

Attachment 1. Methodology and Calculation of Carbon Emission and Offset

Brief Overview

The District's carbon footprint includes emissions from the Scope 1 (Fleet), 2 (Electricity Purchase) and 3 (Imported Water, Employee Commute and Employee Travel) activities. Carbon offsets account for carbon emissions avoided from water conservation, water recycling, hydroelectricity or solar production, carbon sequestered from habitat restoration, enhancement or preservation and the green business program.

The methodology was applied to District operations using actual data for calendar year 2010 and projected data for 2020. The emissions and offset are calculated in metric tons of CO₂e emission per year (MT/Year). For Calendar Year (CY) 2010 data, actual data from best available sources were obtained. For CY 2020, the projection is based on the percent change in the water supply portfolio compared with CY 2010, applying the same assumptions.

Table 1. Water Use and Projected Use (Acre Feet) for CY 2010 and 2020

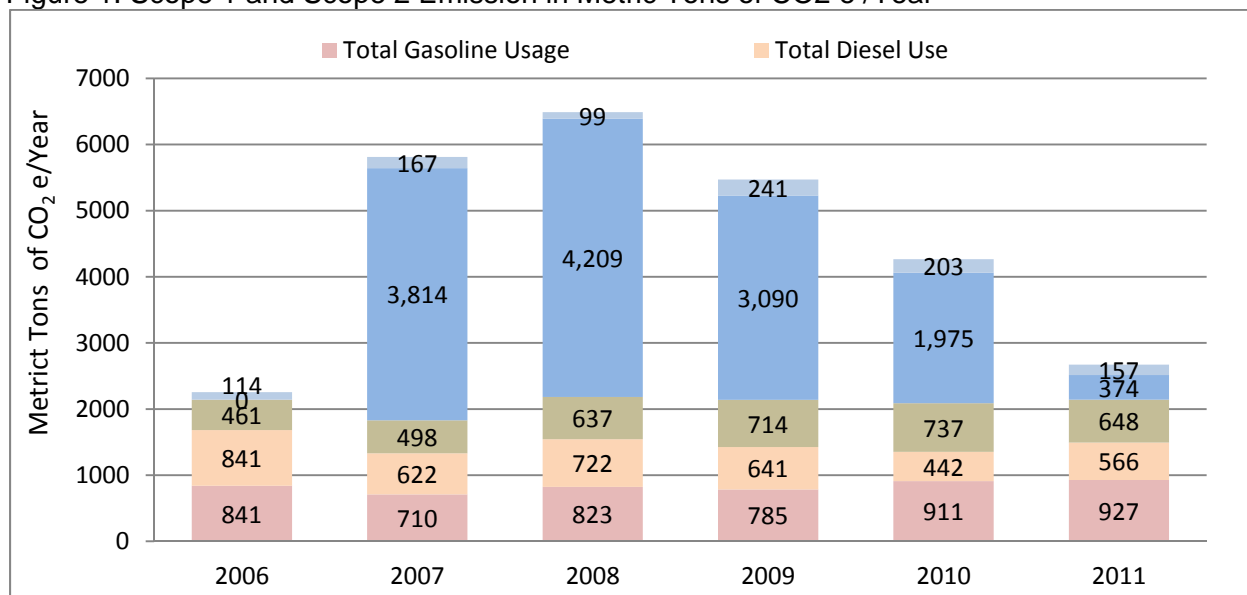
Water Supply Sources	2010	2020	% Change
A. Local Surface Water	111,000	90,900	-6%
B. Natural Groundwater Recharge	50,000	61,200	
C. Import from State Water Project	45,900	60,200	31%
D. Import from Central Valley Project	83,600	109,700	31%
E. Import from San Francisco Public Utilities Commission	49,700	60,600	22%
F. Water Conservation	51,000	76,100	49%
G. Recycled Water	14,700	22,100	50%

Carbon Footprint

Scope 1 and Scope 2 Emissions

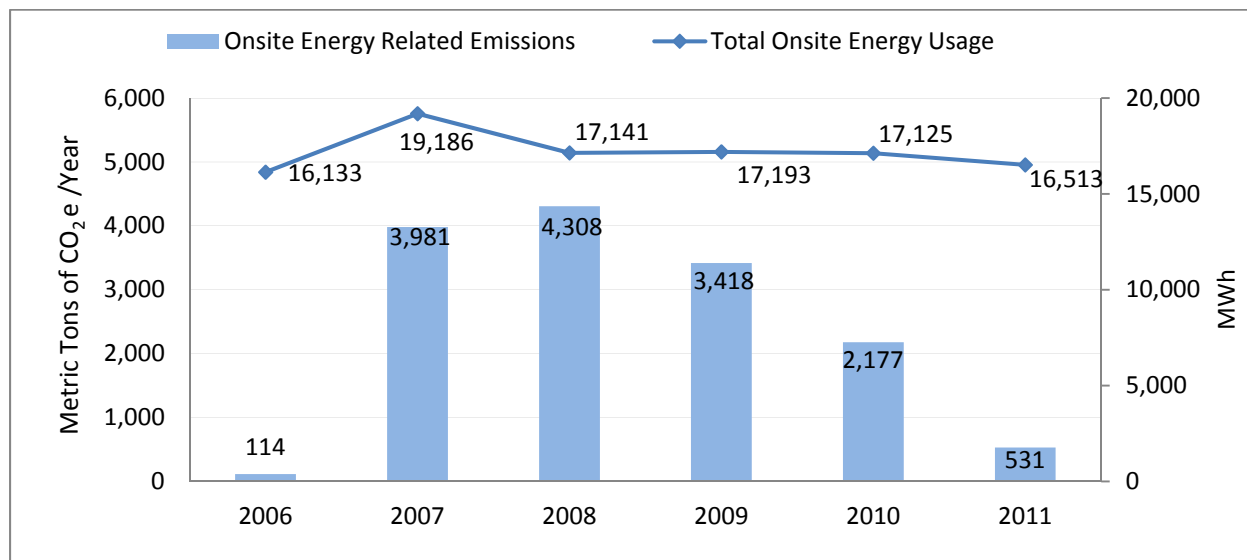
Scope 1 and 2 emissions are based on the Climate Registry's General Reporting Protocol. Figure 1 illustrates six years of Scope 1 and 2 GHG emission inventories via the California Climate Action Registry or the Climate Registry. It depicts relative stable amount of emissions from fleet or natural gas uses, while great fluctuations in emissions from the Power and Water Resources Pooling Authority (PWRPA) and PG&E energy sources.

Figure 1. Scope 1 and Scope 2 Emission in Metric Tons of CO₂ e /Year



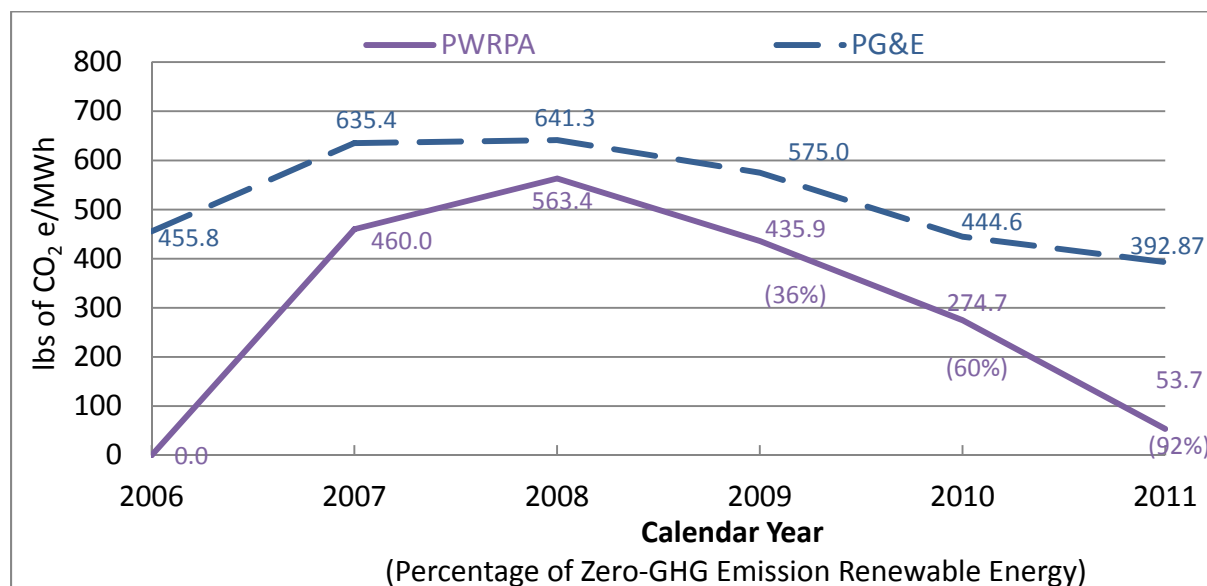
As shown in Figure 2, total onsite energy use averages about 17,000 MWh Per Year, with the exception of CY 2007, while onsite energy related emissions fluctuated from 114 to 4,308 MT/Year.

Figure 2. Onsite Energy Use and Related Emissions



Much of fluctuation comes from changes in PWRPA's emission factors (see Figure 3), as PWRPA energy accounts for about 95% of the total energy directly purchased by the District.

Figure 3. Changes in PG&E and PWRPA's Emission Factors



Specifically, for CY 2010, 94% of the District's directly purchased energy came from PWRPA and onsite solar production. In addition to zero-emission solar power, the District works with two energy suppliers with significant share of renewables in their respective portfolio. The emission factor for PWRPA is about 25% lower than PG&E. PG&E's emission factor is about half of the national average. Both are well below the California average. For CY 2006, a very wet year, PWRPA achieved carbon free energy, resulted in the lowest emission reported by the District. For CY 2011, PWRPA's emission factor reflects a 92% zero-emission energy in its portfolio, resulting in an emission at one seventh of PG&E's.

For CY 2020, PG&E anticipates the emission factor to reduce to 290 lbs of CO₂ e /MWh. As PWRPA continues to increase qualified renewables into its portfolio, staff anticipates the emission factors to remain lower than PG&E's emission factor.

Scope 3 Emissions

Because over 55% of the District's water supply is imported, staff also included emissions related to importing water to the county as Scope 3 emissions. Emission factors for imported water are provided by the Department of Water Resources, Bureau of Reclamation and assumptions for San Francisco Public Utilities Commission's gravity feed system.

Scope 3 also includes emissions from employee commute and business travel , and are calculated based on accounting data and online tools developed by rideshare.511.org and enviro.berkeley.edu/aircalculator.

Total Carbon Footprint

Table 2 below summarizes the District's Scope 1, 2 and 3 carbon footprint. Emissions from energy uses for three treatment plants, local pumping and office/lab buildings is 2,177 MT of CO₂ e/Year, 8% of the total.

About two thirds of imported water is conveyed to the County using zero emission hydropower from the federal Central Valley Project, and gravity feed from San Francisco Public Utility Commission's Hetchy Hetchy system. A large portion of energy for the State Water Project is

also from zero emission hydropower. For CY 2010, the State Water Project's emission factor is 0.46 Metric Tons/Acre Feet (AF). Table 2 estimates the District's carbon footprint to be 28,400 MT for CY 2010 and 37,200 MT for CY 2020, respectively.

Table 2. Summary of Carbon Footprint (in Metric Tons of CO₂ e (MT)/Year)

Sources	2010	2020
Scope 1 (Fleet)	2,200	
Scope 2 (Purchased Electricity)	2,200	
Scope 3 (District Defined)		
a. Import from State Water Project	21,100	
b. Import from Central Valley Water Project	0	
c. Import from SFPUC	0	
d. Employee Commute	1,500	
e. Business Travel	1,400	
Total Emissions	28,400	37,200

Carbon offsets

District's operations include activities that avoid or reduce carbon emissions, including water conservation, water recycling, renewable energy production, and the green business program. The District also invests in carbon sequestration through preserving, maintaining, restoring or enhancing wetlands/riparian habitats.

Though uncertainties exist when quantifying carbon offsets, staff anticipates that the list of sources for carbon offsets continues to expand. For example, as a part of Safe, Clean Water and Natural Flood Protection Program, the District is committing millions to reduce toxins, hazards and contaminants, and restore wildlife habitat and open space. These efforts could provide additional environmental carbon offsets.

Other District's activities can also be added to this list, as quantification methods become available. For example, City of San Jose developed a methodology for quantifying carbon offsets related to interconnected trails, and District's investments in trails could further expand carbon offsets.

Staff continues to monitor latest developments in accounting environmental carbon offset, and advocate for funding efforts to provide environmental carbon offsets to leverage investments in water conservation, recycling, stormwater retention, and other climate smart practices.

Description of Methods Used for Accounting Offset

Though there are uncertainties related to accounting these environmental carbon offsets, to further S4.3.1.1, staff quantified these offset based on the following:

1. For water conservation and water recycling related avoidance or reductions, staff used estimates from the 2011 "[From Watts to Water](http://www.valleywater.org/WorkArea/DownloadAsset.aspx?id=8418)" Report. This report can be downloaded at <http://www.valleywater.org/WorkArea/DownloadAsset.aspx?id=8418>.
2. For Anderson Hydroelectricity and On-campus Solar production, staff used energy production data and PG&E's emission factor data to estimate carbon emissions avoided.
3. For wetlands and habitat related sequestration, staff used a sequestration rate of 0.7 Metric Tons/Acre Per Year. This is based on a 2007 Environmental Protection Agency Study providing a sequestration rate of 0.4 to 1.0 Metric Tons/Acre Per Year for riparian buffer. With this rate, staff collected acreage from the 2010 Stewardship Report; and applied a 25% efficiency rate for preservation or mitigation wetlands or riparian buffer sites based on the 3:1 ratio for mitigation;

4. For Green Business related avoidance or reductions, staff obtained data from 2012 recertification process and imposed a 25% multiplier to avoid double counting the benefits of water and energy conservation related offset estimated by the web-based tool developed by California Green Business Program.

Three Options For Accounting Water Conservation Related Carbon Offsets

Recognizing the uncertainties related to accounting for water conservation related carbon offsets, staff considered three options from this source:

Table 3. Options for accounting carbon offsets from water conservation programs

Options	Description
1. Carbon offsets from all water conservation savings	Carbon offsets from water savings that is directly attributable to District programs as well as savings from codes and/or new standards. The District's water conservation program is a key driving force for achieving all types of water conservation. Incentives motivate people to make changes. They also assist in market transformation and code/standard development.
*2. Carbon offsets from the District's water conservation program	Carbon offsets from water savings that is directly attributable to District programs. It does not include savings from codes and/or new standards. Staff calculated this to be about 25% of the Option 1 carbon offsets based on the District's conservation model that tracks active and passive water savings over time.
3. Carbon offsets from a portion of the District's water conservation program	Carbon offsets from a portion of the water savings that is directly attributable to District programs. The split is proportionally estimated based on the amount of the incentive versus the total cost of the device being rebated. Staff provided a rough estimate of a 50% split based on a weighted average of actual rebate amounts in 2010 versus the total cost of the individual devices.

Three Options for Accounting Carbon Offsets

Table 4 illustrates the estimated carbon offsets from all sources including the water conservation program. The water conservation program provides the greatest carbon offsets for the District.

Table 4. Preliminary List of Sources for Carbon offsets

Sources of Carbon offsets	2010	2020
A. Water Conservation Related Carbon offsets		
Option 1. All Water Conserved	68,300	102,000
Option 2. Programmatic Contribution	17,000	25,500
Option 3. Direct Investment	8,500	12,700
B. Other Non-Water Conservation Related Carbon offsets	5,200	6,400
1. Recycled Water	2,500	3,700
2. Hydroelectricity/Solar Production	100	100
3. Habitat/Wetlands	500	500
4. Green Business Program	2,100	2,100
C. Total Carbon offsets		
Option 1. All Water Conserved + Other	73,500	108,400
Option 2. Programmatic Contribution + Other	22,200	31,900
Option 3. Direct Investment + Other	13,700	19,100

*Board Chair requested that staff utilize Option 2 for all future water conservation.