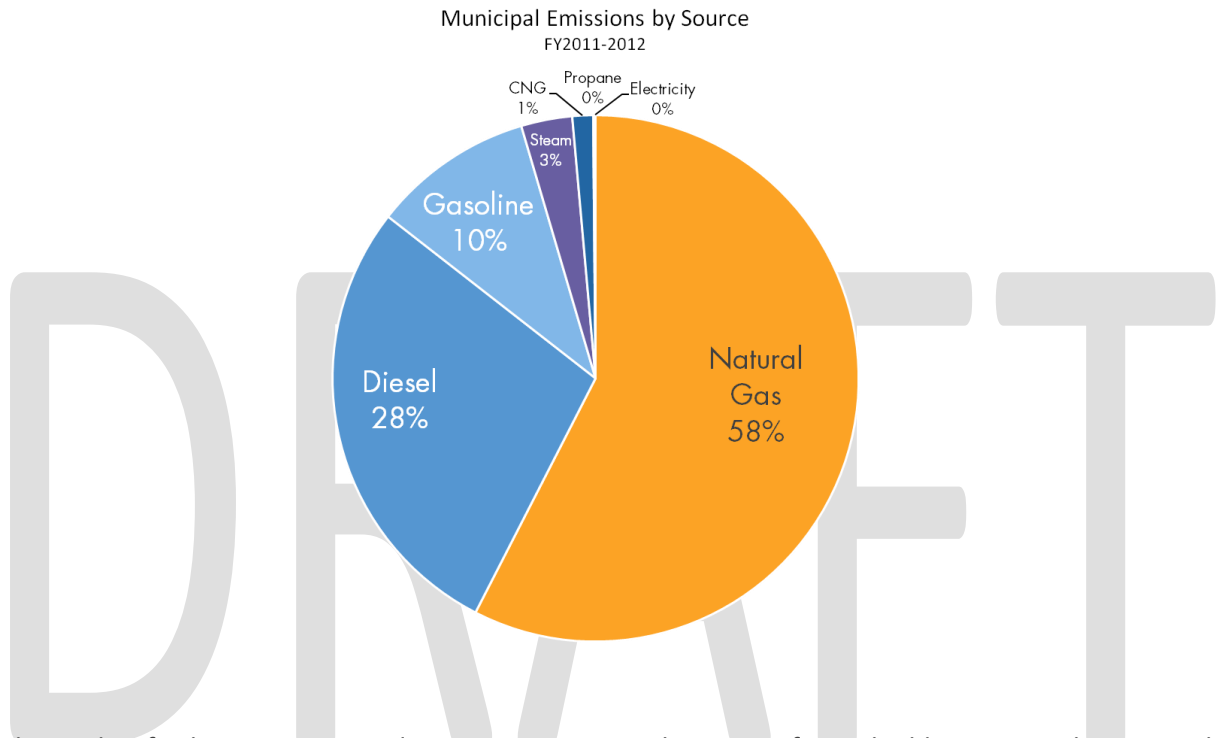
Based on the 2005 baseline year emissions of 213,898 MT of CO₂e, the reduction goals for these target years are:

	Reduction Goal	Reduced Emissions Goal (MT CO ₂ e)
2012	20%	171,118
2017	25%	160,424
2025	40%	128,339
2050	80%	42,780



FY 2011-2012 Emissions Sources

The primary components of municipal GHG emissions for FY2011-2012 are emissions from natural gas use and transportation fuels, as illustrated in the chart below. Emissions from natural gas make up 58% of total emissions, while emissions from transportation fuel (diesel, gasoline and compressed natural gas (CNG)) make up 39%. Emissions from steam, propane and electricity use make up the remainder. Emissions from electricity use in FY2011-2012 were negligible due to the availability of emissions free electricity provided by the Hetch Hetchy hydroelectric system for municipal buildings.

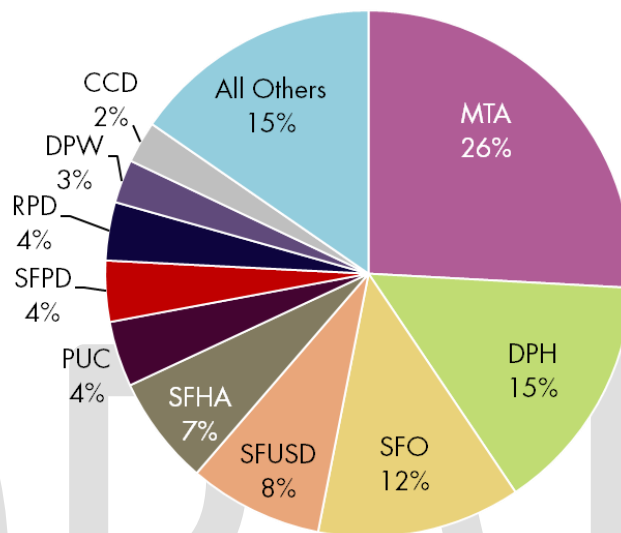


This chart shows that further emissions reduction opportunities lie in retrofitting buildings to use less natural gas and switching to more fuel efficient/lower emissions fuels and vehicles.

Emissions by Departments

The following chart shows the contribution of the top 10 departments to overall municipal emissions for FY2011-2012.

Municipal Emissions by Department
FY2011-2012



Emissions from the top 10 departments contributed to 85% of the total municipal emissions, with the top 5 departments – Metropolitan Transportation Agency (MTA), Department of Public Health (DPH), SFO Airport (SFO), the SF Unified Schools District (SFUSD) and the San Francisco Housing Authority (SFHA) – contributing 68% of the total. The following table includes details on these 10 departments' respective rankings in natural gas and transportation fuel consumption:

Emissions Rank	Department	Consumption Rankings
1	MTA	#1 diesel, #3 gasoline
2	DPH	#1 natural gas
3	SFO	#2 natural gas, #4 diesel, #6 gasoline, #1 CNG
4	SFUSD	#3 natural gas
5	SFHA	#4 natural gas, #7 gasoline
6	PUC	#2 gasoline, #5 diesel
7	SFPD	#1 gasoline
8	RPD	#3 natural gas, #5 gasoline, #6 diesel
9	DPW	#3 diesel, #5 gasoline
10	CCD	#4 natural gas

For the top department, MTA, the primary emissions source is diesel use at their fueling stations, with the highest consumption at the Woods facility (see tables below). For DPH, the primary emissions source is natural gas use at General Hospital and Laguna Honda Hospital. For the SFO Airport, emissions sources are a mixture of natural gas, diesel

and gasoline use. For the SFUSD and the SFHA, the primary emissions source is natural gas use at schools and public housing buildings. For the PUC, gasoline use is the primary source of emissions, with the highest consumption at the Millbrae, Moccasin and CCD – Main facilities. For SFPD, the primary emissions source is gasoline use for vehicles.

The following tables list the top departments in diesel and gasoline consumption, along with information on specific locations where the fuel was consumed, where available, in italics.

Top Departments in Diesel/Biodiesel Consumption:

Diesel / Biodiesel Use Rank	Department	Diesel / Biodiesel Use (gallons)	CO ₂ (MT)
1	Municipal Transportation Agency	4,939,126	43,972
	<i>Woods</i>	1,969,819	15,939
	<i>Flynn</i>	1,587,560	14,729
	<i>Kirkland</i>	1,344,202	12,953
	<i>Central Shops</i>	37,545	350
2	Fire Department	249,047	2,302
	<i>Fuel Delivered to SFFD Tanks</i>	242,319	2,234
	<i>Red Diesel Delivered to Station 35; For two Fireboats</i>	6,728	68
3	Public Works	248,873	2,379
4	Airport, San Francisco International (SFO)	180,115	1,586
	<i>SFO Shuttle Fleet</i>	106,980	868
	<i>General Fleet</i>	54,960	446
	<i>Emergency Generators</i>	18,175	184
5	Public Utilities Commission	174,276	1,498
	<i>CDD - MAIN</i>	62,796	519
	<i>Central Shops</i>	53,734	513
	<i>MILLBRAE</i>	21,373	217
	<i>MOCCASIN</i>	15,482	147
	<i>SUNOL</i>	10,206	88
	<i>EARLY INTAKE</i>	4,433	45
	<i>WARNERVILLE</i>	4,337	37
	<i>SOUTH FORK</i>	1,915	19
6	Recreation and Park Department	61,971	509
	<i>Central Shops</i>	49,381	402
	<i>Golf Courses</i>	10,072	82
	<i>Camp Mather</i>	1,890	19
	<i>Candlestick</i>	628	6
7	Port	14,704	142
8	Sheriff	4,372	42.1
9	Department of Technology	2,844	27.0
10	Public Health	2,705	23.1

Top Departments in Gasoline Consumption:

Gasoline Use Rank	Department	Gasoline Use	
		(gallons)	CO ₂ (MT)
1	Police	597,008	5,258
2	Public Utilities Commission	377,487	3,325
	<i>MILLBRAE</i>	91,046	802
	<i>MOCCASIN</i>	79,716	702
	<i>CDD - MAIN</i>	67,714	596
	<i>Central Shops</i>	56,207	495
	<i>SUNOL</i>	47,310	417
	<i>WARNERVILLE</i>	16,257	143
	<i>EARLY INTAKE</i>	10,283	91
	<i>SOUTH FORK</i>	4,608	41
	<i>OSHAUGHNESSY DAM</i>	2,793	25
	<i>CHERRY VALLEY</i>	1,553	14
3	Municipal Transportation Agency	248,772	2,191
	<i>Central Shops</i>	227,231	2,001
	<i>Woods</i>	21,541	190
4	Public Works	240,343	2,117
5	Recreation and Park Department	124,637	1,098
	<i>Central Shops</i>	103,615	913
	<i>Golf Courses</i>	13,255	117
	<i>Camp Mather</i>	5,907	52
	<i>Candlestick</i>	1,860	16
6	Airport, San Francisco International (SFO)	116,457	1,026
7	Housing Authority	72,648	640
8	Fire Department	52,710	464
9	Public Health	36,383	320
10	Sheriff	32,631	287

Energy and Water Consumption by Buildings

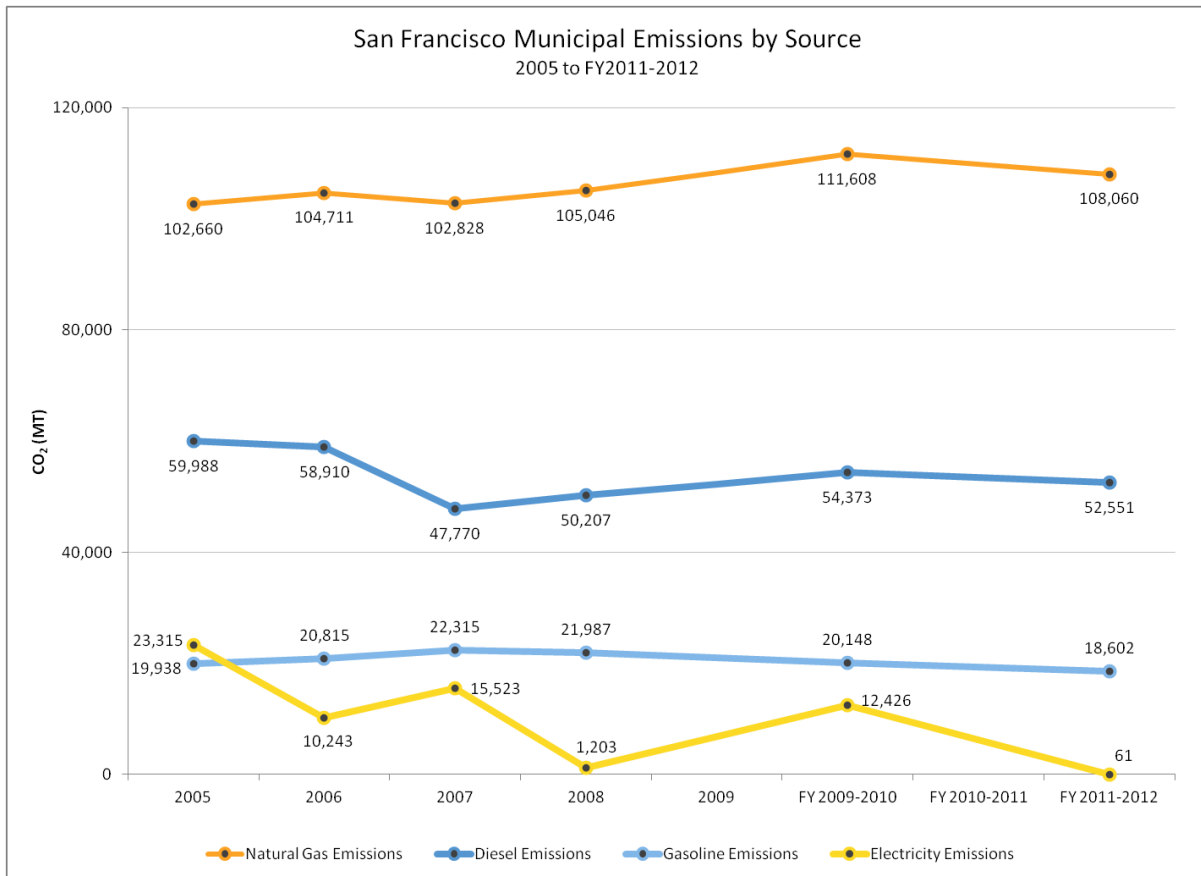
The following tables list the top buildings/campuses in natural gas, electricity and water consumption and identify potential buildings for energy efficiency upgrades and retrofits. Several buildings/campuses appear on more than one list, including the SFO Airport, General Hospital, Laguna Honda Hospital, Hall of Justice, California Academy of Sciences, Moscone Center, De Young Museum, and City College of San Francisco’s Phelan Campus.

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Trends in Emissions and Consumption

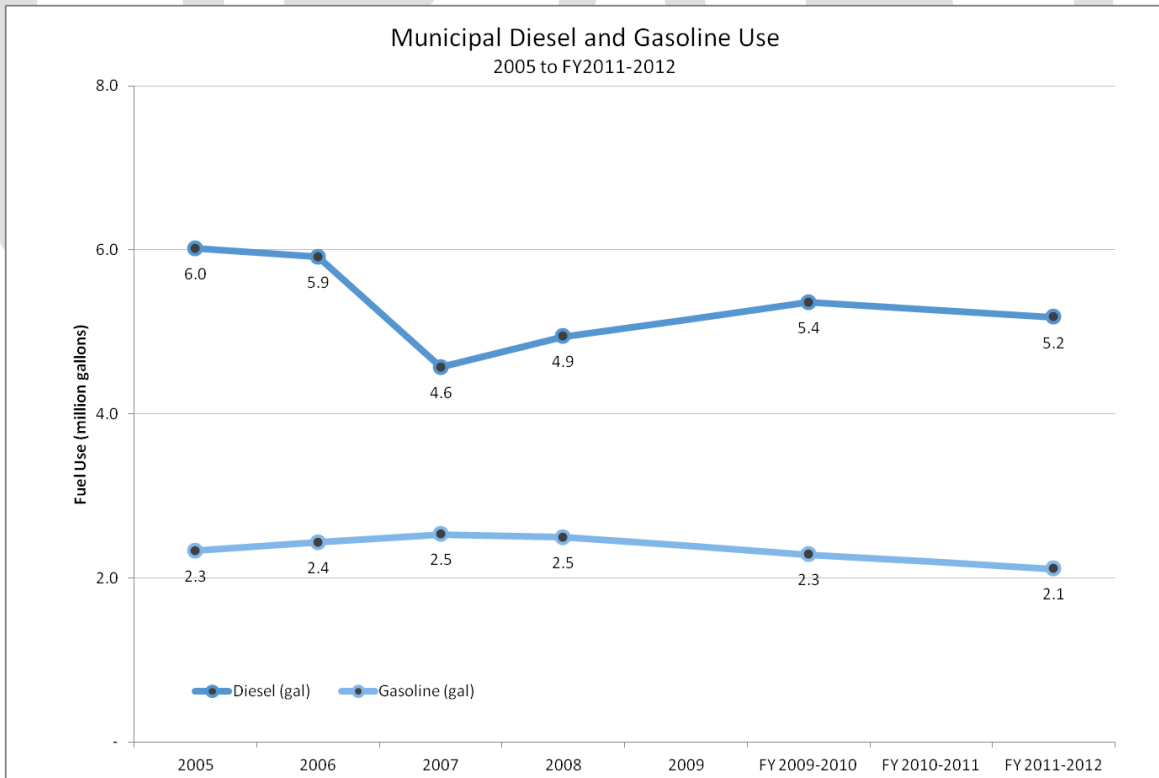
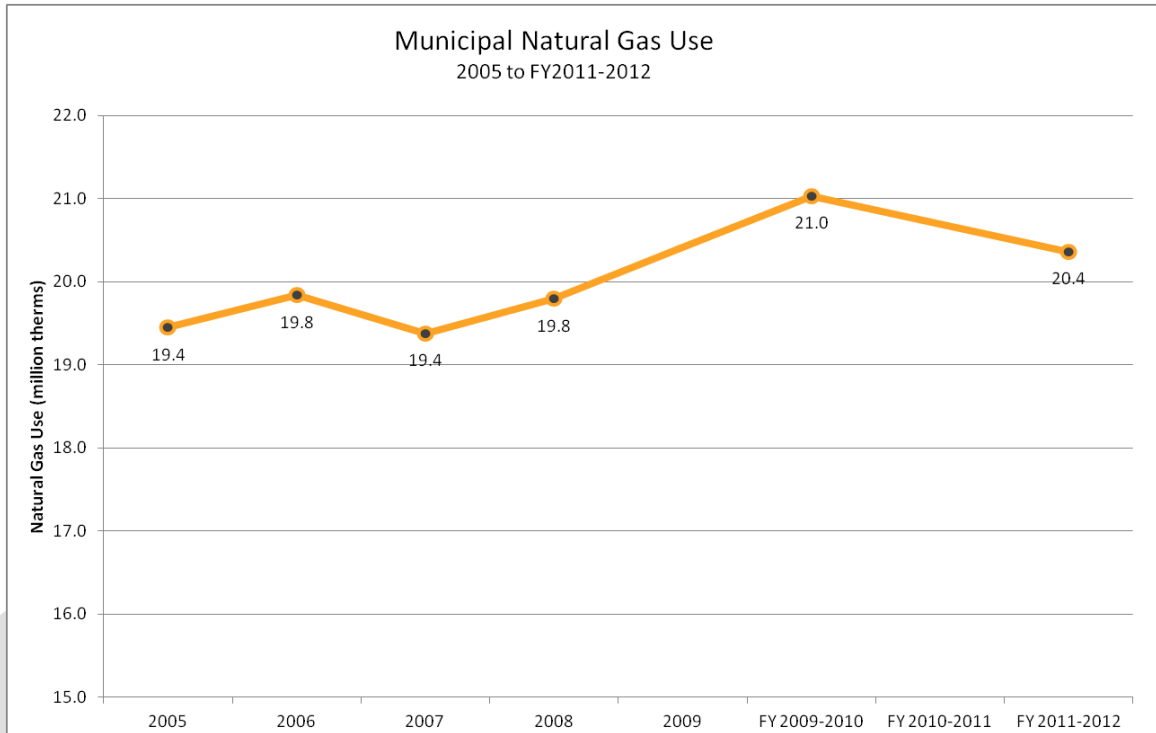
Energy use

The following chart shows municipal emissions by source from 2005 to FY2011-2012². Emissions for natural gas use increased over 5% from 2005 to FY2011-2012 (but did decrease from FY2009-2010). Emissions from diesel and gasoline use decreased, in part due to increased use of bio-diesel fuel. Emissions from electricity use fluctuated due primarily to the fluctuating carbon content of SFPUC electricity.

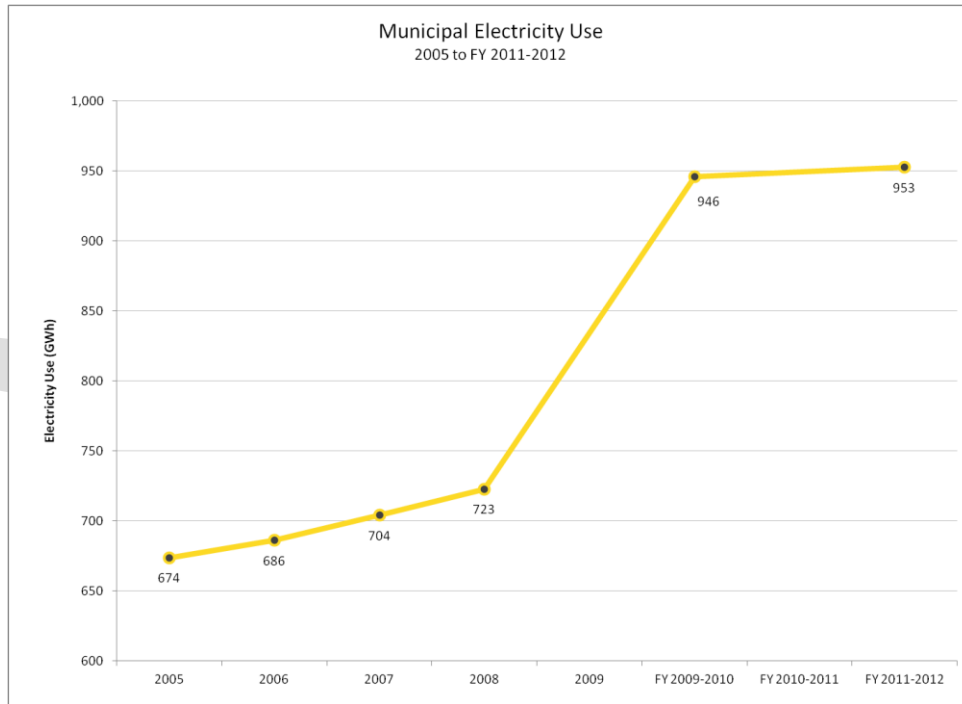


The following charts show the consumption trends for natural gas, diesel and gasoline consumption, the three largest components of the emissions inventory. These trend lines mirror the trend lines for their respective emissions since the emissions factors for these fuels remain constant.

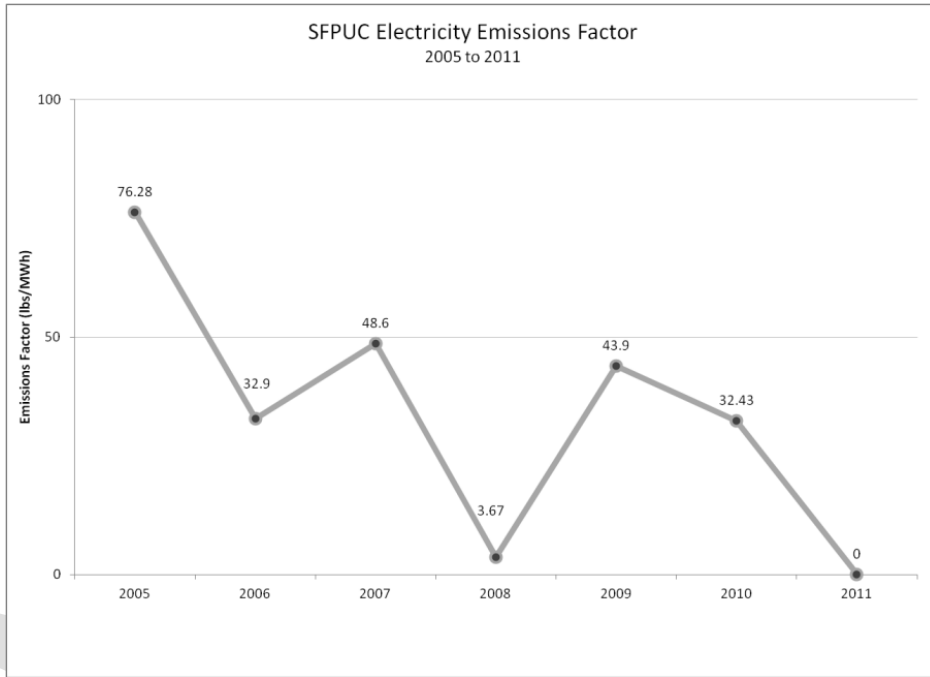
² GHG emissions inventories are not available for calendar year 2009 and FY2010-2011. Values on these charts for those years are averaged values.



The following charts show that, while electricity use has increased, emissions have fluctuated from 23,315 to 61 MT CO₂ between 2005 and FY2011-2012, depending on the SFPUC's electricity emissions factor. Overall, the SFPUC's emissions factor trended down, reflecting cleaner power. The SFPUC's electricity emissions factor is currently 0 lbs/MWh and is expected to remain at zero in the future to comply with the California Air Resources Board's **Rule #**. Thus, while electricity consumption has increased by 41% since 2005³, emissions from electricity have declined and are now effectively zero.

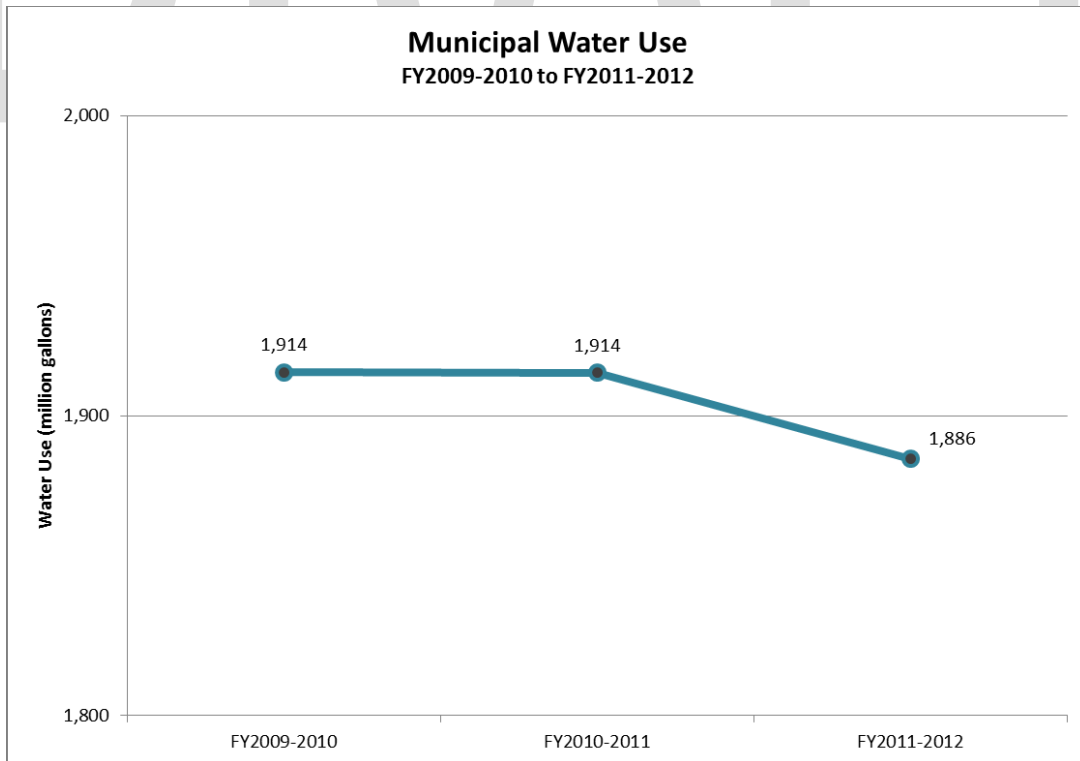


³ Includes the increase from the GHG inventory boundary changes in FY2009-2010.



Water Use

Municipal water use data is available from FY2009-2010 to present. Water use has decreased approximately 1.5% over the past two years. A list of top buildings/campuses in water use for FY2011-2012 is included in the section “Energy and Water Consumption by Buildings” above.



Summary

Municipal emissions for FY 2011-2012 have decreased by 12% from the 2005 baseline emissions, but have fallen short of its 2012 goal of a 20% reduction by 16,658 MT CO₂e. In order to meet future goals, the City will need to make significant reductions:

- 27,352 MT CO₂e by 2017 (a 15% decrease from FY2011-2012),
- 59,437 metric tonnes (MT) of CO₂e by 2025 (a 32% decrease from FY 2011-2012)
- 144,996 MT of CO₂e by 2050 (a 77% decrease from FY 2011-2012)

Based on the FY2011-2012 GHG emissions inventory, major reduction areas are natural gas use in buildings and emissions from diesel and gasoline. The list of top 20 buildings/campuses in natural gas use identifies potential buildings for energy efficiency upgrades while the lists of top departments in diesel and gasoline consumption identifies departments and facilities where more efficient/lower emissions fuels and vehicles should be a priority.

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