City of Palo Alto
City Council Staff Report

(ID # 2473)

Report Type: Study SessionMeeting Date: 4/16/2012

Summary Title: Update of the Climate Protection Plan

Title: Update on the Climate Protection Plan - Earth Day Staff Report

From: City Manager

Lead Department: City Manager

Recommendation
This is an informational report and requires no Council action.

Executive Summary
Climate change has become perhaps the most important threat facing the global environment and economy. Locally, the effects of climate change are likely to reduce the availability of hydro generated electricity, increase the incidence of forest fires and extreme weather events, and lead to a rise in sea level, which would impact Palo Alto's shoreline and flood prone areas. The City of Palo Alto (City) took a leadership role in 2007 as one of the first U.S. cities to develop a Climate Protection Plan (CPP). The CPP describes measures that could be taken to reduce the City's greenhouse gas (GHG) emissions and set GHG reduction goals.

This report provides an update on activities and results to date, as well as progress made towards meeting GHG reduction goals set by the Council. The 2012 GHG emissions reduction goal for municipal operations (also called City operations) is 20% below the 2005 baseline levels. The corresponding 2012 GHG emissions reduction goal for the entire community was set at 5% below the 2005 baseline levels.

Staff at present estimate that emissions from City operations could be reduced by 27% by the end of 2012, and community emissions could be reduced by 15% by the end of 2012. These projected reductions far exceed the goals set for 2012 and if our projections hold, would meet the 2020 community reduction goal of 15%.

These estimated reductions for both City operations and Community emissions will be primarily due to greater purchases of electricity from renewable supplies, participation in the PaloAlto**Green** program, lower levels of waste to the landfill and improvements to City facilities, generally related to energy efficiency. There is insufficient data available to assess the change in transportation related emissions since 2005, as a result, the projected emissions from this

sector were held constant. Attachment B and C to this report compare 2005 emissions baseline to staff's projected GHG emissions for 2012 for both City operations and the community.

Staff expects to return to Council a year from now, in April 2013, with actual emission reduction numbers for 2012 and we will be able to confirm if our projections held up. If we have met our 2020 GHG reduction goals, Council may want to discuss whether to increase our 2020 community level GHG reduction goal. Palo Alto's current community GHG reduction goal of 15% by 2020 is in line with State of California's AB32 legislative goal for 2020. Should Palo Alto adopt a higher reduction goal for the community, it would help lead the way beyond the State-wide goal and toward greater sustainability.

Background

Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). According to the Environmental Protection Agency (EPA) climate change may result from human activities that change the atmosphere's composition (e.g. through burning fossil fuels) and the land surface (e.g. deforestation, reforestation, urbanization, desertification, etc.). The term climate change is often used interchangeably with the term global warming, but according to the National Academy of Sciences, "the phrase 'climate change' is growing in preferred use to 'global warming' because it helps convey that there are [other] changes in addition to rising temperatures."

Global warming is commonly referred to as an average increase in the temperature of the atmosphere near the Earth's surface and in the troposphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human induced. In common usage, "global warming" often refers to the warming that can occur as a result of increased emissions of greenhouse gases from human activities.

Emissions Reduction Goals

The City of Palo Alto's Climate Protection Plan (Attachment A) set greenhouse gas emissions reduction goals that were adopted by Council in 2007. Those goals were;

- Short term goal - by 2009 the City will reduce emissions by 5% from 2005 emissions levels
- Mid term goal - by 2012 the City and Community will reduce emissions by 5% from 2005 emissions levels.
- Long term goal - by 2020 the City and Community will reduce emissions by 15% from 2005 emissions levels

In April 2010, staff informed Council that the City's emissions were reduced by 12%, which exceeded the 2009 reduction goal of 5%. As a result, Council revised the emission reduction goal for City operations to 20% by 2012. In addition to the emission reduction goals, the CPP also had other goals which are outlined in the Discussion section of this report, along with the progress made in achieving those goals.

Cost Benefit Analysis and Budget Implications -
The costs of actions to reduce greenhouse gas emissions are a key component of prioritizing which actions to take in implementing a Climate Protection Plan. The City retained a consultant to develop a cost benefit analysis of the action items discussed in the CPP, which was presented to council on July 21, 2008 (http://www.cityofpaloalto.org/civica/filebank/blobdload.asp?BlobID=12872). While continuing to refer to the analysis, staff expects to pursue an update to the analysis in the coming year and would expect to present results to Council in April of next year.

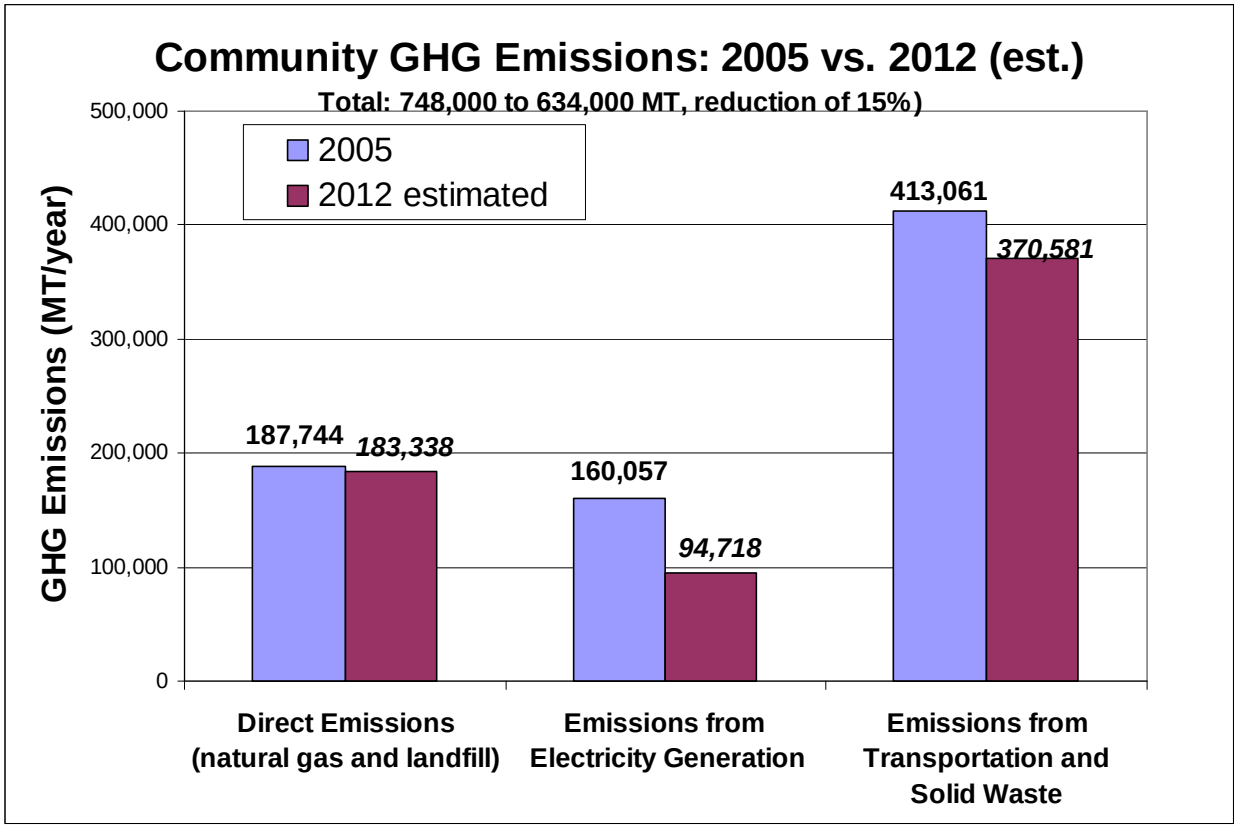
How the Climate Protection Plan fits into Other Environmental and Sustainability Efforts
The Climate Protection Plan intersects with and influences many other environmental programs and initiatives. For example, the Zero Waste plan calls for an increase of the diversion rate of several categories of solid waste which will significantly reduce GHG emissions from the community. Another example is the Urban Forest Master Plan, where there are not only benefits from the carbon sequestration properties of an urban canopy, but also from reduced energy costs resulting from strategically located trees that shade buildings.

Discussion
The City operations and Community are on track to meet and potentially exceed the emission reduction goals set for 2012 (Attachment B and C). The estimated community reduction of 15% is primarily due to an increase in renewable electricity purchases, an increase participation in the volunteer PaloAlto**Green** program, and waste and water treatment emission reductions and is illustrated below.

Community emissions are broken into different categories that conform to industry standards:

- Direct emissions related to fossil fuels burned on site. This is primarily natural gas combustion in Palo Alto and landfill emissions (also called Scope 1)
- Indirect emissions resulting from the generation of electricity, heating and cooling, or steam generated off site. (Scope 2)
- Emissions from transportation, solid waste disposal, and wastewater treatment (Scope 3)

The chart below summarizes the comparative community emission levels in the three categories. The use of natural gas has decreased slightly, primarily as a result of a large commercial natural gas customer leaving town. The electricity emission reduction accounts for the majority of the reduction and is due to greater amount of renewable energy supply. The community's total purchase of PaloAlto**Green** RECs was factored into the community emissions total (as a reduction of 879 lbs of CO2 per REC purchased). Reduction in solid waste accounts for the reduction in the third category. Attachment B provides greater details of these numbers, with 2012 numbers being estimates for the year.



Note: Staff has calibrated the community totals to reflect weather related differences between 2005 and the projected estimates for 2012. Weather adjustment is primarily related to normalizing the hydro electric supply to an average historic precipitation level. Since 2005 hydro conditions were relatively wetter and 2012 is projected to be a relatively dry, the c emission reduction using actual hydro generation for the community would only be 8.4% compared to the weather adjusted 15% emission reduction outlined in the report and illustrated above.

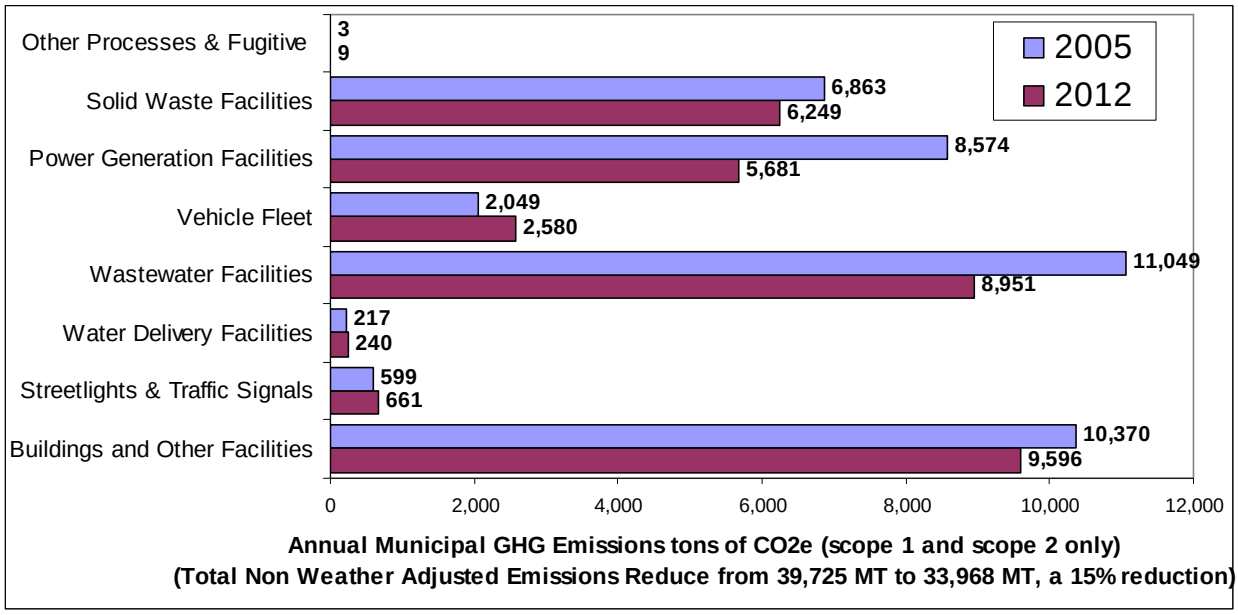
Staff was not able to estimate transportation related emissions at this point, therefore the transportation emissions numbers from 2005 have been brought forward as 2012 estimates for consistency. Staff expects to undertake a transportation emission level assessment this coming year.

Staff estimates that City operations will exceed the revised 2012 goal of 20% reduction and that there is the potential of reaching reductions close to 27%, based on a weather adjusted estimate, given current information. Without weather adjustments or accounting for PaloAlto**Green** purchases the reduction is estimated at 15% as illustrated in the chart below.

The reductions are primarily from improvements in the Water Quality Treatment Plant (WQTP), efficiency measures taken at many facilities including City Hall, the participation in waste management programs, and the greater use of renewable electric supply Improvements at the

Water Quality Treatment Plant were 1) replacing natural gas with landfill gas for the afterburner of the incinerator, 2) fine tuning the controls of the compressed air to the aeration tanks, 3) lighting upgrades, 4) installing solar photovoltaic panels and 5) installation of ultraviolet light disinfection to replace chlorination. Staff did not include biogenic sources which are a result of emissions associated with landfill and wastewater sludge incineration and over which we currently have no control. In addition, the comparative totals include the City's facilities participation in the PaloAlto**Green** program.

City Operations GHG Emissions: 2005 vs. 2012 (est.)



Staff has revised its baseline calculations for City operations emissions to be in line with the current calculation methodology known as the Local Government Operations protocol (LGOP). The LGOP was developed by Air Resources Board (ARB) staff in partnership with the Climate Action Reserve (CAR), The Climate Registry (TCR), and Local Governments for Sustainability (ICLEI). The LGOP was published in May 2010 and subsequently has become the standard methodology for calculating GHG emissions for Government operations. Even it Staff continued to use the original calculation methodology used in 2007, the City operations emissions would be reduced.

In addition to the emission reduction goals, the CPP also had other goals. These goals are tabulated below along with the progress made in achieving those goals.

CPP Goals	Update on Progress
Incorporate carbon reduction into the City's Comprehensive Plan goals to ensure continuity with other City	Draft greenhouse gas reduction strategies and sustainability principals will be recommended for incorporation in each element of the amended Comprehensive Plan. Council is

priorities	expected to adopt an amended Comprehensive Plan in mid-2013.
Explore and evaluate a policy whereby all of the Palo Alto Utilities would become climate neutral and enable customers to choose climate neutrality through various voluntary mechanisms.	City developed the nation's top-ranked voluntary renewable energy program PaloAlto**Green** and is assessing the potential of a carbon neutral electricity portfolio for all customers.
Use this CPP as a springboard for determining GHG reducing actions, and revisit action steps reformulated at least biennially.	Staff is committed to continually reviewing and revising the CPP actions to continue to lead in environmental sustainability.
Maintain and report GHG inventories on a regular basis	Staff has compiled and reported on annual municipal operations GHG emissions inventory to national registries (CCAR, TCR) since 2005. Staff is also internally using the Hara Emissions Management System to consolidate and track municipal GHG emissions.
Promote participation by Palo Alto businesses in inventory efforts	Staff will continue to be active in CCAR, SSV (Sustainable Silicon Valley), JVSV (Joint Venture Silicon Valley), SVLG (Silicon Valley Leadership Group) or other organizations. This includes participation by joint action agencies and vendors with which Palo Alto interacts (Northern California Power Agency, Palo Alto Solid Waste Collection and hauling agreements, etc.)

A more detailed list of accomplishment is provided in Attachment D. This attachment is formatted in a manner similar to the original CPP so the reader can easily relate to the sections and programs discussed in 2007. Attachment D summarizes many of the City's sustainability efforts, and includes the following sections.

1. Utilities;
2. Sustainable Purchasing;
3. Transportation and Sustainable Land Use;
4. Green Building;
5. Zero Waste;
6. Education and Motivation.

This attachment outlines actions taken to reduce emissions from City and community GHG sources along with a review of existing programs and potential actions or new programs that could be undertaken in the future. Attachment A is a summary of the original Climate Protection Plan. The original plan can be found on the City's website (2007 CPP). Attachments B and C are tables that compare 2005 emissions baseline to staff's projected emissions for 2012 for both City operations and the community.

Future vision for the Climate Protection Plan

To establish itself as a recognized leader in environmental sustainability, the City should continue to implement the Climate Protection Plan along with revisions to incorporate new programs including plans around adaptation to climate change. Staff plans to continue its effort to promote a carbon neutral electric portfolio and to review opportunities to collaborate with the Urban Forest Master Plan (UFMP) team and incorporate the values relating to the carbon sequestration properties of our urban forest. Staff is also reviewing the opportunity to have the Climate Protection Plan certified for CEQA (California Environmental Quality Act) compliance so that the EIR (Environmental Impact Report) process for development in Palo Alto could be streamlined. Finally, transportation-related emissions are under review and a consultant is expected to be engaged to help establish more rigorous protocols for calculating baseline and future transportation-related emissions.

Attachments:

- Attachment A - Summary of Climate Protection Plan (DOC)
- Attachment B - Community Emissions (PDF)
- Attachment C - City Operations Emissions (PDF)
- Attachment D (DOC)

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City Manager Approval:

James Keene, City Manager

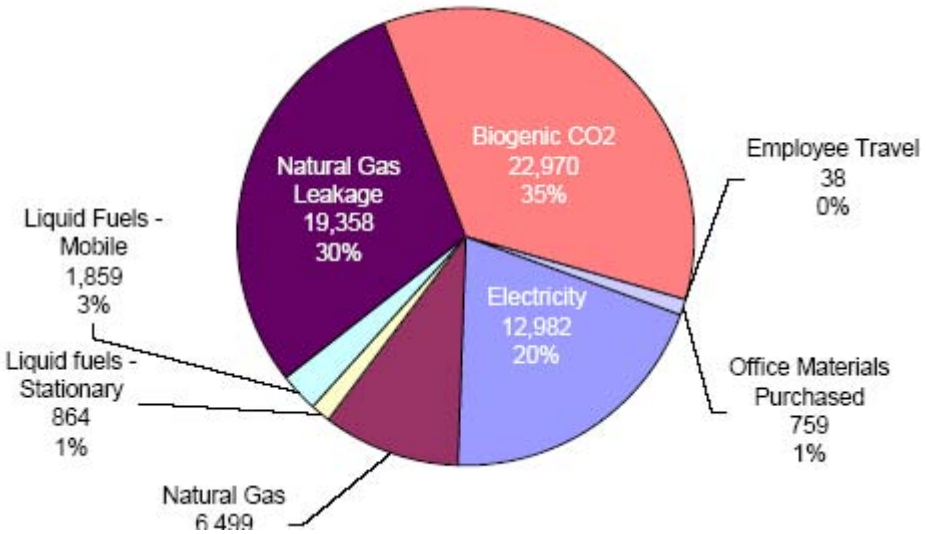
Summary Description of the 2007 Climate Protection Plan
(Note: Emission estimates updated since 2007 and is reflected in the body of the report)

In December 2007 Council approved a Climate Protection Plan (CPP) that set a short, medium, and long term goals to reduce City operations and community greenhouse gas (GHG) emissions. These goals were:

1. Short Term Goal: By 2009, the City Operations will reduce emissions by 5% from 2005 emission levels for a total reduction of 3,266 metric tons of CO_2.
2. Medium Term Goal: By 2012 the City Operations and Community will reduce emissions by 5% from 2005 emissions level for a total reduction of 29,702 metric tons of CO_2.
3. Long Term Goals: By 2020, the City Operations and Community will reduce emissions by 15% of 2005 levels, equal to 119,140 metric tons of CO_2, and bring the community in line with State emission reduction goals.

Outlined below in Figure 1 and Figure 2 are the City's and Community's GHG emissions profiles, as outlined in the 2007 CPP. The City's emissions of 65,329 Metric Tons of CO_2e (MT CO_2e) and the community's emissions of 728,720 MT CO_2e combined is equivalent to approximately 14 tonnes per resident. Electricity and natural gas related emissions account for approximately 40% of the 793,621 MT CO_2e total municipal plus community emissions. (Note: the natural gas leakage estimate has since been substantially revised downwards, from 19,358 MT CO_2e to 4,717 MTCO_2e.)

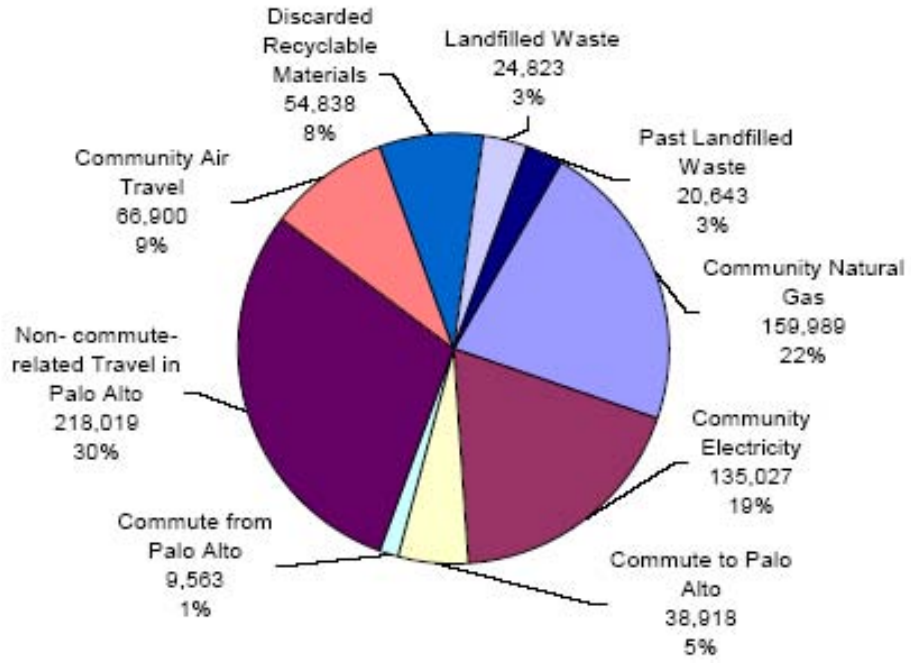
Figure 1: Municipal (City Operations) GHG Emission Sources in 2005 (65,329 MT CO_2e)



Source: Climate Protection Plan: December 2007

Note:
Natural gas leakage numbers were updated with more accurate numbers since 2007 that resulted in considerable reduction in leakage estimates.

Figure 2: Community GHG Emission Sources in 2005 (726,720 MT CO_2e)



Source: Climate Protection Plan: December 2007

B. Short Term GHG Reduction Goals

The City operations undertook a number of departmental level initiatives to meet the goal to reduce municipal GHG emissions by 5% at the end of 2009. Utilities energy efficiency and conservation programs were integral part of this effort. The initiative was classified under five main categories: employee education, electricity conservation and efficiency upgrades, paper use reduction, commute reduction, and waste reduction. A revised 2005 benchmark of 29,364 MT CO_2e was established. This lower benchmark down from 65, 329 MT, figure 1 above) reflects the reduced estimate for natural gas leakage and biogenic emissions from the waste water treatment plant because the facility serves other cities too and Palo Alto has minimal control over those emissions.

In April 2010, staff reported to Council that municipal GHG emissions declined by 11% in 2009 relative to the revised baseline year of 2005 (excluding employee commute estimates) (CMR: 194:10). Emissions were down from 29,364 MT CO_2e to 25,518 MT CO_2e. The principle contributors to this reduction are outlined below:

- Major upgrades and process improvements at the water quality plant, accounted for 75% of the reduction
    - Replace natural gas used in the biosolids incinerator emission control equipment with landfill gas that had previously been burned in a flare
    - Improve aeration system and replace air diffusers
    - Install more efficient motors and lighting fixtures

- Upgrade building systems and fixtures
    - Lighting fixture upgrades at the Elwell Court building
    - Reduced lighting levels at selected locations
    - City hall upgrades: motors, boilers, HVAC system

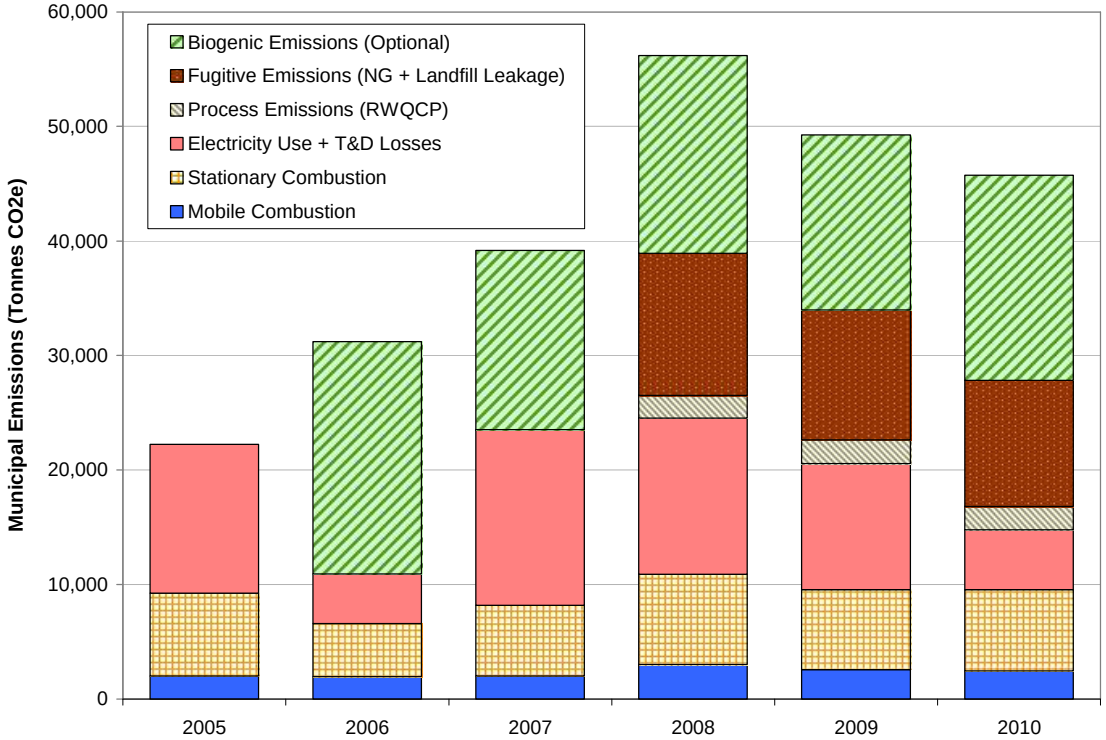
C. Measurement and Reporting of GHG Emissions

In order to meet the long term GHG reductions, which is the difference between the 2005 GHG estimates and the 2020 emissions, a robust and consistent measurement methodology needs to be established. The 2007 CPP estimates for 2005 emission were based on the ICLEI methodologies prevailing at that time. These methodologies are being revised and updated, and considerable research has gone it to measurement and quantifying techniques over the past few years. Staff is following those measurement methodologies and coalescing our initial estimates with the new ones to develop a more robust baseline GHG estimate for 2005 in order to more accurately measure the change the emission since then. This is a continuous process and staff will have a more definitive update to Council in 2013.

Utilities staff have developed a robust understanding of GHG measurement techniques for utility operations by participating in the voluntary GHG emissions reporting program since 2006. The City reported its municipal GHG emissions estimates to the California Climate Action Registry (CCAR) from 2005 to 2009 and to the Climate Registry (TCR) in 2010.

The graph below is for illustrative purposes, to show how the measurement of all six GHG gases (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6) is important, and how the actual emissions associated with the City's electricity supply varies widely with the hydro electricity generation in the electric supply portfolio. As an example, year 2006 and 2010 were very wet and the City got a lot more hydroelectric supply, replacing market purchases (primarily consisting of natural gas based electricity supply) which the City otherwise would have purchased. It also includes methane (CH_4) and nitrous oxide (N_2O) from fugitive and process emissions which the City began reporting in 2008.

Figure 3: Municipal Operations GHG Emission Sources, 2005-2010



Utilities Department also began reporting the sources of its electricity supply to the California Air Resource Board (CARB) in 2009. This is mandated under the initial AB32 regulation. This annual report lists the sources of electricity for the year and is not administratively burdensome for now. CPAU has also been reporting to the USEPA on its SF6 inventory and leakages on a voluntary basis over the past five years, and has guidelines in place to minimize the leakage of this high potency GHG. CPAU is also moving away from purchasing SF6 insulated distribution system switchgear in order to reduce its total SF6 inventory.

ATTACHMENT B

City of Palo Alto GHG Emissions Summary

COMMUNITY EMISSIONS

All Units in Metric Tonnes of CO2e

	2005 Data	2005 CO2e		2012 Data estimates	2012 estimated CO2e	Notes
Scope 1 Emissions						
Natural Gas Use	31,374,970 therms	159,989		30,642,287 therms	154,444	1
Natural Gas Distribution Leakage		4,717			4,718	
Palo Alto Landfill Fugitive Emissions		6,811			6,248	2
Palo Alto Landfill Gas Flaring (biogenic)	144,681 Mcf LFG	5,853			7,554	3
Wastewater Stationary Combustion		1,792		6,543 dry tons incinerated	1,792	4
Wastewater Process Emissions		1,953			1,953	5
Wastewater Sludge Incineration (biogenic)		10,374		6,543 dry tons incinerated	10,374	6
Scope 2 Emissions						
Electricity - total	996,091,198	146,227		1,015,981,512	133,410	
Hydro Supply	548,759,598	0		417,028,611	0	
Renewables Supply	49,980,000	0		188,571,259	0	
Brown Power Supply	397,351,600	158,427		410,381,643	163,623	
Renewable Energy Credits (PAG)	30,600,755	(12,201)		75,776,000	(30,213)	7
Scope 2 Emissions -- Weather Adjusted						
Electricity - total	996,091,198	160,057		1,015,981,512	94,718	
Hydro Supply	514,072,516	0		514,072,516	0	
Renewables Supply	49,980,000	0		188,571,259	0	
Brown Power Supply	432,038,682	172,257		313,337,737	124,930	
Renewable Energy Credits (PAG)	30,600,755	(12,201)		75,776,000	(30,213)	
Scope 3 Emissions						
Commute within town		671			671	8
Commute into Palo Alto		38,918			38,918	8
Commute from Palo Alto		9,563			9,563	8
Non Commute Travel		217,348			217,348	8
Palo Alto Air Travel		66,900			66,900	8
Life Cycle Emissions From Annual Total Waste Placed in Landfills	69,491	24,823		32,434	11,586	9
Landfilling of Recyclable Materials						
Paper	9,955	31,299		4,646	14,608	9
Plastic	2,236	3,307		1,044	1,543	9
Plastic Bags	306	518		143	242	9
Glass	1,147	321		535	150	9
Aluminum Cans	113	1,537		53	717	9
Mixed Metal	2,373	11,274		1,108	5,262	9
Concrete	1,383	14		645	7	9
Wood	2,670	6,568		1,246	3,066	9
Total (biogenic excluded)		**734,550**			**673,146**	
Total (weather-adjusted, biogenic excluded)		**748,380**			**634,453**	
				reduction of	15.22%	

Notes

1	Total Citywide NG sales (not including COBUG use or CNG use) * 5.306 kg CO2 per therm
2	2012 estimate is number reported to TCR for 2010; calculated using total captured landfill gas, actual methane percentage, and assumed 75% capture rate. 2005 estimate has been revised to reflect current methodologies.
3	2012 estimate is number reported to TCR for 2010 and represents biogenic emissions from flaring of landfill gas and burning landfill
4	2012 estimate is number reported to TCR for 2010 and represents N2O emissions from incineration of biosolids; RWQCP natural
5	2012 estimate is number reported to TCR for 2010 and represents N2O emissions from biological treatment process and from
6	2012 estimate is number reported to TCR for 2010 and represents biogenic emissions from incineration of biosolids at RWQCP;
7	2012 estimate is from the 2011 PAG sales total
8	Emission related to transportation have not been revised for 2012
9	Based on ratio of 2011 to 2005 tons landfilled

ATTACHMENT C

City of Palo Alto GHG Emissions Summary

MUNICIPAL OPERATIONS based upon the TCR/LGOP reporting

All Units in Metric Tonnes of CO2e

Buildings and Other Facilities		2005			2012 estimate *
Scope 1		***CO2e***			
	Stationary Combustion	3,524			2,615
	Fugitive Emissions	5,163			5,116
	Total Direct Emissions	8,686			7,731
Direct Biogenic Emissions					
	Stationary Combustion	0			0
	Total Direct Biogenic Emissions	0			0
Scope 2					
	Purchased Electricity	1,684			1,865
	Purchased Steam	0			0
	Purchased Heating	0			0
	Purchased Cooling	0			0
	Total Indirect Emissions	1,684			1,865

Streetlights and Traffic Signals					
Scope 2					
	Purchased Electricity	599			661
	Purchased Steam	0			0
	Purchased Heating	0			0
	Purchased Cooling	0			0
	Total Indirect Emissions	599			661

Water Delivery Facilities					
Scope 1					
	Stationary Combustion	1			1
	Total Direct Emissions	1			1
Direct Biogenic Emissions					
	Stationary Combustion	0			0
	Total Direct Biogenic Emissions	0			0
Scope 2					
	Purchased Electricity	216			239
	Purchased Steam	0			0
	Purchased Heating	0			0
	Purchased Cooling	0			0
	Total Indirect Emissions	216			239

Wastewater Facilities					
Scope 1					
	Stationary Combustion	6,419			4,333
	Process Emissions	1,953			1,953
	Fugitive Emissions	0			0
	Total Direct Emissions	8,502			6,416
Direct Biogenic Emissions					
	Stationary Combustion	10,374			9,621
	Total Direct Biogenic Emissions	10,374			9,621
Scope 2					
	Purchased Electricity	2,547			2,535
	Purchased Steam	0			0
	Purchased Heating	0			0
	Purchased Cooling	0			0
	Total Indirect Emissions	2,547			2,535

Vehicle Fleet					
Scope 1					
	Mobile Combustion	2,047			2,578
	Fugitive Emissions	2			2
	Stationary Combustion	0			0
	Total Direct Emissions	2,049			2,580

ATTACHMENT C

Direct Biogenic Emissions					
	Mobile Combustion	1			0
	Stationary Combustion	0			0
	Total Direct Biogenic Emissions	1			0
Scope 2					
	Purchased Electricity for EVs	0			0
	Total Indirect Emissions	0			0

Power Generation Facilities					
Scope 1					
	Stationary Combustion	0			0
	Process Emissions	0			0
	Fugitive Emissions	0			0
	Total Direct Emissions	0			0
Direct Biogenic Emissions					
	Stationary Combustion	0			0
	Total Direct Biogenic Emissions	0			0
Scope 2					
	Purchased Electricity	8,574			5,681
	Purchased Steam	0			0
	Purchased Heating	0			0
	Purchased Cooling	0			0
	Total Indirect Emissions	8,574			5,681

Solid Waste Facilities					
Scope 1					
	Stationary Combustion	35			26
	Process Emissions	0			0
	Fugitive Emissions	6,811			6,204
	Total Direct Emissions	6,846			6,231
Direct Biogenic Emissions					
	Stationary Combustion (flaring)	5,853			7,554
	Total Direct Biogenic Emissions	5,853			7,554
Scope 2					
	Purchased Electricity	17			19
	Purchased Steam	0			0
	Purchased Heating	0			0
	Purchased Cooling	0			0
	Total Indirect Emissions	17			19

Other Processes & Fugitive Emissions					
Scope 1					
	Process Emissions	3			9
	Fugitive Emissions	0			0
	Total Direct Emissions	3			9

TOTAL EMISSIONS - 2005			Weather adjusted			Weather adjusted
	Scope 1	26,088	26,088		22,968	22,968
	Direct Biogenic Emissions	16,228	16,228		17,175	17,175
	Scope 2	13,637	16,329		11,000	11,487
	TOTAL	55,953	58,645		51,143	51,630
	TOTAL NON-BIOGENIC	39,725	42,417		33,968	34,455

Weather adjusted total non biogenic	42,417	34,455
		19% reduction
PAG purchases (municipal) (RECs)	0	8,988
PAG purchases (municipal) (tonnes)	0	3,584
Total GHG comparision**	42,417	30,872
		27% reduction

* Estimate is using 2009 numbers we publicly reported

** Total** GHGs includes reductions associated with PAG purchases and only non-biogenic, weather adjusted estimates.

Attachment D includes the following sections;

1. Utilities;
2. Sustainable Purchasing;
3. Transportation and Sustainable Land Use;
4. Green Building;
5. Zero Waste;
6. Education and Motivation.

Each section of Attachment D corresponds to the sections in the original CPP. In each section, Staff has evaluated actions for reducing emissions from City and Community GHG sources. To the extent possible, Staff has reviewed existing programs, described results and the potential actions or programs that will help reach future goals.

1. Utilities

Considerable progress has been made through the City of Palo Alto Utilities (CPAU) programs to reduce the carbon emissions associated with community electricity and gas usage since 2005. The tables below illustrate CPAU programs that are projected to reduce electric supply related emissions by 41%, and natural gas supply related emissions by 7%, from 2005 levels by the end of 2012. Increases in the renewable electric supply, as well as increased participation in the PaloAlto**Green** program, energy efficiency and conservation programs were the principal drivers for this reduction.

The City's electricity usage has remained generally flat since 2005, but is expected to increase in 2012 primarily due to a large commercial customer moving computer server operations into Palo Alto. Natural gas usage has dropped due to energy savings and because a large commercial customer wound down its operations in Palo Alto.

Estimated Electricity Consumption Related Emissions & Impact of Utilities' Programs

	Metric Tons of CO_2 per year
Reference Year 2005 Emissions	**160,000**
Changes in Emissions since 2005:	
Efficiency & Conservation Programs: 2.7% savings	(11,000)
Incremental local solar PV Installation: 2,560 kW	(1,500)
Increase in Renewable Energy Supply: from 5% to 19%	(55,000)
Increase Palo Alto Green Participation: from 3% to 8%	(18,000)
Economic Activity Related Load Growth: principally commercial	20,000
Projected Year 2012 Emissions (59% of 2005 Emissions)	**95,000**

Estimated Natural Gas Consumption Related Emissions & Impact of Utilities Programs

	Metric Tons of CO_2 per year
Reference Year 2005 Emissions	**167,000**
Changes in Emissions since 2005:	
Efficiency & Conservation Programs: 1.3% savings	(2,100)
Incremental local solar hot water systems: 34 systems	(38)
Distribution pipeline related leakage reduction	0
Economic Activity Related Load Decline: principally commercial	(9,500)
Projected Year 2012 Emissions (93% of 2005 Emissions)	**155,000**

State and federal agencies continue to tighten appliance efficiency standards and code requirements leading to additional energy savings for the community. These savings are in the baseline beyond those the City is allowed to count in meeting the established gas and electric long-term energy efficiency goals. CPAU continues to aggressively pursue those goals and expects to achieve an additional 4% to 5% savings of both electricity and natural gas usage. CPAU also expects to increase the renewable supply from 20% of the City's electricity sales in 2011 to at least 33% by 2015. The renewable supply goal is expected to be achieved within the 0.5¢/kWh electric retail rate impact measure approved by Council.

Beyond the 33% renewable supply goal, there is interest in the community to have a 100% carbon neutral electric supply portfolio. A carbon neutral electric supply portfolio would reduce the carbon emissions of the electric portfolio from 160,000 metric tons (MT) in 2005 (and 95,000 MT in 2012) to zero. Since electricity accounted for 19% of the community's entire emissions in 2005, a carbon neutral electric supply portfolio alone would result in a 19% reduction in community emissions.

Energy Efficiency and Conservation Program Achievements

The City of Palo Alto Utilities (CPAU) has made considerable progress since 2005 in reducing the community's use of electricity and natural gas through energy efficiency (EE) and conservation programs. The current annual impact electric efficiency and conservation gains attained through CPAU programs from 2005 through Fiscal Year (FY) 2011 is 27,573 megawatt-hours per year (MWh/year) or 2.7% of annual load, as illustrated in Table B1 below. This has resulted in an emission reduction of 10,992 MT. As shown in Table B2, natural gas EE savings achieved since 2005 total 498,938 therms, or 1.5% of annual natural gas load, which translates into emission reductions of 2,647 MT.

Table B1: Electricity Efficiency and Conservation Savings and GHG Reductions

Year	Annual EE Savings Goals	Added Savings (MWh/yr)	Added Savings Achieved (% of load)	Past & Present Savings Achieved (MWh/yr)	Past & Present GHG Reductions (MT/yr)
FY 2006	na	1,877	0.19%	1,877	748
FY 2007	na	4,711	0.48%	6,587	2,626
FY 2008	0.25%	4,399	0.44%	10,986	4,380
FY 2009	0.28%	4,668	0.47%	15,654	6,2540
FY 2010	0.31%	5,270	0.55%	20,924	8,341
FY 2011	0.60%	6,650	0.70%	27,573	10,992
FY 2012	0.65%	n/a	n/a	n/a	n/a

Table B2: Natural Gas Efficiency and Conservation Savings and GHG Reductions

Year	Annual Savings Goals	Added Savings (therms/yr)	Added Savings Achieved (% of load)	Past and Present Savings Achieved (therms/yr)	Past and Present GHG Reductions (MT/yr)
FY 2006	n/a	24,429	0.08%	24,429	130
FY 2007	n/a	16,050	0.05%	40,479	215
FY 2008	0.25%	35,237	0.11%	75,716	402
FY 2009	0.28%	146,028	0.48%	221,744	1,177
FY 2010	0.32%	107,993	0.40%	329,737	1,750
FY 2011	0.40%	169,198	0.55%	498,935	2,647
FY 2012	0.45%	n/a	n/a	n/a	n/a

In addition, water efficiency and conservation programs have achieved more than 1.5% reduction in water consumption since 2005, but these savings has minimal impact on City's carbon footprint.

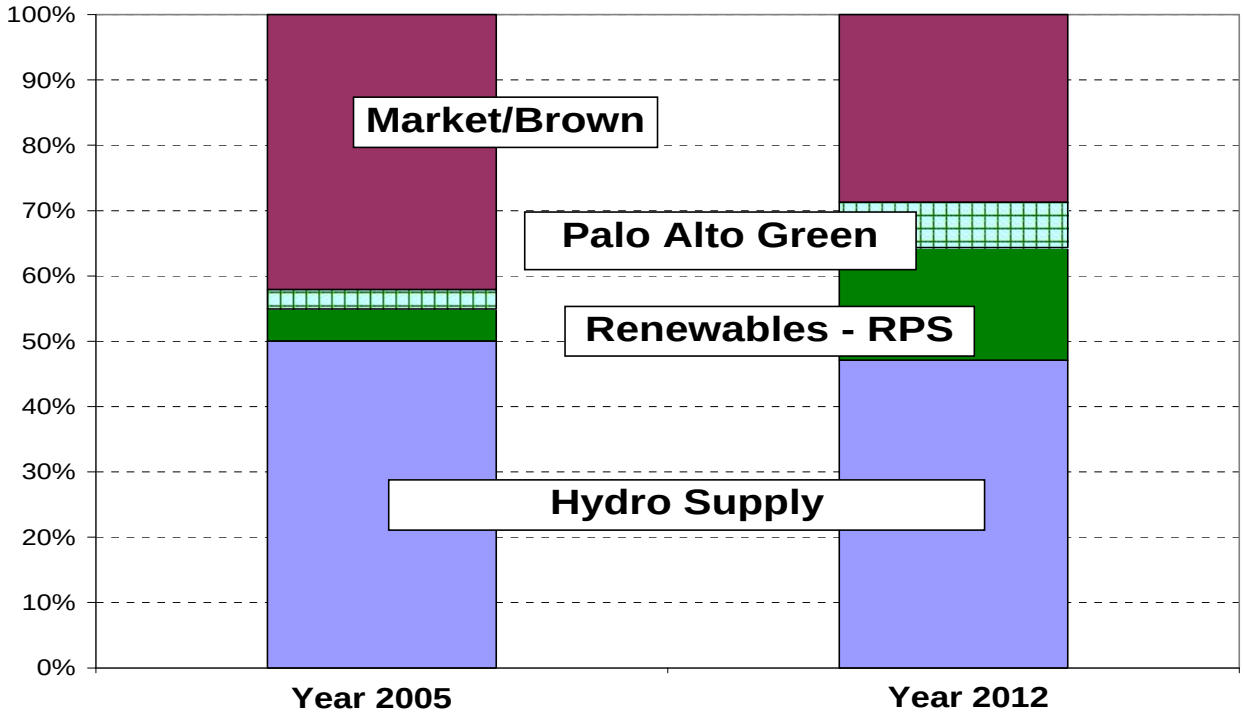
A Demand Side Management (DSM) program includes renewable energy, energy and water

efficiency, as well as energy and water conservation. Some of the specific programs include direct installation of efficiency measures for low income customers, rebates for installation of efficient appliances and equipment, education programs, residential energy use audits, home energy reports, commercial customer programs by end use and type of business class, green building construction program, and many others. The DSM Program Report for FY 2011 can be found at http://www.cityofpaloalto.org/civica/filebank/blobdload.asp?BlobID=29871

Increasing Renewable Energy Supply

The City's renewable energy supply share has increased from less than 5% in 2005 to close to 20% in 2012. Participation in the voluntary PaloAlto**Green** program has also increased from 3% to 8% of electric load during the same period. This has reduced the reliance on fossil fuel based electric supplies share considerably. The chart below illustrates this progress.

Comparative Electricity Supply Sources: 2005 & Projection for 2012 (normalized to average hydro conditions[1])



Utilities Plans for the Coming Years (2012 to 2020)

CPAU expects to continue to aggressively pursue energy efficiency and conservation opportunities, as well as to support the Planning and Community Development Department in encouraging green buildings and permitting processes. These programs are expected to reduce electricity and natural gas usage by an additional 4 to 5% by 2020. Staff expects to update the 10-year energy efficiency goals for the period 2014 to 2023 and will seek Council approval of these updated goals in early 2013.

The City's renewable energy supply (RPS) is projected to increase from 20% in 2012 to 33% by 2015. This RPS will increase even further if the community chooses to pursue a carbon neutral portfolio for electricity. By the end of the calendar year, staff plans to recommend a way to reach a carbon neutral electric portfolio.

[1] Hydro supply varies widely each year, but on average supply approximately 50% of the electricity needs. For comparative purposes and to measure progress towards meeting long term GHG reduction goals, average hydro supply is assumed.

CPAU continues to encourage local solar electric or photovoltaic (PV) resource investments through rebates and guaranteed energy buy-back program in the Palo Alto CLEAN program approved by Council in March 2012. The PaloAlto**Green** program also continues to support local PV resources by buying PV Renewable Energy Credits (RECs), but the PaloAlto**Green** program may be transformed as the community pursues a carbon neutral electric portfolio strategy. Staff is also re-evaluating the role local energy storage could play in meeting peak electricity demand, firming-up PV resource output, and its potential to enhanced local reliability. This assessment is expected to be provided to Council in fall 2012.

In addition, staff is developing a Residential Electric Vehicle (EV) Time-Of-Use rate for a pilot program to encourage late night and early morning charging at single family homes. Charging EVs during peak use times could impact local distribution transformers and require expensive upgrades. Charging EVs at night and in the early morning reduces the cost to purchase electricity as well as the probability of having to upgrade local transformers. Using EVs instead of internal combustion engines for vehicles will reduce community GHG emissions. Based on California Energy Commission (CEC) projections, Palo Alto may have 3,000 to 10,000 residential and commute cars charging in the City by 2020, which would reduce community GHG emissions by 1.5% to 5% by 2020. However, EVs are expected to increase community electrical energy load by 1% to 2%.

Many new and enhanced energy efficiency programs for all customer groups have been developed in the past few years by CPAU. Among these new programs are the Keep Your Cool program for commercial kitchens and coolers, the Labs Energy Efficiency Program and the Home Energy Reports for residents. All CPAU DSM programs are designed to assist customers in using energy and water resources more wisely and positively. In particular, the Home Energy Reports use information gleaned from social psychology studies to help influence behavior into more sustainable patterns. This research has shown that many people are more likely to change behaviors if they are aware that others act in a different way. The reports provide residents with comparative household energy usage data to help these customers understand when their use is higher than others, as well as to provide information and tips on how to reduce electric and natural gas consumption and bills.

In addition to these new programs, CPAU is also planning a 200 home pilot to provide hourly energy and water usage data in near real time to volunteer customers. This will be accomplished by installing smart meters and associated home energy use monitoring and control equipment, thus allowing customers to be knowledgeable about their consumption patterns and opportunities available to use energy and water more efficiently. Staff expects to finalize the design of the pilot and seek Council's approval of the pilot this summer.

The implementation of a cap-and-trade program, aimed at reducing California's GHG emissions, will impact the City's electric utility operations starting in 2013 and gas utility operations starting in 2015. Under the terms of the cap-and-trade regulations adopted by the California Air Resources Board (CARB), CPAU will be allocated GHG emission allowances. The regulation requires that CPAU sell these allowances in the auctions conducted by CARB and utilize the auction sale proceeds "exclusively for the benefit of retail [electric] ratepayers" and consistent with the State's GHG reduction goals. Staff will be seeking Council direction on utilization of the revenue generated from the sale of the allowances this summer.

2. Sustainable Purchasing

Products and services acquired by the City will have emissions impact during their manufacture, distribution, use, and disposal. Incorporating environmental performance criteria into City expenditures can have a significant impact on climate protection, as well as supporting other sustainability policies and programs such as Zero Waste, green building, and pollution

prevention. The City's purchase of environmentally preferable products and services, in conjunction with the environmental purchasing efforts of other Bay Area or State Public Agencies, has impacts beyond City operations. The City has the potential to stimulate market demand and further expand access to these products and services.

Many purchases that are environmentally preferable are also fiscally preferable because of less material use (e.g., paper when copiers and printers are set to duplex), reduced maintenance (e.g., structural pest control which relies on long-lasting structural repairs instead of expensive automatic monthly spraying or other chemical control), and direct costs, (e.g., remanufactured toner cartridges, which when specified correctly cost approximately 30-60% less per copy than new cartridges). Other cost savings can be seen by reduced-risk products that decrease potential harm to users or the environment and reduced disposal and end-of-life costs.

The City's Climate Protection Plan authorized the implementation of a green purchasing program in 2007. Since that time the City has adopted a Green Purchasing Policy which supports existing environmental policies and Council direction to reduce GHG, pesticides, mercury and achieve Zero Waste and pollution prevention goals. The following products and services have been purchased with green purchasing criteria:

- Copiers and printers ordered by the City's Information Technology Services (IT) are purchased with duplex capability and are preset to provide that function before they are deployed for use. Printers with a duplex function are replacing older models that are phased out from use. Through these efforts an initial assessment in 2010 (based on 2009 use) indicated a 15% reduction in paper use and annual savings of approximately $7,000 in paper costs. This number has not yet been revised to reflect more recent paper purchases;
- EPEAT Gold™ standards for computer and monitor purchases are required by IT. EPEAT criteria reflect several categories of environmental attributes that cover the full lifecycle of electronic products including the reduction or elimination of environmentally sensitive materials, material selection, design for end of life, energy conservation, corporate performance and packaging;
- Low-mercury fluorescent lighting;
- Discontinued use of hand soaps containing triclosan–an anti-bacterial product associated with water quality and potential human health issues;
- Structural pest control requiring the rigorous EcoWise Certification (Palo Alto was the first to require this certification) and additional requirements for local reporting and bee protection. Spray insecticides and poison rodenticides are no longer used at any City facility;
- Bay-Friendly landscaping standards in landscape maintenance contracts which includes use of locally-sourced mulches, OMRI certified organic fertilizers and other measures that reduce waste;
- GreenSeal™ Certified products for use by the City's custodial contractor. These products place an emphasis on reduced-toxicity and higher recycled content (these same standards for City staff use will be explored in the coming months);
- Requirements for out-sourced printing services to require increased amount of recycled-content paper and vegetable-based inks. All utility inserts are now printed on 100% post-consumer content paper;
- Discontinued purchase of expanded foam foodware and plastic bags by staff or for use at City-sponsored events;
- Purchase of a drinking water station to replace the use of single use bottles at City events;
- In select contracts, additional evaluation points are given to those companies that are Certified as a Bay Area Green Business;

- Boilerplate language in Purchasing contract Terms and Conditions has been revised to require extended producer responsibility, disallow the use of expanded foam plastics as packaging material, and standards for energy and water efficiency and Zero Waste;
- Two life cycle costing workshops have been held by Utilities for key accounts and staff. Additional workshops are planned for the future as needed;
- The City of Palo Alto received the 2011 *Green California Summit and Exposition Award for Leadership in Green Purchasing* and is considered a regional leader on this front.

In addition to the purchase of greener services and goods, green purchasing policies are now required to obtain grant funding from some public agencies. In 2011, the City received a $250,000 grant from CalRecycle for street maintenance. The grant required a green purchasing policy to be eligible for funding.

Although the City has made good strides on its green purchasing program, the very limited staff time available to run this program has not allowed for a detailed quantification of how these efforts contribute to the City's GHG reduction, Zero Waste and other environmental goals. The general understanding is, however, that less waste results in less energy use in the manufacture, transport and disposal of an item. Less energy use from energy-efficient products directly results in less GHG.

Next Steps:
Green purchasing projects are selected to align with existing City policies, Council directives and regulatory requirements. 2012-15 projects include:

- Supply Chain Plastics Reduction Project. This project led by Public Works-Watershed Protection is being done in partnership with the cities of Sunnyvale, San Jose and Santa Monica. This effort requires the elimination of expanded foam plastics, e.g., Styrofoam™ from secondary and shipping packaging and broader efforts to minimize overall packaging (right-sized boxes) while continuing to ensure product protection. While the City currently has this requirement listed in its purchase order Terms and Conditions from a green purchasing effort two years ago, the language is being revised and vendor outreach will be conducted to ensure knowledge of the requirement;
- Greening the purchase of Office Supplies (currently underway);
- Greening the purchase of custodial products;
- Reissuing and revising standards as needed for contracts and services that have already been greened and are due to be released again for bids or proposals;
- Continuing to integrate City environmental policies with Purchasing procedures and processes and refining these as the program evolves so that expectations for best value and price are congruent with city environmental goals.

3. Transportation and Sustainable Land Use

On a global basis, transportation and land use continues to represent one of the largest contributors to Greenhouse Gas emissions. In Palo Alto, original estimates for emissions related to transportation comprised 40% of the community's emissions. The City of Palo Alto's policies are highly supportive of reducing vehicle use, particularly single-occupancy vehicle use, for commuting or other trips. The Comprehensive Plan, Zoning Ordinance, and Capital Improvements Program direct the City to develop projects and programs to facilitate pedestrian and transit-oriented development, safer and more convenient pedestrian and bicycle travel, particularly related to school routes, traffic calming for safety of drivers and other road users, and facilitation of greater use of Caltrain, buses, and shuttles. In general, every single-vehicle auto trip diverted to another mode reduces greenhouse gas emissions. The City has also encouraged and facilitated the use of low emission, including all-electric, vehicles.

Staff is working on many programs to enable a reduction of such emissions, as described below.

Short and Medium Term Goals from 2008-2011

- Develop land use patterns that reduce travel-related emissions by supporting pedestrian, bicycle and transit use
- Achieve 15% bicycle mode split for local work commutes (and 5% for all commutes) by 2020.
- Reduce and/or offset community travel-related emissions by 5%
- Coordinate with Green Building efforts to ensure compatibility between built environment and sustainable land use initiatives
- Reduce emissions by an additional 10% by 2015
- Increase Caltrain and other transit use by 25% by 2015
- Provide annual reporting of transit and TDM effectiveness
- Increase Electric Vehicle (EV) infrastructure

How did we do on short and medium term actions?

1. Facilitate and enhance potential for mixed-use development.

Several mixed use developments were approved through the entitlement process from 2008-2011, though Site and Design or Planned Community review are typically required and can lengthen the review process and increase uncertainty for applicants. .Some of the mixed use projects of significance include:

- 901 San Antonio Road (Campus for Jewish Life): incorporates senior ownership housing, low-income senior housing, market rate townhomes with a daycare center, a health club, a community theater, and other facilities near a major intersection at San Antonio Road and Charleston Road. Construction is completed and occupied.
- 2180 El Camino Real (College Terrace Center): approximately 30,000 square feet of office space, a small grocery store and other retail, and 8 below-market rate rental units; in building review, expect construction to commence in spring of 2012.
- 1445 Alma Street (Alma Plaza): a grocery store and other retail space with 14 below-market rate rental housing units above the grocery store and 37 single-family homes immediately to the rear of the site. Commercial and BMR units are under construction, and other residential expected to commence later in 2012.
- 1080 Channing Avenue (Edgewood Plaza): a grocery store, other retail space, and 10 single-family homes. Approved by Council with anticipated construction start in spring of 2012.
- 102 University Circle: two stories of office and retail space, with four residential units on the third and fourth floors. Construction completed and occupied.
- 420 Cambridge Avenue: retail/office first floor with two floors (4 units) of housing above. Construction completed and partially occupied.
- 2350 Birch Street: ground floor office with 8 residential units above. Zoning approved but final design review pending.
- A handful of smaller projects on El Camino Real or downtown include 2-3 stories of office/commercial space with one or two residential units above.
- 195 Page Mill Road (Hohbach): 84 rental units above 50,000 square feet of office/R&D. Pending final action.

2. Zone for Mixed Use and Higher Density Around Transit Stations

The City has adopted Pedestrian-Transit Oriented Development (PTOD) zoning near the

California Avenue station. Existing zoning allows for mixed use and higher density around the downtown transit station, though parking remains an obstacle to successful projects. Two mixed use PTOD projects noted above have been approved (and one constructed) in the California Avenue PTOD area, and a third (195 Page Mill Road) is pending. The 102 University Circle project provides a mix of uses downtown, and high density housing near the downtown Caltrain station was approved (and is under construction) for 50 affordable housing units at 801 Alma Street. Another high density affordable housing project was approved and constructed at 488 W. Charleston Road, which is proximate to a future Bus Rapid Transit stop on El Camino Real.

3. Reduce Parking Needs for New Development

Several significant projects employed reductions in parking spaces allowed by the City's zoning for projects that are proximate to transit, provide effective transportation demand management (TDM) measures, exhibit a mix of residential and commercial uses, or provide for affordable housing. . Most of the projects noted above have taken advantage of one or more of those parking reductions. Staff has worked to increase use of existing garages through the City's parking permit program, from 60% use to 80% use, and is working with a Downtown Parking Study Group to consider potential residential permit parking strategies. Staff is also evaluating the use of attendant parking and/or "stackers" to facilitate increased parking lot or garage capacity to minimize the space devoted to parking

4. Require Transportation Demand Management (TDM) Programs

Transportation Demand Management (TDM) programs have been proposed and approved in recent years for several projects, including 901 San Antonio, 2380 El Camino Real, 1601 California Avenue (Facebook, since departed), 3401 Hillview (VMWare) and the pending 355 Alma Street (Lytton Gateway). TDM programs have included such measures as providing transit passes (such as Caltrain "Go-Pass") for building occupants, Zip Cars or similar rentals, bike share programs, and/or vanpool or carpool priority, etc. TDM programs are required whenever parking reductions are requested or where required as environmental mitigation. The programs typically specify performance objectives, and monitoring information is provided for a minimum of two years or longer depending on mitigation thresholds of a TDM program,

5. Develop Monitoring Programs for Transit Use and TDM Effectiveness

The City is developing a database of TDM programs in order to gain better information about the types of programs used and their effectiveness, specifically the degree to which drive-alone travel is reduced. Baseline information is typically required of an applicant, and monitoring reports are to be submitted at regular intervals. To date, the projects with adopted programs either have not existed long enough to assess effectiveness or have not been constructed so measures are not yet implemented. One exception was the Facebook site, where ride-alone travel by employees was reduced to about 60% through a variety of company-sponsored bus shuttles, provision of GoPasses to staff, bike sharing, and TDM information measures.

6. Implement Pedestrian and Transit Oriented Zoning in Downtown

The City has not yet adopted a Pedestrian and Transit Oriented Development zoning district in the vicinity of the University Avenue Caltrain Station. Existing zoning does, however, allow for substantial intensity and mixed use development, but solutions to parking costs and impacts need to be evaluated prior to further encouraging downtown density. Potential high intensity development, including special zoning, for the City's Intermodal Transit Center on University Avenue, is in the initial stages of consideration on the property between the train depot and El Camino Real.

7. Develop Comprehensive Plan Programs to Support Increased Density near Transit.

The City's Comprehensive Plan currently identifies areas around the City's two transit station as appropriate for higher density and mixed use development. A Comprehensive Plan update will look at additional land use and transportation implementation strategies for increased housing density. The California Avenue-Ventura/Fry's area plan is underway and will address potential density options in that pedestrian and transit-oriented area. The City's Housing Element is in draft form and will focus housing options on areas near transit stations or corridors.

8. Modify Zoning Ordinance to Require Pricing Strategies to Reduce Parking

The City has not modified its ordinances to attach pricing strategies to parking. This issue will be part of the consideration for the downtown and California Avenue parking studies now underway and in the Transportation Element of the Comprehensive Plan Update.

9. Develop Plans for Transportation Improvements around California Avenue Caltrain Station

The City has developed a concept for streetscape improvements along California Avenue to provide for a "complete street" approach benefiting all modes of travel, enhancing pedestrian and bicycle safety, and enhancing the aesthetics of the streetscape. Plans are scheduled for completion in the fall and construction would begin in 2013 pending grant-funding allocations. The City's Bicycle and Pedestrian Transportation Plan designates Park Boulevard as a key facility providing access to California Avenue and the train station. Implementation of the Bicycle Boulevard will begin in 2012.The California Avenue-Ventura/Fry's area concept plan will also address land use, transportation improvements for the surrounding area, though their implementation timeframe is uncertain.

10. Bicycle and Pedestrian Plan and Infrastructure

a. Bicycle Plan and Programs: The City of Palo Alto is currently a designated Gold Level Bicycle Friendly City by the League of American Bicyclists, with bicycle use comprising an estimated 7% of commute trips to and from the city. The City's new Bicycle & Pedestrian Transportation Plan recommends a policy to double that rate by 2020 through aggressive implementation of the Plan. The City Council is scheduled to consider adoption of the new Bicycle and Pedestrian Transportation Plan in May 2012. This Plan is intended to enhance the use of bicycles for commuter, convenience, and recreational uses, with a goal of becoming a "Platinum" Bicycle Friendly Community during the next evaluation in 2015. Part of the Plan will include establishing baseline bicycle usage data and automated monitoring to provide updated bicycle use information, which will assist with calculations of emissions reductions. The Plan objectives and other anticipated programs include:

- Increasing bike boulevard mileage from 4.0 existing to 22.2 miles
- Increasing bike lane mileage from 41.6 existing to 44.3 miles
- Initiating new Enhanced Bikeways facilities such as "cycle tracks" with a target of up to 16.2 miles of new facilities
- Initiating a bike share program, beginning in Summer 2012 with 100 bicycles at up to one dozen sites throughout Downtown Palo Alto, Stanford University, and the California Avenue Caltrain Station
- Expanding bike parking "corrals" from the existing 6 downtown sites to approximately two dozen over the next two years.

b. Safe Routes to School: On March 1, 2012, the City initiated an expansion of its highly successful Safe Routes to School program, thanks to a two year grant from the Vehicle Emission Reductions Based at Schools (VERBS) program of the Santa Clara County Valley Transportation Authority. This grant provides funding for a broad range of efforts to reduce auto congestion and increase greener school commute choices, including comprehensive

Walk and Roll to School maps for every PAUSD school, updated and expanded bicycle safety education for students and parents, and school-level promotions of walking, biking, taking the bus/shuttle, and carpooling to/from school.

The VERBS grant will also fund the installation of automated bicycle and pedestrian counters near each school, which will allow the City to monitor seasonal trends in school commute choices. The program evaluation incorporated into the grant will include GHG reduction calculations for Palo Alto's Safe Routes to School program, based on a regional methodology now being developed by the Metropolitan Transportation Commission.

The tables below demonstrate the dramatic growth in cycling to PAUSD secondary schools since 2005, a very different picture than in virtually any other city in the state or nation:

PAUSD High Schools	Student population	Bikes	% Biking
Fall 2005	3450	580	16.8%
Fall 2011	3740	1410	37.8%
Increase	+290	+830	+21.0%

PAUSD Middle Schools	Student population	Bikes	% Biking
Fall 2005	2420	830	34.5%
Fall 2011	2680	1350	50.4%
Increase	+260	+520	+15.9%

11. Transit Use and Enhancements

The City sponsors and jointly funds the Crosstown Shuttle and Embarcadero Shuttle, providing transit service to students, seniors and others in areas not served by other public transportation. The number of riders on the City's shuttles has decreased somewhat (from 137,825 riders in FY2010 to 118,455 riders in FY2011) over the past year, due to cuts in funding that resulted in the Crosstown shuttle being served on an hourly basis, rather than twice per hour. Use of Caltrain, however, has increased substantially over the past year and over the past four years, with weekday ridership increasing from 4,589 average weekday boardings in 2008 to 4,796 average weekday boardings in 2010 and to 5,501 average weekday boardings in 2011, an increase of 20% during that period. The ridership increase is already approaching the Climate Protection Plan goal of 25% increase by 2015.

12. Electric Vehicle Infrastructure

The City has taken steps to facilitate the implementation of infrastructure, particularly charging stations, for electric vehicles (EVs). In the past year, five charging stations have been installed in City garages, with an additional six charging stations approved or pending approval through the development process. Charging stations are also incorporated into requirements for a couple of recent development proposals.

13. Traffic Calming Projects and Programs

In efforts to preserve residential streets from regional and commute traffic, the City implements traffic calming projects at neighborhood requests, which may include treatments such as speed humps and speed tables. Traffic calming projects also include roadway reconfiguration projects to introduce landscape island treatments, pedestrian refuge islands, and improved neighborhood access. Several projects are currently active or were completed during the 2011-12 fiscal year including:

- Charleston/Arastradero – Trial Restriping Project (El Camino Real to Gunn High School) - Active
- Greer Road (Oregon Expressway to Embarcadero Road) - Active

- College Terrace (Various Streets) - Complete
- N California Avenue (Middlefield Road to Embarcadero Road) - Complete

Long Term Goals (2012-2020)

- Reduce emissions by an additional 10% by 2020
- Increase Caltrain and other transit use by an additional 50% by 2020
- Convert discretionary in-town vehicle trips into walking and bicycling trips to help reduce transportation-related GHG emissions by 15% by 2020

What is Planned for Long Term Actions?

1. Evaluate Pedestrian and Transit Oriented Development Zoning Intensity, Including Along El Camino Real

The City's Comprehensive Plan update will include a recommendation for study of the south El Camino Real Corridor, and the Housing Element will focus new housing development in and offer recommendations for increased density near transit stations and along El Camino Real. Staff also expects recommendations about appropriate locations for some increase in height to accommodate housing, and for parking solutions for greater intensity in development downtown.

2. Develop Intermodal Transit Center and High-Density Public Transportation on Demand Project

The City is currently studying a planning and design proposal for the Palo Alto Intermodal Transit Center site to ensure a) connectivity between downtown and the Stanford Shopping Center and beyond, b) improvements to the transit flow through the Center and to University Avenue and El Camino Real, and c) a public component (theater, plaza, activity zone) to function with the private office and other uses on the site . The project is proceeding as a partnership between the City, Stanford, VTA, and a private developer.

3. Implement Grand Boulevard Improvement Strategies for El Camino Real

In 2011, the City of Palo Alto implemented an initial Grand Boulevard Initiative project at the Stanford Avenue and El Camino Real intersection to improve the aesthetics of the intersection and to enhance safety for bicyclists and pedestrians, many of whom are students crossing to and from school. The California Avenue Streetscape Improvements Project will also provide an upgraded link from El Camino to the Caltrain station. Other projects are being contemplated for future grant funding and implementation, such as at Charleston/Arastradero and El Camino Real. The City staff is coordinating with adjacent cities in a study of the boulevard and necessary infrastructure to serve future development. The City's Rail Corridor Study draft suggests improved connectivity at several points across El Camino Real and identifies the El Camino Way area as a potential neighborhood center node for future detailed analysis.

4. California Environmental Quality Act (CEQA)

The City's plans and programs for El Camino Real, the Rail Corridor, downtown, California Avenue, and the Bicycle and Pedestrian Transportation Plan will help to gain certification of the City's Climate Protection Plan in order to streamline preparation of CEQA documents with respect to cumulative Green House Gases. Infill development around transit as part of adopted plans will also help minimize traffic and air quality analyses otherwise needed for CEQA compliance.

Green Building

The City's Green Building Program was initiated in 2003 with requirements for Green Building checklists at early stages (Architectural Review) of an application to ensure an integrated

approach for projects. In 2007, zoning ordinance changes outlined voluntary compliance criteria, followed in 2008 by a Green Building ordinance requiring Green Point Rated (Build It Green) compliance for residential projects and Leadership in Energy and Environmental Design (LEED) Silver level compliance for non-residential projects meeting certain size thresholds. The City of Palo Alto established itself as a national leader for its progressive, high-level program for a new generation of efficient buildings in Palo Alto, which are environmentally responsible and healthy places in which to live and work.

Following the 2008 ordinance, City staff has recommended updates to the ordinance to Council each year, including addition of Home Energy Rating System (HERS) requirements for existing buildings, among other requirements. In 2011, with the State's adoption of the CalGreen building codes, the City's local amendments to CalGreen required a higher level (Tier 2) compliance as mandatory (approximately LEED Silver level plus 15% additional energy efficiency for buildings beyond Title 24 requirements. The City has most recently become the nation's first city to pilot LEED for Neighborhoods as a voluntary program, intended to measure the success of a project in meeting community goals for walkability, access to transit, provision of mixed uses and services, and open space design, etc.

Short and Medium Term Actions Update (2007- 2011)

- Leadership and Energy and Environmental Design (LEED) "Silver" certification or equivalency was required in 2007 for new City buildings and new private buildings over 5,000 sf; increased energy efficiency 15% beyond state mandatory level;
- Between 2007 and 2009, the program went from voluntary to mandatory and including both residential and commercial development;
- Staff continues to work with Utilities staff on publicizing energy efficiency and solar rebate programs;
- A Sustainability Planner was hired to implement program within Current Planning section;
- New single-family residential construction is required to attain a minimum level of green building compliance (70 GPR points, with increasing points required for larger homes, etc.).
- Compliance levels have been monitored through December 2011.
- The California Energy Code (CalGreen) was adopted by reference in 2010, with local amendments for higher "tiered" levels of increased energy efficiency and thresholds.

The City has monitored its progress with annual updates to the codes through 2011, including annual tracking of the numbers and square footage of completed green building projects as well as the number of LEED and Green Point Rated certifications and point ratings achieved.

In FY 2011, the Department processed 961 permit applications under the Green Building Program, an increase of approximately 73 percent from the previous year. In FY 2011, 82 percent of survey respondents rated the City of Palo Alto "good" or "excellent" on water and energy preservation.

The Green Building Program has influenced over $187 million of project valuation and 1,249,758 square feet of "green" construction, and it is estimated that a little over 2,000 people are either working or living in green buildings throughout the City. Prior to the City's ordinance, as few as six green building projects were on record throughout the City. At the end of FY 2011, over 240 had been completed or were under construction. Projects are using one of the following standards: Leadership in Energy and Environmental Design (LEED), Build It Green GreenPoint Rated (GPR), or the California Green Building Code with locally adopted enhanced measures (CALGreen).

In FY 2011, the Department rolled out two additional sustainability initiatives. The Department is conducting the first LEED-ND pilot program (LEED for Neighborhood Development) in the nation for assessing a development site's ability to qualify as a sustainable neighborhood project, including features that reduce dependence on automobile use, increase walkability, and

encourage healthy living. The Department also rolled out energy use disclosure requirements for existing buildings undergoing small renovation work to better understand the existing buildings' current performance and areas where education, policy, and programs can be influential in reducing usage.

FY 2011 Statistics

- Green Building permit applications processed: **961**
- Green Building valuations subject to mandatory regulations: **$187,725,366**
- Green Building square feet subject to mandatory regulations: **1,249,748** square feet
- Energy savings: **3,399** kBtu/yr
- Water reduction: **2,119,485** gallons
- Waste diversion from landfill:) **28,177** tons
- CO_2 emissions reduction: **2,818** tons

Zero Waste

The community's Zero Waste goals of achieving 73 percent diversion by 2011 and striving to reach Zero Waste (virtual elimination of waste to landfills) by 2021 have a significant impact on greenhouse gas emissions. The Climate Protection Plan considered three types of greenhouse gas emissions related to solid waste:

1. Fugitive emissions of landfill gas from the Palo Alto Landfill that are not captured and flared by the landfill gas control systems, thereby releasing methane into the atmosphere. These emissions are calendar year-based and are calculated using measured volumes of landfill gas flared and assuming a capture rate percentage for the control systems.

2. Life cycle fugitive emissions of landfill gas that are not captured and flared by landfill gas control systems, thereby releasing methane into the atmosphere. These emissions were calculated using an ICLEI's Clean Air and Climate Protection (CACP) software. Inputs to the software are the total tons of Palo Alto solid waste landfilled and the amounts of paper products, food waste, plant debris, and wood/textiles in the landfilled waste.

3. Emissions from landfilling of recyclable materials, where failure to recycle the materials results in emissions from manufacturing using virgin materials that are greater than the emissions that would have resulted from recycling the materials. These emissions were calculated using the total tonnage of Palo Alto solid waste landfilled, the results of a 2006 Palo Alto Waste Composition Study, and US EPA emissions factors.

A total of 69,491 tons of Palo Alto solid waste was sent to landfills in 2005. The most recent landfill tonnage figures from the State of California indicate that the landfilled tonnage in 2011 totaled 32,434 tons, a decrease of 53 percent. The 2010 State of California annual report provides a Palo Alto per capita disposal rate, in pounds per person per day, which is equivalent to a diversion percentage of 80 percent. Palo Alto has exceeded its goal of 73 percent diversion by 2011.

A primary factor responsible for the decrease in landfilled waste from Palo Alto is the new Zero Waste services that are included in the collection and processing contract with GreenWaste of Palo Alto. GreenWaste's new services in July 2009 included a program for collecting and composting commercial food waste and compostables, an increase in the materials collected through the single stream recycling program, sending all construction and demolition debris boxes for processing and recycling, and increased efforts to improve commercial sector participation in the recycling and composting programs. Other factors in the decrease include Palo Alto's Construction and Demolition Debris Recycling and Reuse Ordinance, Zero Waste program outreach on recycling and waste prevention, and the economic downturn.

The table below provides a comparison between the solid waste-related greenhouse gas emissions estimates for 2005 and 2011.

Emissions Source	2005 Emissions (metric tonnes)	2011 Emissions (metric tonnes)	Difference (metric tonnes)	Difference (percent)
Palo Alto landfill fugitive emissions	6,811	6,248[2]	-563	-8%
Life cycle fugitive emissions	24,823	11,586	-13,237	-53%
Landfilling of recyclable materials	54,838	25,595	-29,243	-53%
Total	86,472	43,429	-43,043	-50%

The Palo Alto landfill fugitive emissions figure for 2010 was calculated using the volume of landfill gas captured by the landfill gas controls system and assuming a 75 percent capture rate. Life cycle fugitive emissions and landfilling of recyclable materials emissions for 2011 have been calculated using the ratio of waste landfilled in 2011 to waste landfilled in 2005. There are several factors that may introduce error into the estimates for life cycle fugitive and landfilling of recyclable materials. The 2005 estimates relied on a 2006 Waste Composition Study, and the method used for the 2011 estimate assumes that the composition of Palo Alto's waste has not changed since that study. However, it should be expected that the factors responsible for the decrease in Palo Alto's landfilled waste tonnage, such as the Construction and Demolition program and the commercial compostables program, also affected the composition of the waste. A new Waste Characterization Study is currently being planned for completion in FY 2013. Another factor to consider is that the 2005 baseline emissions for solid waste did not include calculating emissions from the PASCO collection fleet, or from processing activities such as SMaRT Station operation and composting. The commercial compostables program involves additional vehicle routes for collecting the compostable materials, as well as composting of the materials at Z-Best in Gilroy. Emissions from these activities would be expected to offset some of the reduction in emissions that result from the commercial compostables materials being diverted from landfill disposal. Staff intends to develop greenhouse gas emissions estimates for solid waste collection and processing activities during FY 2013.

6. Education and Motivation

The threat and risks associated with Climate Change requires not only the government to require or incent more sustainable behaviors to protect our resources and environment, but climate change will also necessitate behavior changes that can not be mandated or required. For that to happen, the City needs to engage and empower the Community to understand what it may mean to become more sustainable in their everyday choices. Staff collaborates with the community on many levels and on many projects to promote sustainable behaviors. This report highlights two

[2] US EPA's greenhouse gas mandatory reporting program requires that landfill gas fugitive emissions be calculated and reported using two different methods. One method uses the volume of landfill gas captured by the control system and assumes a standard capture rate, resulting in estimated emissions of 24,570 metric tonnes. The other method uses the total tons of waste that have been placed in the landfill since 1960 to calculate a theoretical total amount of landfill gas that the landfill would produce. It then subtracts the amount of landfill gas captured by the control systems from the total theoretical value and assumes that this remaining volume of landfill gas was released to the atmosphere. This method estimates Palo Alto landfill fugitive emissions for 2010 to be 58,143 metric tonnes. Both of these numbers have been reported to US EPA. For the purpose of the Climate Protection Plan goals, staff is using the methodology specified by The Climate Registry, which results in the fugitive emissions number reported here. The number reported is for 2010, which is the most recent estimate available.

areas of collaboration with include the Community Environmental Action Partnership (CEAP) and the Cool City Challenge.

Internally, staff has formed a Green Team who also has engaged many departments on various projects and activities, including design thinking exercises at IDEO, hand-on practice to upgrade irrigation controls, the design and execution of a demonstration garden and "green bag" lunch series on sustainable topics.

Community Environmental Action Partnership (CEAP)

Community Environmental Action Partnership (CEAP) was formed with the mandate to collaborate on important environmental issues, including climate protection. It is CEAP's mission to bring together various segments of our community to share knowledge, build understanding, leverage resources and both create and employ innovative environmental solutions. CEAP was formed as a result of the recommendations made by the Green Ribbon Task Force and the City of Palo Alto's Climate Protection Plan, CEAP has now become a network of informed community members lead by segment leaders ("liaisons") who use the hub and spoke model to engage to the community. CEAP is where ideas and solutions to our environmental issues are discussed, communicated and implemented.

Cool City Challenge

The City of Palo Alto has been approached to participate in a grass-roots, community lead program called the Cool City Challenge (Challenge) which is in the preliminary stages of development, including fundraising. This program is being lead by David Gershon, an internationally recognized expert with a proven track record in community-based behavior change, who is also the author of the "Low Carbon Diet" and "Social Change 2.0".

The goal for the Challenge is to scale up a system, based upon the "Low Carbon Diet" model, of small, neighborhood based action groups of 5-8 neighbors each to achieve dramatic carbon reduction, vibrant livability and green prosperity. The program could start in three early adopter American cities (Palo Alto, Davis and Sonoma, CA) and three neighborhoods in Sao Paulo, Brazil of comparable size to the American cities. The ultimate objective of the Challenge is to widely disseminate the lessons learned and tools developed through the first participating cities. If the City chooses to participate, the City of Palo Alto would also have the opportunity to become a model city and highlight many of our programs through published case studies and in a documentary film that is being developed as part of the Challenge. The project is intriguing, but there are many policy questions we will need to explore as part of any decision to participate.