



SAN FRANCISCO FIRE DEPARTMENT
CITY AND COUNTY OF SAN FRANCISCO

Title: Departmental Climate Action Plan
Department: San Francisco Fire Department
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Data Year: Fiscal Year 2010-2011
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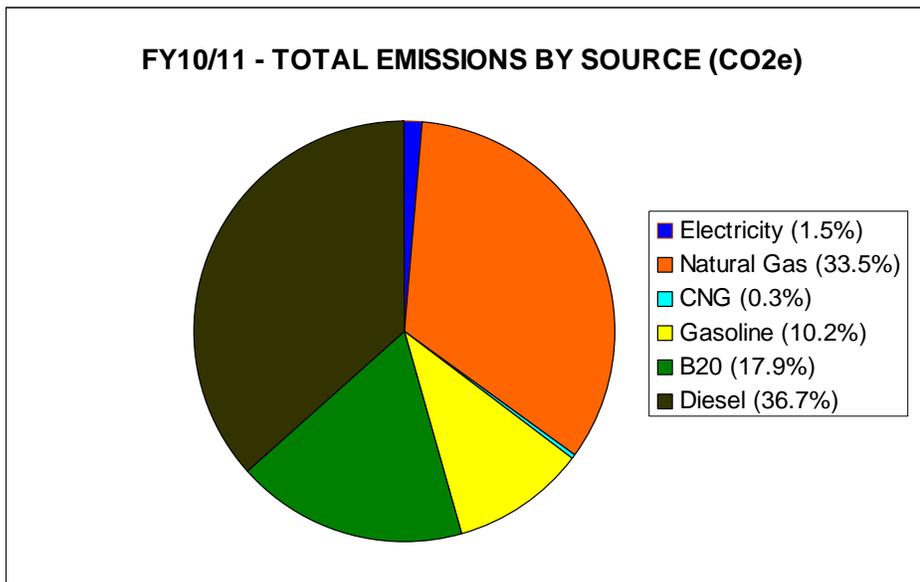
1. Introduction

Carbon Footprint Summary

The Fire Department’s carbon footprint is the calculation of carbon emissions produced from the consumption of energy at Fire Department facilities (electricity and natural gas), and liquid fuels delivered to the Fire Department’s fuel tanks and/or supplied to Fire Department vehicles (gasoline, diesel, biodiesel and CNG).

In FY10/11, the Fire Department produced 4,330 metric tons of CO₂e. By factoring in the amount of carbon sequestered by the trees on Fire Department property, the net carbon emissions produced in FY10/11 is 4,320 metric tons CO₂e.

The chart below shows the total emissions by source. The chart demonstrates that nearly 2/3rds (65%) of the Fire Department’s total carbon emissions came from the consumption of liquid fuels. Also notable is the high amount of carbon emissions produced from the use of natural gas. Electricity, in comparison, is by far a cleaner source of energy.



Climate Action Goals and Implementation Plans

Decrease natural gas usage by 5% with conservation efforts and facility improvements:

- o Distribute periodic energy conservation best practices reminders; limit length of showers and ensure windows are closed when heat is on
- o Encourage facility supervisors to take active role in energy usage monitoring
- o Promote implementation of energy-efficient upgrades in facilities undergoing renovation
- o Install high-efficiency boilers when replacement is needed
- o Find alternative methods for heating water and living spaces, including solar-thermal upgrades

Reduce emissions from liquid fuel usage by 5%:

- o Continue fuel conversion from B5 to B20 bio-diesel

- Continue with SFFD Fleet Management Program goals; remove older vehicles from frontline use and replace with cleaner, more fuel-efficient models
- Encourage and promote use of Bicycle Fleet Program at SFFD Headquarters; address safety issue for the personnel using bikes
- Explore possibility of obtaining a fleet of electric vehicles
- Obtain a fuel management system to facilitate tracking the amount of fuel dispensed into each vehicle and the amount of fuel in each dispenser tank

Increase waste diversion rate by 5%:

- Distribute periodic recycling/composting reminders and conduct zero-waste refresher trainings
- Optimize blue, green and black bin size by conducting waste audits
- Review the contents of medical waste with ambulance crews to find additional recycling opportunities
- Increase participation in the GreaseCycle program
- Achieve at least 50% participation of SFFD members in ePayroll
- Develop an online program that allows Fire Station officers to submit facility maintenance and repair requests electronically
- Explore the possibility of using green cleaning and anti-microbial products that are effective against infectious diseases
- Research less toxic options for antifreeze, brake and automatic transmission fluid

Decrease electricity usage by 5% with conservation efforts and facility improvements:

- Distribute periodic energy conservation best practices reminders
- Encourage facility supervisors to take active role in energy usage monitoring
- Place energy conservation reminders on computers and electrical equipment at Fire Stations, especially televisions
- Promote implementation of energy-efficient upgrades in facilities undergoing construction renovation
- Migrate critical physical servers to virtual servers
- Achieve and confirm compliance with the Lighting Efficiency Ordinance

Decrease water usage by 5% through the following efforts:

- Implement measures recommended by SFPUC to reduce the water use at Fire Stations:
 - Replace all lavatory faucet aerators with 0.5 gpm aerators
 - Replace all showerheads with 1.5 gpm showerheads
 - Replace all 1.0 and 2.0 gallon per flush (gpf) urinals with high efficiency urinals
 - Install high-efficiency laundry machines
 - Replace all 3.5 gpf toilets with 1.28 gpf high efficiency toilets

Continue to promote green building LEED-certified features in all remodels and upgrades to SFFD facilities.

Continue to promote design for infrastructure sustainability and resilience.

2. Departmental Profile

Fire Department Mission

The mission of the Fire Department is to protect the lives and property of the people of San Francisco from fires, natural disasters, and hazardous materials incidents; to save lives by providing emergency medical services; to prevent fires through prevention and education programs; and to provide a work environment that values health, wellness and cultural diversity and is free of harassment and discrimination.

Fire Department Budget

Budget FY10/11 = \$281,157,972

The Fire Department has six major divisions in its operating budget: Operations (Fire Suppression), Fire Prevention, Training, Fire Investigation, Administration and Support Services. The annual budget also includes allocations for personal protective equipment and uniform purchasing. In FY10/11, the Fire Department received supplemental funding from three FEMA grants: the Department of Homeland Security Urban Areas Securities Initiative, the Assistance to Fire Fighters Grant, and the Port Security Grant Program. Federal funds also support the SFFD Airport Division's operations at San Francisco International Airport.

The Fire Department receives revenue from public safety State sales tax allocations, the provision of emergency medical services, and from fire prevention services and associated fees. Fire Department revenue accounts for nearly 25% of the Fire Department's total operating expenses; annual revenue for FY10/11 is calculated at \$64,342,840.

Fire Department Personnel

As of March 1, 2012, the Fire Department employs 1,438 persons, including both uniformed and non-uniformed personnel.

Uniformed Fire Suppression Personnel = 24 hr work schedule; 31 day tour (48.7 hrs/week)	1,192
Uniformed Ambulance Personnel = 10 hr work schedule (40 hrs/week)	141
Uniformed and Non-Uniformed Personnel = 8 hr or 10 hr work schedule (40 hrs/week)	105
TOTAL PERSONNEL =	<hr/> 1,438

Fire Department Facilities

The Fire Department occupies 43 Fire Stations, 2 In-Service Training facilities, 1 facility housing EMS Ambulance Headquarters, the Bureau of Fire Investigation, and Equipment Storage, 1 Fleet Maintenance and Repair facility, 1 facility housing SFFD Headquarters, Administration and the Bureau of Fire Prevention, and 3 Fire Stations at the San Francisco International Airport. The Plan Check offices of the Bureau of

Fire Prevention are located in the facility that houses the SF Department of Building Inspection. Currently, the Department also maintains 1 inactive Fire Station and the Historic Dennis T. Sullivan Memorial Chief's Residence.

During FY10/11, one inactive Fire Station was sold and another, which was being used for the SF Firefighters Toy Program and by the Sisters of Mercy to feed the homeless, was closed for renovation. It will be historically preserved, to become a community room within the Public Safety Building complex, financed through the SF Earthquake Safety and Emergency Response Bond. The remaining inactive station is being used by the Guardians of the City, which is the historical society for Police, Fire, EMS and the Sheriff's Departments.

A map of all active Fire Stations is available on-line at the following URL:
<http://38.106.4.187/index.aspx?page=176>

The Fire Department owns and manages all facilities except for the following properties: SFFD Airport Division facilities (San Francisco International Airport); SFFD Training Facility on Treasure Island (Treasure Island Development Authority), and; SFFD Bureau of Fire Prevention, Plan Check - 1660 Mission Street (SFGSA, Real Estate Division).

All data for the facilities noted above are included in the Fire Department's Climate Action Plan except for: the SFFD Airport Division facilities, which are represented in the San Francisco International Airport's Climate Action Plan, and; one of the Fire Stations (Station 51), which is located in the Presidio on U.S. National Park Property.

Fire Department Vehicles

The Fire Department owns and operates its fleet of fire suppression and EMS/rescue apparatus, which includes fire engines, fire trucks, ambulances, fire and rescue boats, and specialized rescue, support and command staff vehicles. Frontline vehicles are the vehicles used on a daily basis. When these vehicles break down or undergo repairs or service, relief apparatus are placed in service. This prevents any disruption in community fire suppression and emergency medical service responses.

The Fire Department's fleet of passenger vehicles is used for fire prevention activities and other support functions. The Fire Department also maintains several historic fire suppression apparatus.

A summary of the Fire Department's fleet as of 6/30/11 is listed below:

FLEET SUMMARY	COUNT
HEAVY-DUTY VEHICLES	127
LIGHT TRUCKS	109
PASSENGER VEHICLES	60
NON-HIGHWAY/CONSTRUCTION VEHICLES	3
SHIPS AND BOATS	6
TOTAL	305

Fire Department Contact Information

Implementation of the Fire Department's Climate Action Plan is overseen by Assistant Deputy Chief Phil Stevens, Division of Support Services.

Authors of the SFFD Climate Action Plan are the SFFD Climate Liaisons: Compliance Officer, FF/PM Rhab Boughn, and Senior Administrative Analyst, Tania Fokin.

For questions concerning the Fire Department's Climate Action Plan, please contact:

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3. Departmental Carbon Footprint & Historical Analysis

To determine the Fire Department's carbon footprint, the following parameters were taken into account:

- o Electricity usage at SFFD owned/occupied facilities (kWh)
- o Natural gas usage at SFFD owned/occupied Facilities (therms)
- o Liquid fuel purchased/dispensed into SFFD vehicles (gallons)

Usage amounts were then converted into metric tons CO₂e emissions. Conversions for electricity and natural gas include CH₄ and N₂O emissions, whereas conversions for liquid fuels do not.

CO₂e emissions produced due to SFFD's water usage are being represented by the San Francisco Public Utility Commission in the City-wide report produced by SF Environment.

In cases where a facility is partially occupied by SFFD, usage was determined by the percentage of building space occupied, or by the percentage of building occupants employed by SFFD.

Liquid fuels accounted for include fuel amounts delivered to SFFD fuel tanks and vehicles, and fuels dispensed at facilities monitored by the City's Central Shops. Fuel dispensed while on mutual aid responses is excluded. Fire Department operations at the SF International Airport are also not represented in this report.

Historical comparison of facility energy and water usage, fleet fuel consumption, and associated carbon emissions for the three year period, FY08/09 through FY10/11, is also included in this report.

3a. Facilities – Energy & Water Usage and Reduction Measures

Facilities Verification

The list of facilities used by SF Environment to calculate the FY10/11 Departmental carbon footprint has been verified by the Fire Department's Climate Liaisons to be accurate and complete.

In May 2010, the City and County of San Francisco Board of Supervisors and Mayor approved the transfer of costs of operating, maintaining and improving the auxiliary water supply system (AWSS) from the Fire Department to the SF Public Utilities Commission, SF Water Enterprise. In June 2010, the voters of the City and County of San Francisco also approved Proposition B which authorizes a general obligation bond to implement improvements for fire, earthquake and emergency response and to ensure a reliable water supply for fires and disasters. The transfer of assets as well as AWSS operations was completed in FY10/11. The transfer included several facilities, equipment, vehicles and personnel. Energy and water usage data provided in this report for FY10/11 therefore excludes any usage related to AWSS operations, unless otherwise noted.

SFFD Energy & Water Conservation Program

The SFFD Energy and Water Conservation Program, per SFFD General Order 09 A-06, establishes the Fire Department's goal to reduce electricity, gas and water usage by 10% from 2008 levels, as mandated by the Mayor and the Board of Supervisors. Water and energy usage are monitored at all Fire Department facilities and quarterly reports are provided to the Division of Support Services for analysis and distribution. The Energy and Water Conservation Program has become a valuable tool for helping the Fire Department conserve water and energy, as well as for improving the management of financial resources.

Capital Improvements & Green Building Program

The next two sections, Energy and Water, will review energy and water usage over the last 3 fiscal years, as well as describe projects funded by the SF Public Utilities Commission (SFPUC) for both audits and conservation improvements. The last section, Green Building Program, will review a combination of energy and water conservation improvements which is funded through both private and public sources.

3a1. Energy

FY10/11 Carbon Footprint from Consumption of Electricity, Natural Gas & Steam

EMISSION SOURCE	CONSUMPTION	CO2e EMISSIONS (metric tons)
ELECTRICITY (kWh)	4,323,743	63.84
NATURAL GAS (Therms)	272,607	1,450.16
STEAM (lbs)	0	0
TOTAL		1,514.00

Electricity is supplied to San Francisco’s municipal tenants through the Hetch Hetchy Water and Power system, operated by the SF Public Utilities Commission. Besides supplying the City with a source of clean water, the system generates clean, renewable hydroelectric power, which has a low carbon emission rate.

The use of natural gas, however, contributes to over 95% of the carbon emissions produced from energy consumption. At most Fire Department facilities, natural gas is used for heating water, heating living space, and cooking. One of the main focuses for reducing the Fire Department’s carbon footprint is to reduce natural gas usage through the conservation of this finite resource, or by finding alternative methods for heating water and living spaces.

Energy Efficiency & Conservation

The Fire Department’s energy efficiency projects, funded by the SF Public Utilities Commission (SFPUC), are described below. Please see **Attachment A** showing detailed information on the status and scope of all energy and water efficiency and conservation projects. Additional energy conservation measures are identified in the Green Building Programs Section, 3a3.

Energy Efficiency Retrofit Projects

SFPUC Funded Lighting Upgrades:

After conducting an audit of all lighting fixtures at SFFD properties in FY08/09, SFPUC upgraded the lighting at 24 Fire Department facilities during FY09/10. The facilities selected were those expected to provide the best return on investment. Construction began in October 2009 and was completed in March 2010. SFPUC expected the savings to be 243,000 kilowatts per year which would save SFFD \$9,000 per year and SFPUC \$21,000 at the current rates. The drop in usage per location was expected to average 10%. In reality at 64% of the facilities, the drop averaged 15%. However, at the remaining 36% of the facilities, the rate increased by 15%. Several factors may have contributed to this increase. New generators were installed at 3 of the facilities with increased usage and a major construction project occurred at another one of the sites.

SFPUC Funded Window Repairs/Replacement:

In FY09/10, SFPUC funding enabled SFFD to install energy efficient windows at 2 Fire Stations and in FY10/11 windows were changed at 2 additional Fire Stations. Window upgrades in San Francisco provide less significant energy savings than in areas with more extreme climates. Nevertheless, SFFD has seen some savings at locations where the majority of windows were replaced.

SFPUC Funded HVAC System Upgrades:

In FY09/10, SFPUC provided funding to install energy efficient boilers in several Fire Stations. In FY10/11 a high-efficiency boiler was installed at Fire Station 40 (2155 18th Avenue) as a test location to see both how well it performed in terms of mechanical issues, and how well it stood up to the rigors of firehouse use. Since the time the new boiler was installed, natural gas usage at that location has decreased by 20%, most of which is being attributed to the new boiler.

Existing Commercial Building Energy Performance Ordinance

In order to comply with the Existing Commercial Building Energy Performance Ordinance (Ord 17-11, SF Environmental Code §2009-10), the Fire Department used SFPUC's Energy Performance Benchmarking web tool to provide the SFPUC with the following information: verification of the Department's list of facilities; verification of existing data for each facility (such as street address, year built, gross square footage, and primary EPA building category), and; ENERGY STAR benchmarking data specific to the primary EPA building category (such as weekly operating hours, number of employees on main shift, and if applicable, additional information on the facility, subspaces, and parking areas).

The Fire Department completed the SFPUC web survey in December 2011. SFPUC will be distributing the results of the Energy Performance Benchmarking survey in 2012, and will produce a report each calendar year analyzing energy performance results. All annual reports will be made public.

Lighting Efficiency Ordinance

Out of the 45 Fire Department building sites that are effected by the Commercial Lighting Efficiency Ordinance (SF Building Inspection Commission Code, Chapter 13D), 29 buildings are in compliance and 16 buildings are currently not in compliance with the requirements outlined in the Ordinance. All 16 of the buildings currently not in compliance have received temporary waivers granted by SF Environment. The Fire Department was granted the waiver in January 2012.

The proposed schedule for the 16 sites not currently in compliance includes surveying 4 sites per quarter, from January to December 2012, and completing construction of 4 sites per quarter, from January to December 2013. In January 2012, the Fire Department submitted a request for the capital funding necessary to complete these projects.

Renewable Generation

Solar energy systems may be designed to generate electricity through photovoltaic panels, or to heat water through solar collectors. The Fire Department has been interested in installing solar energy generation systems on some of the building roofs at the time when roofs are being repaired. In preparation, an audit on condition and available space on all facility roofs was conducted in FY08/09.

By initial assessment, it appears that solar thermal systems would be a more advantageous system to install, as it would reduce the overall amount of natural gas used for heating water. The use of natural gas is costly and produces high amounts of carbon emissions. Investments in the installation of solar thermal systems for multiple-company Fire Stations and other facilities using high amounts of natural gas would be cost beneficial. However, at this time the Fire Department's budget does not include funding for such projects and it would be very difficult to move forward on these types of projects without assistance from an outside funding source, such as SFPUC.

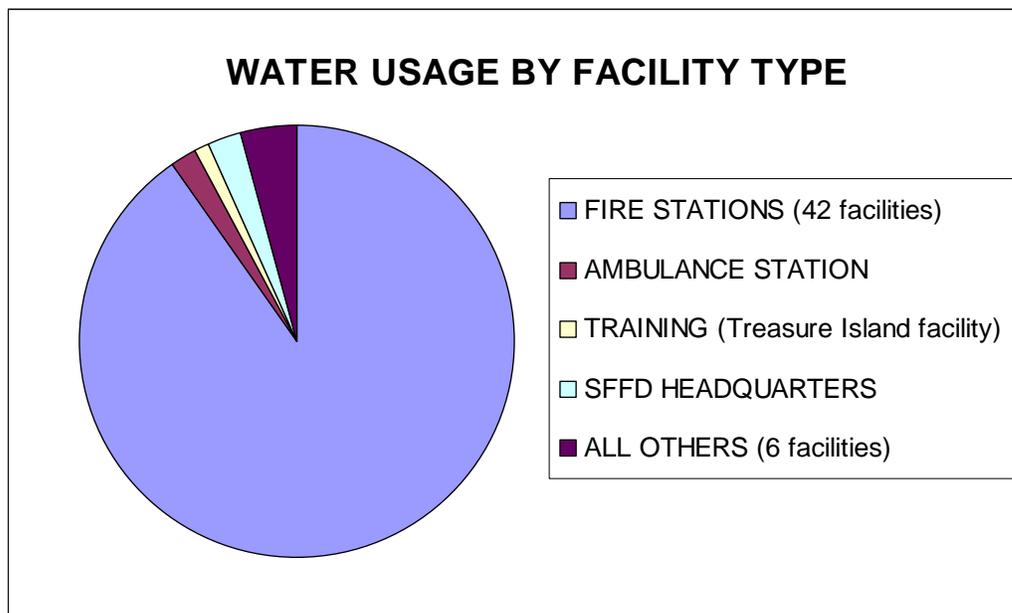
3a2. Water

Water consumption includes water used at all Fire Department facilities. Not included is water from fire hydrants or other water supplies used during fire suppression activities (water used to extinguish fires) or during firefighting drills.

FY10/11 Water Consumption

The amount of water used by the Fire Department is summarized in the table below. Facilities have been separated by type based on similar usage patterns.

FACILITIES	WATER CONSUMPTION (gallons)
FIRE STATIONS (42 facilities)	10,699,604
AMBULANCE STATION FACILITY	228,888
TRAINING (Treasure Island facility)	140,000
SFFD HEADQUARTERS	287,980
ALL OTHER FACILITIES (6 facilities)	494,085
TOTAL	11,850,557

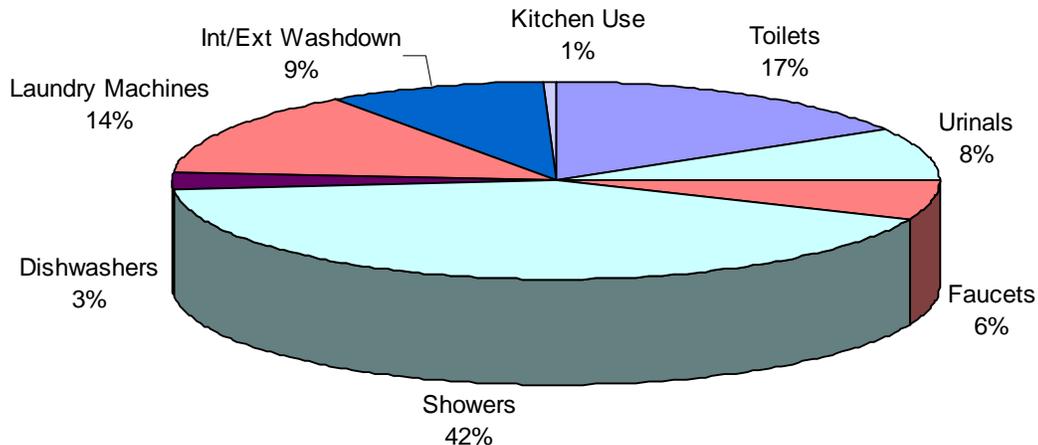


The chart above demonstrates that 90% of water usage occurs at Fire Stations. These facilities are occupied 24/7 and serve as “homes” for the personnel assigned to them. Fire Stations have characteristics typical of residential homes, such as dishwashing, laundry and showers, as well as characteristics typical of office buildings, such as common and private restrooms. Water resources are also used for the irrigation of any landscaping on facility property. The Fire Department’s water conservation efforts are therefore focused on these activities.

Water Efficiency & Conservation

SFPUC Water Conservation Assessment:

In response to San Francisco Executive Directive 08-05, requiring all municipal water accounts to participate in water use reduction, a water conservation assessment of Fire Department facilities was performed by the SFPUC in FY08/09. A report was then produced that included a comprehensive list of water conservation measures and opportunities, savings potential, costs and return on investment. The report also estimated water allocation for the audited sites, as illustrated below:



Ranked by costs savings and cost effectiveness, the water saving recommendations made by SFPUC are to perform the following:

1. Replace all lavatory faucet aerators with 0.5 gallons per minute (gpm) aerators.
2. Replace all showerheads with 1.5 gpm showerheads.
3. Replace all 1.0 and 2.0 gallon per flush (gpf) urinals with high efficiency urinals.
4. Install high-efficiency laundry machines.
5. Replace all 3.5 gpf toilets with 1.28 gpf high efficiency toilets.

Implementation of the measures recommended by SFPUC is estimated to reduce the annual water use by about 4.5 million gallons, or 37%. The corresponding water and wastewater cost savings realized would be approximately \$70,400 per year (at 2008 rates), with the payback for implementation, including rebates and incentives, estimated at 2.9 years.

The SFPUC water audit only addressed staffed Fire Department facilities.

Auxiliary Water Supply System:

The Auxiliary Water Supply System (AWSS) was created after the Great 1906 San Francisco Earthquake as an independent water supply system, specifically designed to provide water for fire suppression. It has proven to be an invaluable asset on numerous occasions. Nonetheless, the age of the system (over 100 years old), the number of miles of underground high pressure pipelines (135 miles) has led to leaks within this 12 million gallon system dedicated to fire protection.

The Auxiliary Water Supply System has traditionally been maintained and operated by the Fire Department. However, in May 2010, the AWSS was transferred to the SFPUC. Since the transfer, the Fire Department is no longer responsible for AWSS and the Department's water bills have decreased significantly. With the passage of the ESER Bond, money was set aside to upgrade the AWSS system. The work is scheduled to be completed over the next five years. The completion of this work will repair leaks, reduce water loss and promote the conservation of our City's water resources.

3a3. Green Building Program

Green building design is an important driver for both mitigation and adaptation to climate change. 33% of CO₂ emissions worldwide and 39% nationally are due to the construction and operation of buildings. Advanced green buildings are now reducing energy use and carbon emissions from 20% to 50% below conventional building designs. Within the next 20 years, new buildings are expected to become net-zero energy, carbon-neutral and better able to survive a changing climate. Green buildings also save water, protect habitat, provide healthy indoor environments, and promote public transit.

Having received over \$65 million in public funding through the Earthquake Safety and Emergency Response (ESER) bond for Fire Station repair and renovation, as well as, privately sponsored funds for the replacement an existing Fire Station, SFFD has numerous green building projects planned. Making energy and water systems efficient becomes much easier when a building undergoes major renovation or reconstruction.

Leadership in Energy and Environmental Design (LEED) consists of a suite of rating systems for the design, construction and operation of high performance green buildings, homes and neighborhoods. Though the Fire Department does not have LEED-certified professionals, SF Department of Public Works, private architects and the engineers involved in these projects are LEED-certified. The primary challenges regarding LEED design include the costs associated with meeting LEED standards. Any new Fire Station will be designed to the highest current efficiency standards for buildings of this type and will include features such as: building systems (windows, HVAC, lighting, showers, toilets and faucets) which meet Energy Star-rated efficiency criteria; bioswale areas; white-coated and possibly "green" sections of roof; and solar thermal water where feasible.

San Francisco's municipal new construction and major renovation projects (5,000 square feet or larger) are required by Chapter 7 of the Environment Code to achieve LEED Gold certification. With the exception of one location, all of our projects meet the 5,000 square foot minimum. Additional green building requirements include Environment Code, Chapter 5, §509: non-PVC Plastics, and Environment Code Chapter 8: Tropical Hardwood and Virgin Redwood Ban.

MOMA-Sponsored Fire Station Construction

Through private funding, the Museum of Modern Art will be providing a new 15,000 square foot Fire Station on Folsom near 5th Street (935 Folsom) while taking over the property at the current location of Fire Station 1 (676 Howard Street). The new Fire Station is expected to be designed to a LEED Gold or Platinum standard and is expected to be completed by June 2013.

ESER Bond Funded Renewals and Renovations

The ESER Bond also addresses health and safety issues at Fire Stations and will fund construction of the new Mission Bay Fire Station. Both are described in greater detail below.

New Fire Station and Seismic Upgrade Construction:

The Fire Department has 4 new buildings in design as part of the ESER bond: 1 new and 3 replacement Fire Stations. The new Mission Bay Fire Station will be part of the new Public Safety Building complex, which will also contain SF Police Department Headquarters and a new Police Station. This building is being designed to meet LEED Platinum standards. It is currently entering the construction design phase. The official ground-breaking ceremony for the Public Safety Building was held on September 8, 2011 and the building is expected to be completed by June 2014.

Three Fire Stations, determined as having strong threat for collapse or severe damage in the event of a major earthquake, have been designated to be rebuilt.

Comprehensive Projects:

Comprehensive projects will upgrade all energy related systems, including windows, HVAC systems, and roofs to LEED Silver standards, and will upgrade all water systems to the maximum water conservation standards. Each project site will also be reviewed for potential alternative energy modifications, such the addition of solar thermal, bioswales, solar panels, and/or green roofs. Alternative energy modifications will only be adopted based on a positive-performance cost benefit analysis.

Focused Scope Projects:

Focused Scope projects will be performed at nearly half of Fire Stations; the number of projects will be based on the availability of funding. These projects will primarily involve roof, shower pan and window replacements and limited work on HVAC systems. All roofs will be at a minimum white-coated, all windows will meet SFPUC's energy efficiency standards, and all shower pan projects will involve water efficiency plumbing upgrades. If funding permits, toilets may be upgraded at the same time. HVAC system upgrades will also meet SFPUC's energy efficiency standards.

Future of Green Building Projects

The concept of green building design and the construction of high performance buildings are relatively new industries. As these industries progress, new technologies will emerge that will further advance building design and will incorporate sustainable improvements to become more net-zero energy, carbon-neutral and better able to survive a changing climate. The Fire Department is a dedicated participant in making this change towards sustainability a reality.

3b. Fleet and Fuel Reduction Measures

The Fire Department owns and operates its own fleet of vehicles.

The vehicles operated by the Fire Department are unique. Fire suppression and rescue apparatus are specially designed for use in our unique City, with the ability to maneuver through narrow alley ways and on steep terrain. The use of fuel is also different than with other vehicles. Because of these factors and others as described below, operational fuel efficiency cannot be monitored by "miles per gallon" as is done for normal passenger vehicles. Fire suppression apparatus are technically not put to work until they arrive at the scene of a fire. Fire Engines pump water into the hose lines at regulated pressures and Fire Trucks raise aerial ladders to provide access to windows and roofs. Fire apparatus can be operating in pump and aerial modes for several hours without adding any additional vehicle miles. Apparatus can be placed in these regular operational modes at a fire or training drills for several hours. For these reasons, calculating fuel efficiency for these vehicles in "miles per gallon" and monitoring odometer readings does not provide meaningful data. However, vehicle "engine hours" are monitored and used for facilitating the scheduling of regular vehicle maintenance. At this time, there is no reliable fuel efficiency calculation used for the comparison of "engine hours per gallon".

Fleet Verification

The list of vehicles and liquid fuel consumption values that have been used by SF Environment to calculate the FY10/11 Departmental carbon footprint has been verified by the Fire Department's Climate Liaisons to be accurate and complete.

3b1. Fuel

FY10/11 Carbon Footprint from Mobile Combustion of Fuel

The amount of fuel used by the Fire Department and the resultant emissions is summarized by fuel type in the table below. The amount of fuel consumed is based on the amount of fuel delivered to SFFD fuel tanks within FY10/11, and does not reflect the actual amount of fuel consumed by SFFD vehicles. The exception is red-dye diesel, which, when it is delivered, is dispensed directly into the SFFD Fire Boats, and all CNG fuel, which is dispensed at City fueling sites that are equipped with a fuel monitoring system. A negligible amount of unleaded fuel (1% of total) was also dispensed from monitored City fueling sites.

FUEL TYPE	CONSUMPTION (gallons)	CO2e EMISSIONS (metric tons)
UNLEADED	50,142	441.75
DIESEL	145,470	1,476.52
RED-DYE DIESEL (MARINE)	11,190	113.58
BIODIESEL (B-20)	95,191	772.95
CNG	1,822	11.12
TOTAL		2,815.92

Fuel Management System

The Fire Department is in the process of obtaining a fuel management system to facilitate tracking the amount of fuel dispensed into each vehicle and the amount of fuel in each dispenser tank. Additionally, the system will provide inventory and fuel management reports. It is anticipated that the system will be installed by June 2012.

In FY10/11, the Fire Department developed an internal system for electronically tracking general vehicle information. With this new tracking system, the amount of fuel dispensed, engine hour and odometer readings for the vehicles at Fire Stations are reported on a monthly basis. This includes all frontline vehicles, relief pieces and specialized vehicles housed at Fire Stations. Fuel, engine hour and odometer reading data for all other SFFD vehicles are not currently captured by this system.

Monthly reporting was initiated per SFFD General Order (GO 11 A-64; 11/11/11) and the system became consistently reliable beginning January 2012. Based on the success of the monthly reporting system, plans are to expand procedures to include reporting for all SFFD vehicles, with fuel, engine hour and odometer readings reported and entered electronically on a monthly basis.

Once the fuel management system is installed, fuel, engine hour and odometer readings will continuously be captured by the system. This will eliminate the need to manually report this information and, as a result, will potentially improve the overall accuracy of fuel consumption data.

Biodiesel Fuel

The San Francisco Fire Department was the first City agency to pilot a biodiesel program. The program was initiated in 2006, and by 2007, three (3) of our 17 diesel fuel stations were successfully converted to B20 biodiesel. The 3 fuel stations that were converted are located in the Southeast quadrant of the City. This area was selected due to the high rates of childhood asthma found in the adjacent neighborhoods. Besides reducing carbon emissions, using B20 reduces the health risks associated with exposure to diesel exhaust emissions by 20%; these health risks include exacerbation of existing asthma and allergy symptoms. As healthcare providers, the Fire Department fully acknowledges the health benefits of converting to bio-fuels, and wants to do more for the overall health of our community and for Fire Department members.

Currently B20 biodiesel accounts for 40% of all diesel fuel delivered to SFFD tanks (see table below). Vehicles using B20 account for 36% of the Fire Department's frontline fleet, which includes all Ambulances (12 to 24 ambulances per day), 6 out of the 43 Fire Engines, and 2 out of the 20 Fire Trucks.

FUEL TYPE	CONSUMPTION (gallons)	PERCENTAGE
DIESEL	145,470	60.4%
BIODIESEL (B-20)	95,191	39.6%
TOTAL	240,661	100%

In 2008, SFFD had anticipated moving forward with additional conversions to biodiesel. However, recommendations from the SF Department of Public Health (SFDPH) advised postponing conversions, due to an impending State regulation prohibiting the storage of B20 in underground tanks. Since all of the Fire Department's aboveground tanks had already been converted, SFFD followed SFDPH's request and postponed conversion.

In 2009, the proposed State regulation was given a waiver until June 30, 2012 and in early 2011 the San Francisco Mayor's Office requested that the Fire Department move forward on the conversion to biodiesel.

Another concern relating to the use of bio-fuels is apparatus engine warranties. Many manufacturers invalidate warranties on their fueling systems if bio-fuels with a concentration of B20 or greater is used. Maintaining valid warranties on the Fire Department's extremely specialized and expensive fire apparatus is crucial to fleet operations, and cannot be jeopardized.

Since State regulatory issues concerning the underground storage of B20 have not been fully resolved, the Fire Department consulted with the Mayor's Office and SF Environment, and has converted all diesel storage tanks to B5 biodiesel, while continuing to use B20 in the original three tanks. State regulators allow for the storage of B5 in underground tanks. The first delivery of B5 was received in February 2012.

To get to where the Fire Department is now in terms of biodiesel usage has not been without challenge. During the initial conversion, B20 caused the liners of the fuel tanks in the ambulances to deteriorate. As a result, in 2007, all of the fuel tanks had

to be sent back to the manufacturer to be re-lined at an expense of approximately \$100,000. To date, the new linings have proven to be compatible with the B20 biodiesel fuel. However, in a separate incident in 2010, some of the ambulances started experiencing problems with the fuel injectors becoming clogged with fungus, presumed to be due to the long-term use of B20. The City's Central Shops has been addressing the problem by adding a cleaner to the ambulance fuel system during their regularly scheduled maintenance.

Fortunately, the same issues experienced with the ambulances using B20, have not been seen with the fire apparatus. Although it should be noted, the cleansing property of biodiesel has caused fuel filters to become clogged more quickly. Fuel filters needed to be changed much more frequently during the first year of B20 use. In order to assure reliable vehicle operation, and due to the variety of makes, models and ages of the diesel motors within the fleet, the Fire Department considers it prudent to obtain biodiesel performance ratings from the manufacturers for each of the motors before vehicles are allowed to be fueled with biodiesel.

Despite these obstacles, it is the Fire Department's intent to convert one fuel tank at a time to B20 biodiesel. A waiting period between conversions will be instituted to ensure that the vehicles of varying makes, models and ages will be able to operate effectively using B20. The conversion process is fairly involved, requiring both the dispensing tank and the vehicle tank to be cleaned prior to using a blend of biodiesel more concentrated than B5. The Fire Department would like to have at least two more B20 fuel stations in operation by the end of 2012.

For the time being, fuel delivered to the SFFD Fire Boats will continue to be marine diesel, which accounts for approximately 5% of all diesel-based fuels consumed by the Department.

3b2. Fleet

Fleet Reduction and Fleet Conversion Measures

The SFFD Bureau of Equipment, Division of Support Services, manages the Fire Department's fleet. The Bureau's responsibilities include: oversight of the maintenance, repair and procurement of all emergency vehicles, preparation of apparatus specifications, fuel management, and outlining improvements and changes planned in the next fiscal budget. In addition, all Fire Department uniformed members must adhere to the Department's established guidelines and Standard Operating Procedures as set forth by the SFFD Vehicle Operations Manual. This Manual includes procedures concerning Vehicle Maintenance and Inspection Procedures, and Driver Training and Safe Driving Practices.

SFFD Vehicle Replacement Program:

All City Departments are guided by the SF Ordinance 278-10, Healthy Air and Clean Transportation Ordinance (HACTO) Program, which states that all passenger vehicles and light-duty trucks in the municipal fleet which are 12 years old or older shall be removed from their fleet, beginning no later than July 1, 2015. Details regarding the HACTO Program are provided in the section below.

While there are no statutory requirements dictating minimum standards and useful life for firefighting/emergency response apparatus, the recommendations provided by the National Fire Protection Association (NFPA) are widely recognized as the industry standard. The NFPA recommendations are accepted to be the minimum standard requirements for vehicles and apparatus, often based on rural and suburban communities with relatively low call volume and less challenging terrain.

Due to the steep hills and narrow streets which characterize many areas of San Francisco, numerous, carefully designed modifications must be specified and incorporated into the design of engines, trucks, ambulances and rescue vehicles, which would not necessarily be considered required in other jurisdictions.

The Fire Department's Vehicle Replacement Program, which is guided by NFPA Standards for Fire Apparatus and Ambulances, establishes longevity standards for maintaining Frontline and Reserve emergency vehicles, as well as the proportions of Frontline to Reserve vehicles within the Fleet. The Fire Department uses the NFPA standards as a general guideline for the specifications of its vehicles; however, due to the Department's high call volume, topography and unique street conditions, the Department imposes standards more stringent than those minimum standards prescribed by the NFPA. These standards are as follows:

Frontline Fire Engines -	10 years	Reserve Fire Engines -	+5 years
Frontline Fire Trucks -	15 years	Reserve Fire Trucks -	+5 years
Frontline Ambulances -	4 years	Reserve Ambulances -	+3 years

The Program ratio of Reserve to Frontline Fire Engines and Trucks is 1:3; for Ambulances, the ratio is 1:2. After a vehicle's Reserve lifespan has expired, it is generally recommended the vehicle be salvaged.

Since the year 2000, as the result of decreasing budget allocations, the Fire Department has been greatly challenged in attempting to maintain these more stringent vehicle replacement standards. Nevertheless, the Department continues to utilize its available resources as judiciously as possible to ensure the safety and reliability of its fleet.

The purchase and replacement of fire apparatus, ambulances and other specialized emergency vehicles should be a regular item in the Fire Department budget. Supporting and maintaining a strong Vehicle Replacement Program has many benefits. As vehicle manufacturers introduce improvements in apparatus design, the newer vehicles yield greater fuel efficiency and cleaner running engines, while more reliable vehicles reduce overall vehicle maintenance costs and provide greater operating efficiency.

Electric Vehicles:

About 10 years ago, the Fire Department was assigned a few electric carts, from the SF Department to Building Inspection, to be used during special events. These electric carts, similar to golf carts, were neither effective nor practical for Fire Department Operations. The carts have since been reassigned.

The Fire Department is still interested in participating in an Electric Vehicle Program which would be more applicable to the administrative component of Fire Department Operations. Electric Vehicles may be designated for use at SFFD Headquarters as Pool Cars, or for use by the Bureau of Fire Prevention for conducting inspections. If an Electric Vehicle Program existed within the Department, a possible location of a charging location would be to retrofit and install one in the basement garage at SFFD Headquarters. Electric Vehicles may be an option to replace some of the Fire Department's older model gasoline passenger vehicles.

Healthy Air and Clean Transportation Ordinance (HACTO)

Section 403 of the Healthy Air and Clean Transportation Ordinance (Ord. 278-10, SF Environmental Code §400, et al.) requires all City Departments to reduce the number of passenger vehicles and light duty trucks in municipal fleets by 5% per year through 2015, and to remove from service all vehicles that are 12+ years old by 2015. Section 404 of the Ordinance requires all City Departments, when purchasing new or replacement vehicles, buy only alternative fuel vehicles or approved "green" vehicles. Another aspect of the Ordinance requires City Departments develop a Transit-First plan (see Section 4b "Transportation Options").

The Fire Department submitted a HACTO plan for FY11/12 to SF Environment in order to comply with the requirements as set forth by the Ordinance. The plan is included as **Appendix B**.

In reference to the Healthy Air and Clean Transportation Program Ordinance, the Fire Department includes all passenger vehicles (cars and carts) and all light truck vehicles (pickups, SUVs and vans) not used for emergency response.

A summary of the Fire Department's HACTO vehicles are as follows:

VEHICLE TYPE	COUNT	> 12 YEARS (older than 2001)	PERCENT > 12 YEARS
PASSENGER VEHICLES	56	22	39%
LIGHT TRUCKS (SUV, VAN, PICKUP)	31	13	42%
TOTAL	87	35	40%

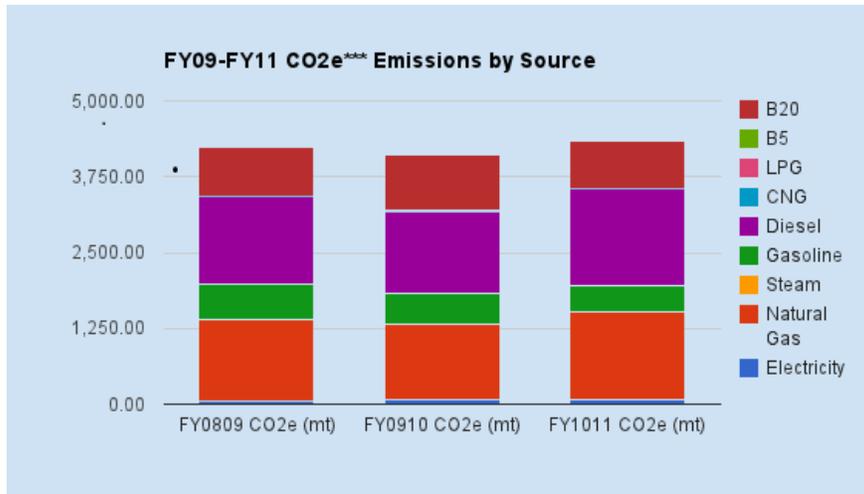
The majority of the Fire Department's fleet consists of specialized vehicles used for emergency response, which are exempt from HACTO. Emergency response vehicles are specialized units and therefore can be costly, and not easily replaced, so eliminating these vehicles from the fleet if older than 12 years is not practical. Although it is not the intent of the Ordinance to reduce the number of emergency response vehicles, the Fire Department's own Fleet Management Program includes purchasing newer, more efficient vehicles to replace the older, higher emissions relief vehicles, when funds permit. For FY12/13, the Fire Department hopes to purchase 4 new fire engines, 2 new fire aerial trucks and 5 new sedans, pending Budget approval.

The Fire Department's HACTO Plan defines the number of vehicles that are covered by the Ordinance (vehicles under 10,000 lbs. gross vehicle weight) and exempts vehicles that are used for emergency response. The Fire Department intends to reduce the number of its HACTO vehicles by 3 vehicles in FY11/12 and 4 in FY12/13. Of the vehicles covered by HACTO, over 35% are currently alternative fuel or "green" vehicles - mostly hybrid and CNG. The Fire Department intends to purchase 2 additional green vehicles.

3c. Historical Analysis

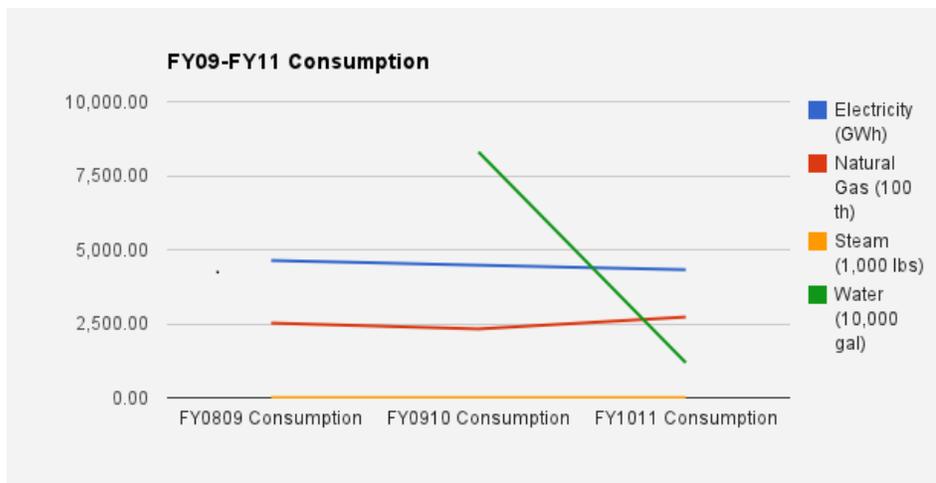
Historical comparison of facility energy and water usage, fleet fuel consumption, and associated carbon emissions has been made for the years FY08/09 through FY10/11. Comparisons have been made to identify trends in usage and to understand what the greatest contributors are to the Fire Department's total carbon footprint. By knowing what is producing the most carbon emissions, the Fire Department can focus conservation efforts on those areas, with the objective of gaining the greatest reduction potential. Results of the analyses are presented below.

Figure 1



The chart in Figure 1 demonstrates that diesel fuel and natural gas are consistently the greatest contributors of carbon emissions.

Figure 2



The chart in Figure 2 demonstrates a reduction in the use of electricity and an increase in the use of natural gas. The dramatic reduction in water consumption shown is due to the transfer of the AWSS facilities, as discussed earlier, and therefore does not accurately represent the Fire Department's water usage.

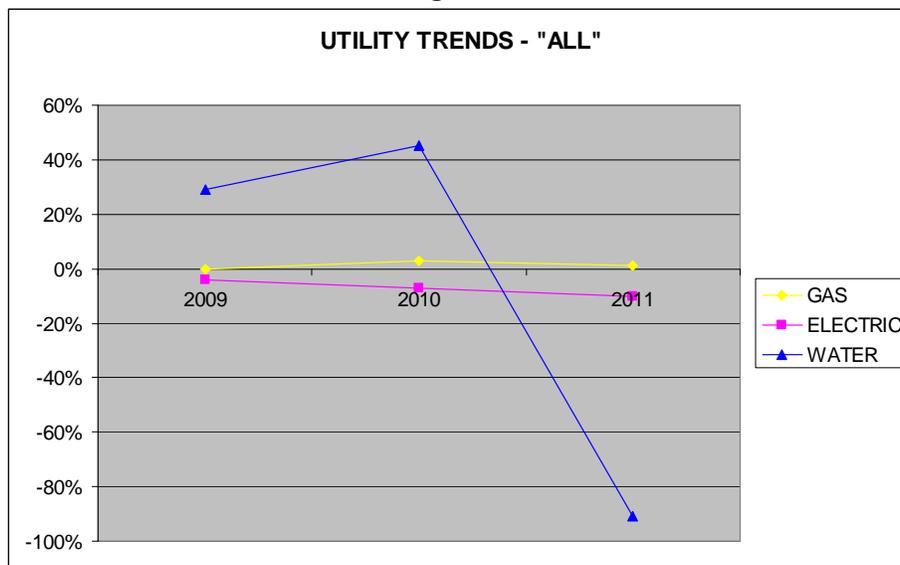
Analysis of SFFD Energy and Water Conservation Program Data

As part of the SFFD Energy and Water Conservation Program, the Fire Department has been tracking the utility usage on all Department-operated facilities. This has occurred separately from the utility usage tracking which is performed by SF Environment. The Fire Department began its data collection in January 2008, with Calendar Year 2008 being used as the baseline year. All years, thereafter have been compared to the CY2008 usage levels at each individual facility.

Facilities have been separated into 2 groups: "All" and "Staffed". Whereas "Staffed" includes only Fire Stations and Administrative facilities, "All" additionally includes Auxiliary Water Supply System (AWSS) facilities and related utilities, and other facilities that are seldom occupied, such as inactive Fire Stations. Since 2008, several of the Fire Department's facilities have been transferred or sold. These include all AWSS facilities (utilities fully transferred to SF Public Utilities Commission by the end of 2010), 2 previously leased properties (utilities fully transferred in 2009) and one inactive Fire Station (sold and utilities fully transferred in 2011).

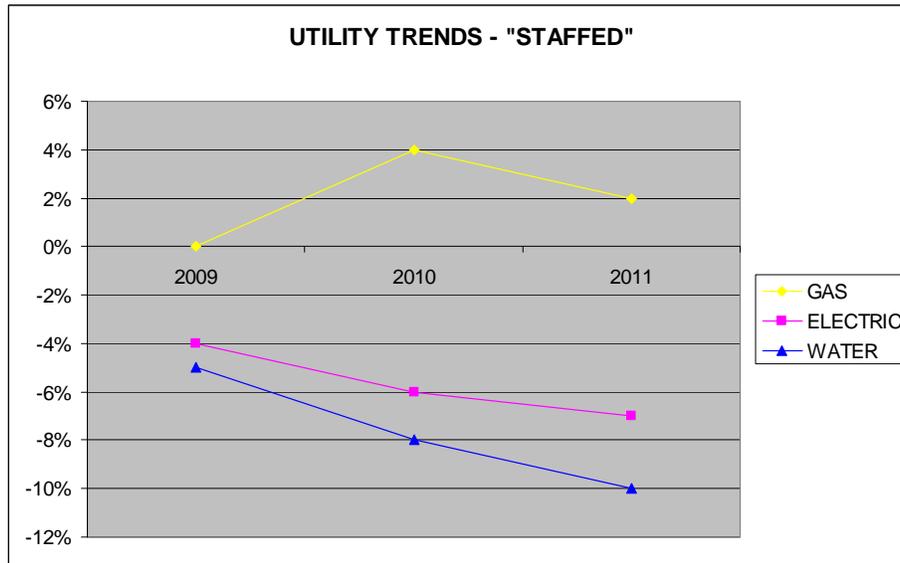
As a result of these property transfers, the number of facilities represented by "Staffed" decreased from 48 in 2008 to 47 by 2011, and the number of facilities represented by "All" was decreased from 57 to 50. The utility most affected by these changes is water, which is apparent in Figure 3 presented below. This is due to the high amount of water needed to operate and maintain the AWSS. Results that most accurately reflect the Fire Department's usage is the graph presented below for the "Staffed" facilities.

Figure 3



Utility trends for "All" Fire Department facilities are skewed due to the transfer of facilities made during period from 2008 to 2011. The resulting trends are similar to the graph presented above in Figure 2.

Figure 4

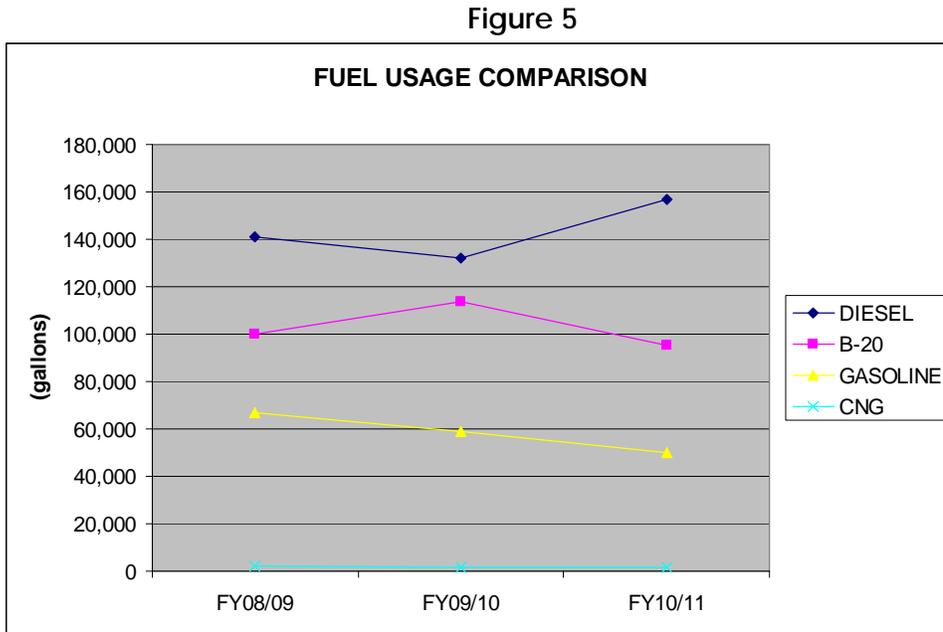


Utility trends for the "Staffed" Fire Department facilities more accurately represent the true utility usage trends. The Fire Department has been very successful in reducing electricity and water consumption, and would like to continue doing so. Since 2008, electricity has been reduced by 7% and water reduced by 10%. The Fire Department will focus on improving measures to reduce the consumption of natural gas, which has increased by 2% since 2008.

Analysis of Liquid Fuel Usage Data

The Fire Department's current method for determining annual fuel usage provides a rough estimate of the actual amount of fuel consumed. A fuel management system is expected to be installed in the coming Fiscal Year. In the interim, the Fire Department will continue to estimate the amount of fuel delivered to the SFFD fuel tanks to be the amount of fuel consumed.

The current trends of fuel usage by fuel type are shown below in Figure 5.



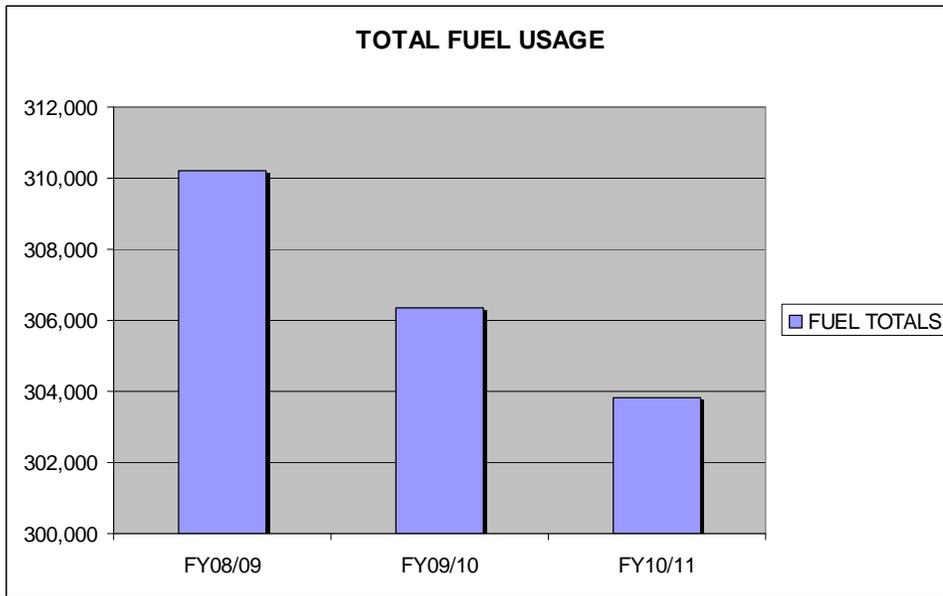
The chart in Figure 5 demonstrates the following significant trends:

- Increase in the use of Diesel
- Decrease in the use of B-20
- Decrease in the use of Gasoline

Since the trends are based on that of fuel delivered rather than fuel consumed, there are too many variables to consider and direct correlations justifying these trends cannot be made.

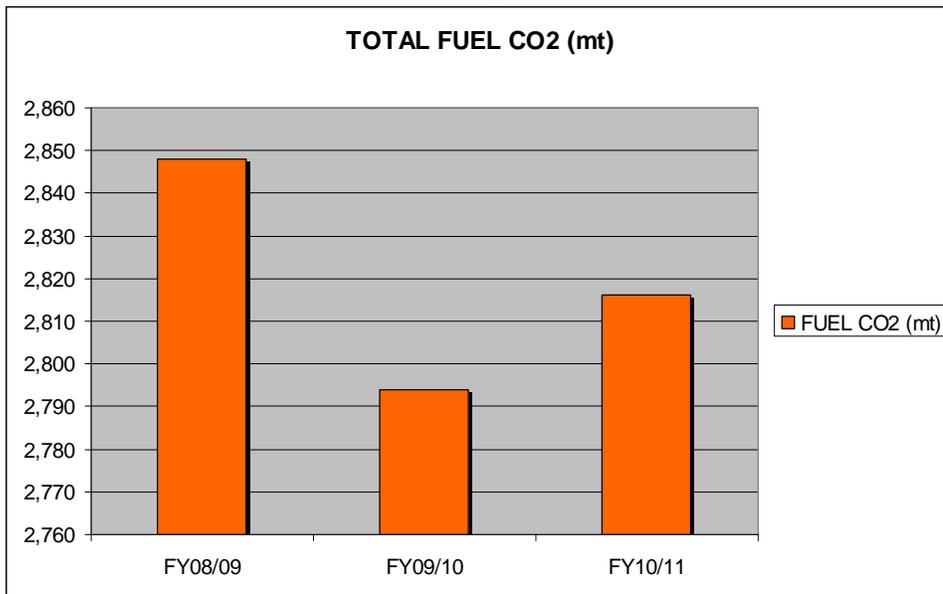
Nevertheless, another type of analysis has been made; comparisons of total fuel usage and total carbon emissions. (Figure 6 and Figure 7)

Figure 6



By analyzing the cumulative total of all fuel types, the chart in Figure 6 shows that the overall amount of fuel usage has been decreasing (2% since FY08/09).

Figure 7



By analyzing the amount of carbon emissions produced by the use of these fuels, a different trend can be seen, as shown in Figure 7. Instead of carbon emissions continuing to go down as the total amount of fuel decreases from FY09/10 to FY10/11, it increases. Although these changes are small (1% increase in carbon emissions from FY09/10 to FY10/11), this demonstrates that the type of fuel being used clearly has an influence on the amount of carbon emissions. By analyzing the graph in Figure 5, the factor having the most influence on this upward trend would have been the increase in diesel fuel. This analysis reinforces the important value of converting fuel from diesel to biodiesel.

4. Other Sustainable Practices

To lower the Fire Department's carbon footprint and lessen our overall environmental impact, the Fire Department is involved in the following programs and projects:

- Recycling and Composting Program
- GreaseCycle Program
- ePayroll
- Commuter Benefits Program
- Work-Related Trips and Bicycle Fleet Programs
- SFApproved.org - Green Product Purchasing Program
- Energy-Efficiency Upgrades and Best Practices
- SF Urban Forest Program

Methods for reducing the Fire Department's overall carbon footprint include recycling and composting, purchasing green products, establishing best practices for the conservation of water and energy, and encouraging alternative forms of transportation for employees.

The Fire Department is also involved in preserving our City's natural resources. To help conserve the endangered Mission Blue Butterfly, the Fire Department has set aside the property belonging to the Fire Department on Twin Peaks for protection and habitat restoration. To help preserve aquatic natural resources, the Fire Department has acquired an oil boom to better enable the Fire Boat to respond to oil spill incidents, such as the Cosco Busan disaster in November 2007.

The Fire Department's carbon footprint has further been offset by calculating the annual carbon sequestration rate of the trees on Fire Department property. The trees were inventoried by type, size and number, and sequestration rates were calculated. The initial tree inventory was conducted in FY09/10.

4a. Zero Waste

Zero Waste goals can be accomplished by effectively diverting trash from the landfill to recycling/composting programs, reducing the amount of waste produced by using less, and by purchasing items that, after being used, may be recycled, composted, or repurposed. Today, the City of San Francisco recovers 78% of the materials it discards, bringing the City ever closer to our goal of zero waste by 2020. SFFD was the first Fire Department in the United States to begin a composting and recycling program. All Fire Department facilities have had on-site recycling and composting programs since April 2003.

Trash Diversion Rate

The Fire Department's trash diversion rate for FY10/11 was 80%, a few points lower than the previous year due to various clean-up projects at the fire stations. With periodic reminders and refresher trainings, SFFD's diversion rate could easily be increased, since materials that are either recyclable or compostable still find their way into the trash.

Waste Assessment Questionnaire

The Captain at each Fire Station is, by default, designated as the Zero Waste Coordinator for that facility. Each Captain, or their designee, has submitted a Waste Assessment Questionnaire, evaluating their involvement in current waste prevention programs, encouraging additional waste prevention measures, and evaluating their understanding of program procedures. This year, the Fire Department's Zero Waste Coordinator requested that Station Captains assign an alternate Station member to serve as the Zero Waste liaison; the person who will facilitate any recycling/composting program modifications and resolve any related issues at that location.

The results from the Waste Assessment Questionnaires have been compiled into a spreadsheet and are included as **Appendix C**. The table below lists the actions that our Zero Waste Coordinators have committed to that will help Fire Department personnel at each facility properly recycle, compost, and/or reduce waste.

Table of Zero Waste Commitments

FACILITY	COMMITMENT
All SFFD Sites	Turn off electronics – lights, computers, TV's, radios, surge protectors

Medical Waste Management

By providing emergency medical care, the Fire Department generates medical waste. The items that are placed in the medical waste stream include equipment used for resuscitations, bandages soiled with blood or bodily fluids, and sharps containers. These items must be separated from the regular waste streams (landfill, compost, recycle), and are placed in red biohazard bins for incineration. The disposal of medical waste is conducted by a company contracted by the City that specializes in medical waste disposal.

The processing involved with the disposal of medical waste is costly. Many items that end up in the red biohazard bins are not necessarily all biohazards. Cardboard boxes from medications can be recycled, and clean plastic wrappers do not need to be incinerated as medical waste. One of the Fire Department's goals is to review Emergency Medical Service operations to assess whether personnel responding to medical calls can improve the sorting of disposable items, with only true medical waste going into the red biohazard bins.

Hazardous Waste Management

The Fire Department contracts with the SF Department of Public Health to pick up hazardous waste products, such as batteries and fluorescent bulbs, for proper disposal. Automotive product waste, paint and chemical waste are collected at the Fire Stations and delivered to the City's Central Shops by the Fire Department's Bureau of Equipment for recycling or proper disposal.

GreaseCycle

The SF Public Utilities Commission oversees a cooking oil recycling program, GreaseCycle, which recycles used cooking oil into biodiesel for City vehicles. Not only does the program create a cleaner-burning renewable fuel, it also reduces damage and costs to repair sewer infrastructure. Used cooking oil is often disposed of down the drain where it can clog sewers, resulting in backups, overflows into the street, potential health hazards, and foul-smelling odors.

Prior to FY10/11, only 10% of the Department's Fire Stations were participating in this program. This year an additional 13 Stations signed up for Greasecycle, bringing participation to 45%. Fire Stations are occupied 24/7, and all are equipped with kitchens where full meals are prepared and cooked several times a day. Clogs and backups caused by grease are a common problem. The Fire Department will continue to promote and expand the GreaseCycle program, helping to decrease costs associated with plumbing repairs and maintenance.

ePayroll

As of August 2011, all City employees were able to enroll in ePayroll, a service for City employees to view their pay stub information online and eliminate paper paystubs, saving paper, printing and distribution costs. As of December 2011, 15% of SFFD members were enrolled in ePayroll. In April 2012, two trainings were held at SFFD's Headquarters to promote the use of ePayroll. Additionally, the Department will be sending out online ePayroll training to all personnel encouraging the ePayroll program. The Department's goal is to have 50% of SFFD members receive their pay stubs through ePayroll by December 2012.

Electronic Documents and "Read-Only" Versions

The Fire Department has been in the process of transitioning toward a "paperless" system for distributing forms, memos, trainings and General Orders. In FY10/11 all General Orders, memos and most forms became paperless, with most the majority being "read-only", with no option to print. So far in FY11/12, approximately 25 regular reports have been transferred online, with the daily and monthly reports being recorded, reviewed and approved electronically.

The Fire Department's goal is to complete the development of an online program that allows Fire Station Officers to submit facility maintenance and repair requests electronically. Additionally, the program will generate automatic electronic notifications to our vendors for service calls, saving us time and money. Currently requests for services are faxed to many of our vendors.

4b. Transportation Options

In San Francisco, transportation accounts for 37 percent of greenhouse gases emitted into the atmosphere. With approximately 27,000 City employees, the types of transportation employees use to get to and from work, and while at work, has a significant impact on air quality in the area.

The SF Healthy Air and Clean Transportation Ordinance (HACTO), described earlier in Section 3b2 "Fleet", additionally requires City Departments to promote public transportation, ridesharing or other driving alternatives, and to minimize single-occupancy vehicle transportation for work-related duties. Each City Department is required to write a Transit-First plan, which outlines how the Department will promote transportation options and reduce work-related trips.

Challenges in promoting alternative transportation for Fire Department members are: work assignment and work schedule.

The majority of Fire Department employees work 24 hour shifts at Fire Stations, beginning at 8:00am. Most have a regular assignment at a designated Fire Station. But many, once arriving at work, are reassigned and must pack their equipment and personal protective gear, and commute across town to another Fire Station. As there can be no delay in arriving to their new assignment, most Fire Department employees assigned to Fire Stations drive their personal vehicle to work.

Employees assigned to Ambulances work 10 hour shifts and report to a single facility, but can be assigned to work shifts that start and end at any time of day or night; times, when public transportation is usually not available.

Fire Department employees who work a regular commute-hour schedule are few by comparison. These employees mostly are administrative staff or Bureau of Fire Prevention Fire Inspectors working at SFFD Headquarters. It is with these employees that the Fire Department has the most opportunity to promote transportation options and will be focusing efforts.

San Francisco Commuter Programs

The Fire Department's Transit-First Plan encourages the use of alternative methods of transportation by its members whenever possible. This includes promotion of the following City programs:

- Commuter Benefits Program
- City Hall Bike Room
- City Bicycle Fleet
- Rideshare Matching Assistance
- Emergency Ride Home Program

The Fire Department, however realizes that reliable transportation options are not always available to members working at Fire Stations or on Ambulances, as described above. Nevertheless, the Fire Department regularly distributes e-mails received from SF Environment's Clean Air and Transportation Program to all

employees. These e-mails generally include Commuter Program information and related promotional materials.

Currently, about 25 employees are signed up for the City's Commuter Benefits Program; however, this is no indication of the actual number of employees who are using public transportation on a regular basis. According to a commute survey conducted in November 2010, 29% of employees working at SFFD Headquarters commute to and from work using a mode other than driving a car alone. This amounts to more than just 25 employees.

Future internal employee outreach efforts planned include:

- o Presentation on Transportation Options at Executive Staff Meeting (April 2012)
- o Provide Commuter Program information during new employee orientations
- o Post approved flyers and promotional items at all facilities
- o Encourage and promote use of Bike Fleet Program at SFFD Headquarters
- o Continue to distribute SF Environment Commuter Program e-mails to all employees

San Francisco Work-Related Trips Programs

Because transportation has a major impact on air quality in the City, the primary focus is to reduce vehicle emissions by reducing vehicle trips taken while at work. Excluding the use of emergency response vehicles, the types of work-related trips required by Fire Department employees may include trips for in-service training classes, official meetings, and for conducting official business related to fire prevention activities.

On-Line Training:

To reduce the number of trips taken to attend in-service training classes, and to reduce the number of emergency response vehicles taken out-of-service, the Fire Department has instituted on-line training. Using the Fire Department's existing computer system, monthly reading materials and tests are posted on-line for use by Fire Department personnel at their Fire Station or computer workstation. All monthly EMS reading materials tests are posted, as well as other appropriate training materials related to fire suppression operations. On-line training shall continue to be utilized whenever possible and practical.

Trips for Cleaning Personal Protective Equipment:

To improve the health and safety of Fire Department personnel, the Fire Department has acquired washer/extractors for cleaning personal protective equipment, turnout coats and pants. After being exposed to carcinogens encountered at fires, personal protective equipment needs to be cleaned; otherwise Firefighters will continue to be exposed to cancer-causing gases and particulates. Currently, equipment is sent out for cleaning to a contractor who is located 90 miles away in Lodi, California. By installing washer/extractors at Fire Stations, turn-around time for cleaning equipment will decrease, and thereby promote the regular cleaning of equipment after fires.

The Fire Department will soon have 4 washer/extractors installed, and will be getting 7 more. As the Wash/Extractor Program is being developed, the Fire Department will need to consider ways to reduce the number of potential trips

that will need to be made to washer/extractor sites. However, by not having to use an independent service provider driving 90 miles each way to pick up and drop off equipment on a weekly basis, it will significantly reduce the carbon emissions generated overall.

Pool Cars:

The Fire Department currently maintains 5 pool cars which may be utilized by personnel at SFFD Headquarters. Employees will often use pool cars to carpool to meetings, thereby reducing the number of overall trips. At least 2 pool cars per day are checked out for use.

Similarly, Fire Inspectors with the Fire Department's Bureau of Fire Prevention share vehicles to conduct fire inspection duties. Most Bureau of Fire Prevention vehicles are assigned to be shared by 2 or 3 inspectors, and are small hybrid passenger cars, appropriate for their use.

Bicycle Fleet:

The Fire Department has received 5 grant funded bicycles to be used as an alternative means of transportation. Two of the bikes are pool bikes at SFFD Headquarters, and are used similarly to the pool cars. Two bikes are at the SFFD Division of Training (2310 Folsom), and one is assigned to the SFFD Bureau of Fire Prevention.

To promote the use of the bicycle fleet, SFFD Headquarters has developed a bike check-out system that includes the issue of a helmet, reflective vest, bike lock, and map of bike routes. Personnel checking out the bike are responsible for reading the bicycle owner's manual, inspecting the bike for safety and cleanliness, and for wearing eye protection, and proper shoes and clothing.

4c. Green Purchasing

The Fire Department's Buy Green Scorecard is attached as **Appendix D**. Although the results of the Department's Buy Green Scorecard are lower than last year's, the Department anticipates the purchases of green products to increase in the future.

Green Purchasing Goals

The Fire Department's Green Purchasing goals are to:

- o Complete a green purchasing consultation
- o Explore and incorporate where possible green cleaning products
- o Train all Accounting staff to log all purchases at the item-level commodity code in the ADPICS program (not the group, subclass, or class-level code), so that our reports accurately reflect our purchases

The first goal was completed in February 2012 when Fire Department staff met with SF Environment for a green purchasing consultation. This was an opportunity to train the Department's new staff member responsible for ordering supplies how to effectively use the SF Approved website to find green products.

Another important procedure learned in the training is for green product purchases to be properly logged at the item-level commodity code in the ADPICS program. If this information is not recorded properly, the Department does not receive "points" towards SF Environment's Buy Green Scorecard. Even if the Department is purchasing green products, if these purchases are not logged properly, according to the Buy Green Scorecard, it is as if the Department is not purchasing any green products at all. It is suspected that this is the main reason why this year's results of the Department's Buy Green Scorecard are lower than last year's.

Green Product Research

The Fire Department continues to research alternative green products. Switching to recycled printing paper was easy, however finding household paper products that work in the Fire Department environment and meet the green requirements has taken time. After researching and testing different products, by FY10/11 the Department began purchasing fully compliant toilet paper and paper towels.

To address pest control issues at SFFD facilities, the Fire Department uses the City-wide contract with Pestec, which uses integrated pest management methods that focus on decreasing the use of chemical controls for pests and suppressing the root causes of pest infestations through sanitation, harborage reduction and habitat modification. Several of our facilities experience ongoing mosquito infestations and, with the limited choices of green pest management options for mosquito control, it has become difficult to fully address the problem.

For FY11/12 the Fire Department will be exploring the possibility of using green cleaning products. As part of workers safety legislation, OSHA requires that work surfaces be cleaned with an appropriate disinfectant as determined by the EPA (U.S. Environmental Protection Agency), which oversees the registration of anti-microbial products. Appropriate disinfectants include a diluted bleach solution and

EPA-registered antimicrobial products. To be eligible for use by SFFD, the green cleaning product must meet the required disinfectant standards and not be cost prohibitive.

The Fire Department currently uses a bleach dilution as the primary disinfectant. . Any new green cleaning product that the Department purchases must be proven to be effective against infectious diseases, such as MRSA, HIV, Hepatitis B/C and Tuberculosis, and be as effective as, if not more effective than, bleach. Not using an appropriate or approved disinfectant would increase the potential of exposures to infectious materials for both SFFD personnel, and our patients. If a new green disinfectant product is ultimately chosen, it must be proven effective by industry standards and incorporated into the Fire Department's Infection Control Policy as a Department-approved product.

4d. Information Technology

Energy consumption associated with desktop computers is the City's single largest use of energy for the City's Information Technology operations. Energy consumption can be reduced through the purchase of energy efficient computers and the use of power management tools which limit energy consumption to times of actual use.

The Fire Department's policy on the purchase of new equipment ensures that all purchases of new computer and electronic equipment meet the Electronic Product Environmental Assessment Tool (EPEAT) Gold or Silver standard, when available.

Virtual Servers

It has been over five years since the Fire Department's servers were last upgraded. However, as part of the SF Department of Technology (DT) server virtualization project, the Fire Department is in the process of migrating critical physical servers to the DT virtual server environment. Most servers are at peak use only 5-15% of the time they are powered on, yet most hardware consumes 60-90% of the normal workload power even when idle. By consolidating multiple servers across a number of host servers, the Fire Department will significantly reduce energy consumption without sacrificing reliability or service levels. The first part of the virtualization project is estimated to be completed by June 2012.

Energy-Efficiency, Equipment and Systems Upgrades

The Fire Department has been analyzing its monitor inventory and replacing CRT monitors with LCD flat screen monitors, thereby reducing energy consumption and eliminating exposure to harmful radiation. Additional measures include the removal and/or discontinued issue of individual printers, and upgrading printers to multifunctional capabilities to save paper resources.

An on-going project includes the removal of older printers at Fire Stations. Fire Stations are required to have a minimum of 2 printers for operational purposes, located on the Communications Floor. These printers have been upgraded to more energy efficient models that use less toner and can print double-sided. Most Fire Stations also have additional printers located in the Officers' rooms - printers that were installed in 1999. These older printers use more energy, print only single-sided, and are failing. As they fail, printing is redirected to the Communications Floor printers, and the old printer is permanently removed.

During FY10/11, Fire Department's IT staff, in collaboration with the SF Department of Emergency Management's IT staff, completed the consolidation of personal workstations and eliminated workstations dedicated to reporting and/or scheduling tasks only. Now, most personnel at Fire Department Headquarters can access all work related applications from their single desktop workstation. This has eliminated approximately 90% of the instances where users needed two separate computers at their desks. The Fire Department expects to see a significant improvement in energy savings due to eliminating all of the older, less energy efficient computers at SFFD Headquarters (698 Second Street), SFFD Division of Training facilities (2310 Folsom and 600 Avenue M, Treasure Island) and the Ambulance Headquarters, Station 49 (1415 Evans Avenue). By merging the two networks to run on only one computer,

the Fire Department was also able to replace 25 older computers at Fire Stations with newer, more energy-efficient models.

Energy-Saving Modes and Best Practices

Due to the nature of the Fire Department's Mission, enabling energy-saving modes on emergency response and patient care documentation computer systems is not always operationally feasible. However, energy-saving practices have been applied whenever possible, with non-emergency response computers configured with the following energy-saving settings:

Turn off monitor:	After 5 minutes
Turn off hard disks:	After 20 minutes
System standby:	After 20 minutes
Screen saver:	default setting

The one area the Fire Department would like to see continued improvement on is energy efficiency in the Fire Stations. When crews respond to 911 calls from the Fire Station, it is critical for them to respond immediately. This often results in lights and electrical equipment, such as televisions, being left on when the station is vacant.

An additional measure the Fire Department is in the process of implementing is providing energy conservation reminders on all non-emergency response computers, with special focus on electrical equipment at Fire Stations, including televisions. The Fire Department will also be distributing memos regarding energy-saving practices, including turning off personal items, such as personal laptop computers, when not in use.

4e. Carbon Sequestration / Urban Forest

The Fire Department acknowledges the importance of the City's Urban Forest and the many benefits it provides - from reducing atmospheric carbon dioxide to increasing aesthetic value - and supports the preservation and enhancement of this valuable resource. The Fire Department understands that the act of inventorying, measuring, labeling and monitoring each individual tree creates an intimate relationship between the "resource manager" and the "resource", fostering an improved sense of urban forest stewardship.

In FY09/10, the Fire Department conducted an audit of the trees growing on the property surrounding Fire Department facilities. The audit included the calculation of the carbon sequestration rate for each individual tree. The audit also provided an opportunity to identify areas where additional trees could be planted.

The audit included 49 properties that all have unique forestry considerations and a considerable amount of work was done cataloguing data on our forestry resources. Each tree was identified by species or type and measured for diameter (DBH). The data was entered into the US Forest Service Climate Change Resource Center, Center for Urban Forest Research's (CUFR) Tree Carbon Calculator. Results were recorded for carbon sequestration rate and amount stored.

The results from the Tree Audit conducted in FY09/10 are as follows:

SITES AUDITED	49
TOTAL TREE COUNT	530
TOTAL CO2 STORED (lbs)	395,82
CO2 STORED/YEAR (lbs/yr)	22,278
CO2 STORED/YEAR (metric tons/yr)	10.13

While attempting to calculate carbon sequestration rates, personnel working on the audit identified limitations with the Tree Carbon Calculator. Since the CUFR Tree Carbon Calculator offered a limited number of tree species to choose from, the Fire Department developed a system to account for tree species not presented in the Carbon Calculator program. The system was devised so that persons not familiar with tree species would be able to conduct the audit. If exact tree species were not able to be identified, trees could be identified by type (deciduous, conifer or palm) and further by basic leaf shape (simple, palmate or compound). Fruit-bearing deciduous trees with simple leaves were given its own category.

Due to the work done on the tree audit as described above, the Fire Department has been selected by SF Environment to participate as a pilot department in a new urban forest program which will better support inclusion of forestry resources in City department's Climate Action Plans. SF Environment has applied for a grant from the Cal Fire Urban & Community Forestry Grants Program to fund this program.

The Fire Department remains interested in exploring new ways to better manage and highlight SFFD's contribution to San Francisco's urban forest.

5. Community Wide Impact

When responding to emergency 911 calls, Fire Department personnel are focused on the task-at-hand, suppressing fires or providing emergency medical care. This is also when the Fire Department is most visible to the public. It may seem that this would not be the most opportune time to be educating the public about climate change and sustainable practices. However, there are opportunities when the Fire Department is providing other public services in non-emergency situations, where the Fire Department's role can have an influence on sustainable practices community-wide. Another way the Fire Department's role can impact the community-at-large is by demonstrating that a traditional department can successfully fulfill its Mission, and at the same time, incorporate advancements in technology and infrastructure for that support a more sustainable future.

Below are examples of the efforts the Fire Department has been making to become a more sustainable City Department, to preserve our natural area resources, and to reduce our overall environmental impact. Many of these efforts occur behind the scene.

Educate at Public Events & Trainings

Fire Department members can encourage recycling and composting, use of alternative transportation, efficient energy and water use practices, and other conservation measures during publicly held training classes and presentations. These include:

- Neighborhood Emergency Response Team (NERT) Training, which teaches personal preparedness for emergencies and natural disasters.
- SF Firefighters in Safety Education (SFFISE), which provides fire safety and outreach to children in SF schools.
- School Visits, where Engine and Truck Companies visit SF elementary schools.
- Fire Station Visits, where school and youth groups tour Fire Stations.
- Community Affairs; at street fairs, safety fair events and Fire Station open house days.

In adult training situations, instructors can make introductory class announcements to remind participants of recycling bin locations and to encourage carpooling or taking public transportation to the next training sessions. At elementary schools, volunteers and on-duty crews can incorporate recycling and conservation reminders into their presentations. Visitors to Fire Stations will see the recycling stations set up throughout the Station, and members can point out the Fire Department's conservation measures to visitors. SF Environment may assist in providing educational materials and/or presentation methods appropriate for the presentation and training audience. For these measures to be successful, a coordinated effort and allocation of resources will be required.

Educate at Public Meetings

The official public meetings held by the Fire Department are those of the Fire Commission. Fire Commissioners and Fire Department members can potentially promote conservation measures through Fire Commission activities.

The following measures were recommended by the Fire Commission Secretary to demonstrate the Fire Commission's support of the Fire Department's environmental commitment:

- o Post a copy of the Fire Department's Climate Action Plan on the home page of the Fire Commission website.

Promote the Use of Cleaner Fuel & Lower Emissions Vehicles

To raise awareness and demonstrate to the community its commitment to the use of cleaner fuels, the Fire Department intends to attach labels to bio-fuel and CNG vehicles that will be clearly visible from the street. This would currently include all Ambulances, Fire Apparatus in the Southeast area of the City, and all CNG passenger vehicles.

Other City Departments also have vehicles using cleaner fuels. SFFD would like to suggest that rather than having each individual City department develop their own green-vehicle labeling system, a City-wide labeling system be implemented for use on all City vehicles using cleaner fuels. This would demonstrate the City's unified commitment to emissions reductions.

As previously mentioned in Section 3b1 "Fuel - Biodiesel Fuel", the Fire Department is expanding its Biodiesel Program.

Raise Awareness of Green Building Features at Renovated Fire Stations

The Fire Stations that will be undergoing seismic and comprehensive remodels as part of the ESER Bond will be LEED-certified. LEED-certified buildings are designed to: lower operating costs and increase asset value; reduce waste sent to landfills; conserve energy and water; be healthier and safer for occupants; reduce harmful greenhouse gas emissions, and; other environmental benefits.

Upon completion of the remodels, the Fire Department suggests plaques be placed on the buildings informing the public of the green building features incorporated into the building's design. This would help inform the public of the measures the City is taking towards creating more sustainable infrastructure and raising awareness of what technology is considered green and why.

An example of a feature that could be highlighted is the creation of bioswales. Bioswales are storm water runoff conveyance systems that provide an alternative to storm sewers, and can be enhanced with native plants. Whereas the Fire Department is responsible for the care and maintenance of its facilities, including the property surrounding the facility, the importance of creating of a bioswale area could be described. In addition, the inclusion of climate-appropriate species within the bioswale area as part of water conservation Best Practices could also be highlighted.

Design, construction and placement of the plaques will need to be coordinated with the SF Department of Public Works, who will be overseeing the ESER Bond remodel projects, and the SFFD Division of Support Services.

Respond to Environmental Hazards

In January 2009, the Fire Department was awarded funds from the CA Department of Fish and Game to purchase oil spill response equipment which provides the ability to deal with the immediate needs of an oil spill and to assist in a unified spill containment response to protect local resources.

The acquisition was prompted by an oil spill incident in November 2007, when the container ship, Cosco Busan, collided with the Bay Bridge. The collision caused the release of 54,000 gallons of bunker fuel oil into the Bay, killing more than 20,000 birds and resulting in clean-up costs in excess of \$61 million.

In response, an Oil Spill Task Force was created and Oil Spill Containment classes have been held, training local Fire Station crews in the event of a similar incident. In October 2009, the Fire Department was dispatched to assist with the containment of the Dubai Star oil spill.

Protect Endangered Species on Twin Peaks: Mission Blue Butterfly

Twin Peaks is home to the endangered Mission Blue Butterfly. The area on the northeastern slope of Twin Peaks, which is under the jurisdiction of the Fire Department, has been one of the sites identified as prime habitat for Silver Lupine, critical host plant to the Mission Blue. Preserving the Silver Lupine habitat is key to the survival of the Mission Blue Butterfly.

The Fire Department has transferred stewardship of the portion of its Twin Peaks property to SF Recreation and Parks Department, so it will be managed in a manner consistent with San Francisco's Natural Areas Program. Habitat restoration efforts include eradication of exotic species, introduction of Silver Lupine plants, and protection of breeding and restoration areas from humans and their dogs. The Fire Department still retains access to this area for emergency operations.

Adjacent to the property being restored, signs have been posted to inform and educate the public of the restoration efforts taking place, and identify the City departments and community organizations involved.

Assist in Habitat & Historic Trail Stewardship with Non-Profit: Sutro Stewards

The Fire Department recognizes the value in preserving our City's natural areas. The Fire Department's Twin Peaks property, which lies between Twin Peaks and Mount Sutro, provides a continuous urban green belt. The historic trail that winds through Mount Sutro Forest can be linked to the open space area on Twin Peaks. Sutro Stewards, a local non-profit organization, began an ambitious program of trail restoration, maintenance and realignment, to create a continuous trail through the open space areas. Sutro Stewards and another key partner, SF Urban Riders, have been working with the Fire Department and other agencies to improve the neglected portions of the trail, with the goal of conserving open space, promoting recreation and building community.

However, the area of the trail that traverses Fire Department property is heavily overgrown with poison oak and brambles. Before restoration work begins, the Fire Department and the City want to assure the safety of volunteers doing restoration work, and the safety of visitors using the trail and traversing the property. The Fire Department is dedicated to finding a solution to these issues and supporting the work of Sutro Stewards and SF Urban Riders, restoring the historic Mount Sutro trail.

Promote Urban Agriculture

Growing food locally by establishing urban gardens reduces the greenhouse gases caused by transporting food from remote agricultural locations.

As part of the Healthy and Sustainable Food for San Francisco Directive, the Fire Department has participated in a land audit conducted to identify potential City-owned plots of land that could be used to grow food. Several plots have been identified, including under-managed areas that could be better served as community gardens rather than the potential of becoming blight. The Fire Department will continue to explore more stable long-term solutions for the management for these identified areas, consistent with City-established policies.

Plan for Resilience and Sustainability

The Fire Department supports the City-wide development of resilient and sustainable urban infrastructure to ensure a viable future for San Francisco. The concept of sustainable urban infrastructure goes beyond individual projects, and considers entire infrastructure systems, such as water delivery, electrical grids, telecommunication networks, waste streams, biodiversity and the preservation of natural areas. To achieve sustainability goals, every project must begin at the planning stages, and receive political and financial support from the top.

Currently the City requires all new City buildings to meet LEED Gold standards. High efficiency buildings are a start, but developing sites to have low impact on their surroundings with energy-efficient landscaping, for example, to protect water resources, maintain sustainable habitats, and to connect green spaces and wildlife corridors, will require looking beyond the building envelope. Without a similar government policy mandating the integration of resilient and sustainable infrastructure in the design of major projects, sustainability will be difficult to achieve. There is still much more that can be done.

The Fire Department's ability to provide emergency services to the citizens and visitors of San Francisco routinely depends upon a wide range of traditional infrastructure support services, including transportation, energy, water, environmental protection, and communications, in order to provide and deploy human resources, goods, and information. This is true whether it's during day-to-day operations, or during a major disaster. Ensuring that the infrastructure systems required to provide emergency services are available in times of need is paramount. The Fire Department acknowledges the importance of the development of sustainable urban infrastructure to meet the needs of the present without compromising the ability of the future generations to meet their own needs. Careful consideration and planning is therefore required when developing new systems, or deciding to retain or how to upgrade traditional ones.

An example of a City-wide sustainability goal that may be achieved is reducing the reliance on fossil fuels. A bio-fuel production and delivery system can be developed to improve the security of fuel resources for municipal use. Although still in the beginning stages, with the further development of GreaseCycle and similar programs, the City has the ability to produce its own bio-fuel, and to provide a local delivery system to fuel busses, emergency vehicles and other critical infrastructure systems. Another example of municipal energy development is to harness the energy of the gravity-fed Hetch Hetchy water supply and AWSS system by establishing micro-hydro turbines to generate electricity. Both bio-fuel and micro-hydro projects could be realized with the City's SFPUC engineers.

Planning for a sustainable future can lead to the development of a sustainable community for San Francisco. The Fire Department is eager and willing to be part of that change and to make resilience and sustainability a reality for our City.

Appendices

Appendix A SFFD Healthy Air and Clean Transportation Ordinance Plan

Appendix B SFFD Waste Assessment Questionnaires

Appendix C SFFD Buy Green Scorecard 2011