City of Palo Alto (ID # 5693)

City Council Staff Report

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Summary Title: Earth Day Report (EDR15)

Title: Annual Earth Day Report Study Session and Sustainability/Climate Action Plan (S/CAP) Update

From: City Manager

Lead Department: City Manager

This is a Study Session report and requires no Council Action.

Executive Summary

As the heart of the region that drives the eighth largest economy in the world, what is created in Palo Alto has influence far beyond its borders. Palo Alto has made impressive—and in some cases remarkable—progress toward reducing its carbon impacts, greenhouse gas emissions, and resource consumption since establishing its first Climate Protection Plan in 2007.

Bold actions like carbon neutral electricity, and systematic improvements ranging from water conservation and EV readiness to green building ordinances and safe routes to schools, have put Palo Alto in the forefront of sustainability leadership internationally. Based on annual data for the calendar year 2014, the community of Palo Alto has cut its overall greenhouse gas (GHG) emissions by an estimated 32% from 2005 levels and 37% from 1990 levels[1] [2]. It has energy efficiency initiatives underway for further reductions at City facilities and in the community, and the City of Palo Alto Utilities (CPAU) is increasing renewable power sourcing and encouraging local solar generation. Having passed the initial climate protection goal set by Council in 2007 (20% reduction in 1990 levels of GHG emissions by 2012), the City is in the position to establish new goals that not only generate cost savings but set the conditions for Palo Alto to take a global leadership position, commit to a low- or zero-carbon future, and create a roadmap to that future.

[1] GHG reductions were overstated in the 2014 Earth Day Report, due to a transcription error; the correct figures should have been 29% and 35%, respectively, not 29% and 41%.

[2] These figures are net of RECs (Renewable Energy Certificates), and reflect estimates of transportation emissions that were still being updated at the time this report was prepared, and do not include "scope three" emissions. See discussion below.

But, like most cities, it is a long way from meeting the challenge of the looming climate crisis, in both its global and local aspects. Our present GHG reduction trajectory will not take us to California's stated goal of 80% reduction by 2050—much less to the steeper reductions that will be required if we adopt more aggressive targets. Meeting those climate goals will require courage, focus, and a commitment to data-driven agility that is rare in most organizations. And it will require adequately resourcing the sustainability and climate commitments the City decides to make.

While cities around the world ratchet up their own sustainability initiatives, Palo Alto will need to act boldly in order to maintain its legendary leadership position—and to ensure the well-being of this community in the face of the challenges ahead. Specifically, Palo Alto will have to find ways to address GHG emissions from the use of natural gas and significantly reduce the use of single occupant automobiles in order to make meaningful progress toward reducing carbon emissions. In the context of California's worsening drought there will also be increasing need to reduce water consumption, address risks of reduced hydroelectric supplies and adapt to the other potential impacts of climate change. If we're smart, we can use the climate crisis to catalyze the community around a better life as well as a better environment.

Background

The City of Palo Alto is poised to initiate a series of ambitious programs in order to appropriately respond to changes in climate, markets, and the needs of its Community. The drivers for this work are varied, and come from a range of authoritative sources:[3]

- **Science:** The International Panel on Climate Change (IPCC) has determined that "we risk severe, pervasive and irreversible impacts" from climate change, and need "substantial" emissions reductions (of 40-70% or more) by mid-century. The International Energy Agency has asserted that 80% of proven fossil fuel reserves must "stay in the ground" if the planet is to avoid the worst of climate projection.

  Meanwhile, climate disruption records continued to be broken in 2014, which was the warmest year recorded since 1880. Munich Re America reported that "Insured winter storm losses in the United States in 2014 were the highest in eight years, at $2.3 billion, while insured losses due to severe thunderstorm events exceeded $10 billion for the sixth year in a row." [4]

  The UN World Meteorological Organization (WMO)[5] reported that high ocean temperatures contributed to exceptionally heavy rainfall and floods in many countries and extreme drought in others. Twelve major Atlantic storms battered the United Kingdom in early months of 2014, while floods devastated much of the Balkans throughout May. The monthly precipitation over the Pacific side of western Japan for

[3] From the Office of Sustainability's Sustainability & Climate Action Plan S/CAP FAQ's

[4] http://www.claimsjournal.com/news/national/2015/03/04/262111.htm

[5] http://www.un.org/apps/news/story.asp?NewsID=49970#.VRm-yvnF-So

August 2014, meanwhile, was 301 per cent above normal – the highest since area-averaged statistics began in 1946. At the same time, crippling droughts have struck large swathes of the continental United States while Northeast China and parts of the Yellow River basin did not reach half of the summer average, causing severe drought.

- **California:** The State of California, in AB32, committed the state to reduce its greenhouse gas emissions by 20% from 1990 levels by 2020, and set an aspirational goal to reduce emissions 80% by 2050.[6] Recent revisions to California's Title 24 will require that all new residential buildings be Zero Net Energy (ZNE) by 2020, and new all commercial buildings by 2030; this will apply to retrofit projects above certain thresholds.[7] Meanwhile, Governor Brown has challenged the state to Increase the renewable portfolio to 50% of needs, reduce petroleum up to 50% and double the efficiency of existing buildings by 2030.[8]

- **Europe:** The European Union has adopted an emissions reduction target of 40 percent below 1990 levels by 2030. The United Kingdom has committed to reduce its emissions by 50 percent below 1990 levels within the 2022–2027 timeframe, and Germany has set 2030 emissions target of 55 percent below 1990 levels.

- **United States:** President Obama's March 19 2015 Executive Order[9] requires the federal government to cut GHGs by 40% by 2025 from 2008 levels and increase Federal renewable energy sources to 30%; estimated savings: $18 billion. Several major federal suppliers, including Lockheed Martin, General Electric, and IBM, announced new voluntary GHG reduction commitments; IBM says it will cut energy-related greenhouse gas emissions 35% (against 2005 levels) by 2020.[10]

- **Other cities:** Cities around the world have become the leaders on climate initiatives; more than 17 cities in the Climate Neutral Cities Alliance **have already declared the goal of carbon neutrality by 2050** (which they are defining as 80% reduction in GHGs by 2050)—and Copenhagen and Melbourne have committed to 100% emissions reductions by 2025, while Burlington VT[11] and other cities have already achieved 100% renewable energy supply.

[6] *First Update to the Climate Change Scoping Plan: Building on the Framework Pursuant to AB32--The California Global Warming Solutions Act of 2006*
http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf
[7] http://cleantechnica.com/2014/04/15/californias-net-zero-energy-building-will-reshape-us-construction-industry/
[8] http://gov.ca.gov/news.php?id=18828
[9] https://www.whitehouse.gov/the-press-office/2015/03/19/executive-order-planning-federal-sustainability-next-decade
[10] http://thinkprogress.org/climate/2015/03/19/3635953/obama-federal-ghg-emissions-executive-order/
[11] http://thinkprogress.org/climate/2014/09/15/3567307/vermont-renewable-power/

City	Measure	Results
Benicia, CA[12]	Benicia has budgeted $625,000 to incentivize businesses to make resource and management improvements to reduce energy, water, solid waste, recycling, and fuel costs.	As of November 2013 the program has assisted ten businesses for annual cumulative annual savings of nearly $140,000 while reducing annual GHG emissions by 135 metric tons.
New York City[13]	In 2007, New York committed to reducing emissions and by prioritizing efficient modes of travel and broadened its commitment in 2011 to include equity, by expanding travel choices	Cycling: largest bike share system, with 6,000 bikes serving up to 40,000 daily trips. Electric Vehicles: City fleet uses 600 EVs and has 153 charging stations. City Council passed a law that requires 20 percent of new off street parking to be built "charger ready".
Fort Collins, CO[14]	Fort Collins Utilities is central in the public/private FortZED partnership to reduce 40MWh (15 MWh residential, 25 MWh commercial) and develop a new business model to help customers access a broader range of energy services—efficiency improvements, distributed renewable energy options, and demand response—all offered as a bundled package of integrated utility services.	Unanimous approval from the City Council for a climate plan that "requires all sectors of the city's economy to aggressively ratchet down greenhouse gas pollution. The Council set benchmark reductions from 2005 levels of 20 percent by 2020; 80% by 2030; and 100% by 2050."
Copenhagen, Denmark[15]	Carbon neutral and 75% modal share for bicycles to work and educational institutions by 2025	Plan adopted and underway
Helsinki, Finland[16]	Car-free by 2025	Kutsuplus "dynamically re-routable" shuttle deployed; first "mobility operator" formed (23 company consortium); collaboration with Palo Alto and Silicon Valley in development.

[12] Climate Change Scoping Plan: *Chapter III: California's Approach to Climate Change*

[13] PlaNYC Progress Report 2014: http://www.nyc.gov/html/planyc2030/downloads/pdf/140422_PlaNYCP-Report_FINAL_Web.pdf

[14] FortZED http://fortzed.com/; http://www.environmentcolorado.org/news/coe/fort-collins-sets-gold-standard-climate-action

[15] Good, Better, Best: The City of Copenhagen's Bicycle Strategy 2011-2025 kk.sites.itera.dk/apps/kk_pub2/pdf/823_Bg65v7UH2t.pdf

[16] Kutsuplus https://kutsuplus.fi/home

There are multiple reasons for Palo Alto to pursue the sustainability and climate initiatives discussed here: to make a small contribution to reducing global emissions; to provide a leadership example to other cities; to save the City and community money through improved efficiency; to reduce future risk; and balance fiscal responsibility with other community values.

Solutions appropriate for Palo Alto will need to address specific local economic considerations and community needs. This in turn requires understanding the specific needs of the City and community related to energy and resource consumption, transportation, development and the considerations of daily life. And it requires the data systems that provide this view into the systems that produce the experience of living and working in Palo Alto.

Discussion

Palo Alto's climate risks are significant, and are the most difficult kind to address: low likelihood, high potential impact. It can be hard to justify significant investment in risks that are seen as small or distant. It's certainly not prudent to go "all in" on such risks. But it's also not prudent to ignore risks with impacts as potentially large as significant, long term disruption of the climatic regime on which California's prosperity depends.

Fortunately there are ways to address these concerns—with considerable near-term benefit. Efficiency, for example, can be seen as performance improvement and innovation, not sacrifice. Approached intelligently, Palo Alto can approach the climate challenge in ways improve City's governments operational and financial effectiveness, while improving quality of life for all Palo Altans, —with actions that make sense both by today's criteria and by the criteria that one of the "low risk, high impact" futures would require.

This will require cooperation across City departments and diverse community stakeholders, in which staff and stakeholders understand their roles within their individual domains of influence, and connect with partners outside to do the larger work together.

This discussion includes:

- Sustainability and Climate Action Plan (S/CAP)
- GHG Emissions from City Operations
- GHG Emissions from City and Community Activities
- GHG Emissions from City of Palo Alto Utilities
- Water Consumption and Considerations
- Highlights and Accomplishments from City Departments
- Future Vision
- Next Steps

<u>Sustainability and Climate Action Plan (S/CAP)</u>

Every major city in our region, and in the world, has made a commitment to meet the challenge of climate change with local solutions to a global issue. Palo Alto led the way with one of the

nation's first Climate Protection Plans in 2007, and is now poised to take the next step in climate leadership.

The Sustainability and Climate Action Plan (S/CAP) is Palo Alto's ambitious plan to create a prosperous, resilient city for all residents. It supports Palo Alto's leadership position on climate protection and shows how the City will meet—or exceed, state requirements for GHG emission reductions.

The City has named this initiative the Sustainability and Climate Action Plan, not the Climate Action Plan, as a reminder that it's about water and ecosystem function as well as climate and tons of GHGs. It's also an organizing frame for considering the future we want—and, as such, it will need to integrate with the Comprehensive Plan and other City initiatives now underway. But, in contrast to most City initiatives, it will attempt to explicitly link the City's more traditional approach toward safely achievable goals with a "reverse engineered" future vision—planning backwards from "impossible" goals to the present—and ensuring that those two approaches meet.

Together with a world-class consulting team, staff has held an invitational expert charrette[17], convened an open call community "Ideas Expo" (at which more than 75 people presented 18 poster sessions and other ideas), convened an "executive advisory board", provided interim briefings to City Council on developing themes, and is planning a community climate summit, and participation in relevant CompPlan events this year.

Staff and consultants are exploring three "goals scenarios":

- California's aspiration of 80% reduction by 2050 (80x50);
- a more aggressive goal of 80% reduction by 2030 (80x30); and
- the "California Moonshot": 100% carbon neutral by 2025 (100x25).

The S/CAP team is testing these challenging scenarios with a disciplined process:

- Surveying the world to identify best practices and performance goals
- Generating a range of potential technology and policy options
- Filtering these options for technical, financial, political, behavioral and legal feasibility
- Developing a series of implementation "roadmaps" for meeting each of the potential goals, along with prospective budgets—and financing strategies—for achieving those goals
- Presenting these roadmaps to the community and Council as part of a grounded conversation to determine the plan and path we will choose.

[17] Charrette: A public meeting or workshop devoted to a concerted effort to solve a problem or plan the design of something.

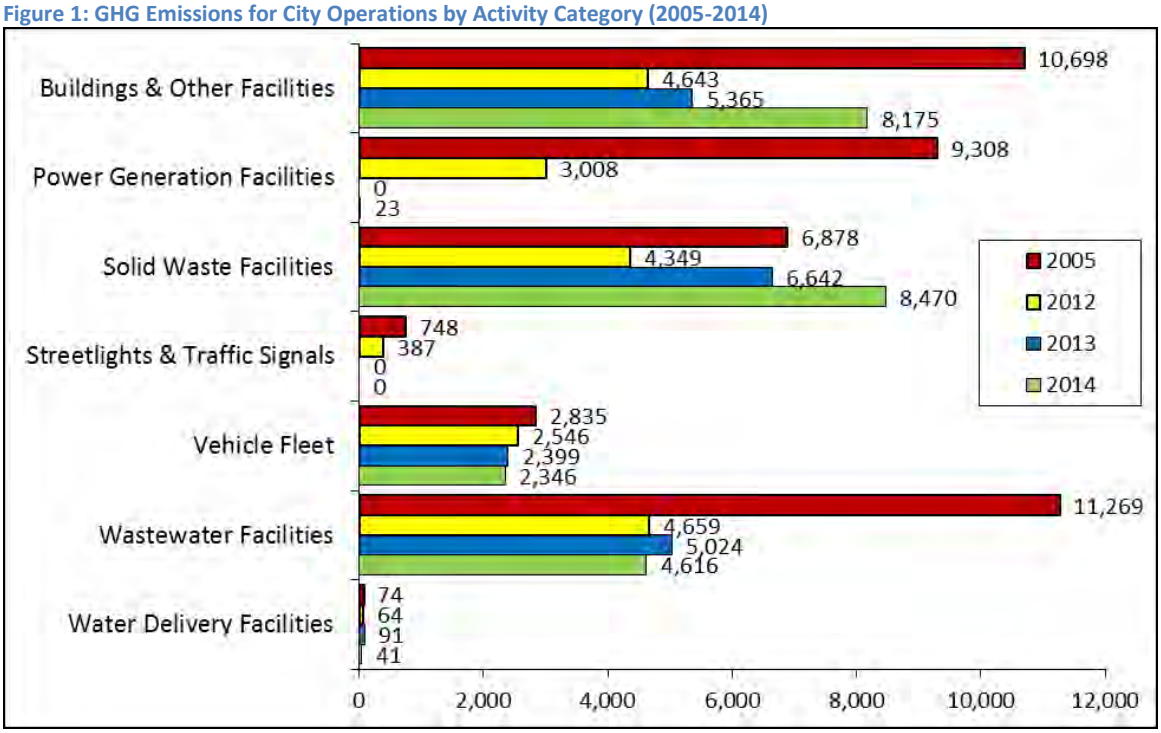
Staff has not yet determined whether the Moonshot—or any of these goals—is achievable either financially, politically or socially. But these challenges affect the questions the S/CAP team is asking, and the questions that are asked affect the answers we find.

Some of the key strategies under evaluation for Palo Alto's pathway to a low-carbon—or no-carbon—future include radical resource efficiency, comprehensive electrification ("fuel switching" from fossil fuels to carbon-neutral electricity), local renewable energy generation and distributed energy storage, rethinking mobility to provide more convenient transportation with less congestion, forthrightly facing water risk, bringing municipal operations—from facilities to fleets—in line with Council policy and community vision, exploring future business implications for CPAU as it adapts to new conditions, and broadening our focus from "sustainability" —a broad notion of "do no harm"—to "adaptation" —expanding our capacity to respond and thrive in the face of shocks and stresses like drought and sea level rise—to "regeneration" —building the health and vitality and the ecosystems, both local and far-flung, that support it.

GHG Emissions from City Operations

Overall the performance of City Operations is mixed for 2014, with steady declines in emissions from Vehicle Fleet, Wastewater Facilities, and Water Delivery Facilities. There were increases in emissions for Buildings & Other Facilities and Solid Waste Facilities, and the City will explore action items in these areas.

Figure 1: GHG Emissions for City Operations by Activity Category (2005-2014)



Source: CPAU: GHG Emissions Analysis (February 2015)

The increased Facility emissions correspond to increases in energy and natural gas consumption during 2013 and 2014, which is due in part to large construction projects across the City, and several buildings being returned to service. Staff expects that the improvements made to buildings and systems will result in improved resource and GHG performance in years to come. The past three years of consumption and cost data for City Operations shows steady increase in electricity consumption across all facilities, with slight declines in gas and water usage. To identify opportunities to optimize the portfolio of buildings, staff recommends that the City conduct regular resource efficiency audits to reduce any non-essential consumption and spending.

Year	Electricity (kWh)	Electricity Cost	Gas Usage (Therms)	Gas Cost	Water Usage (CCF)	Water Cost	Annual Totals
2014	29,713,565	$3,126,178	891,292	$938,600	242,336	$1,893,504	**$5,958,281**
2013	28,809,795	$3,193,814	842,020	$832,556	283,943	$2,137,872	**$6,164,243**
2012	29,037,416	$3,331,729	827,295	$780,787	230,204	$1,650,344	**$5,762,860**
3-Year Totals		$9,651,721		$2,551,942		$5,681,720	

Source: CPAU: All City Accounts (2012-14)

Some performance-driven upgrades have been performed to reduce energy consumption and manage resources more effectively as Public Works renovated several properties, specifically

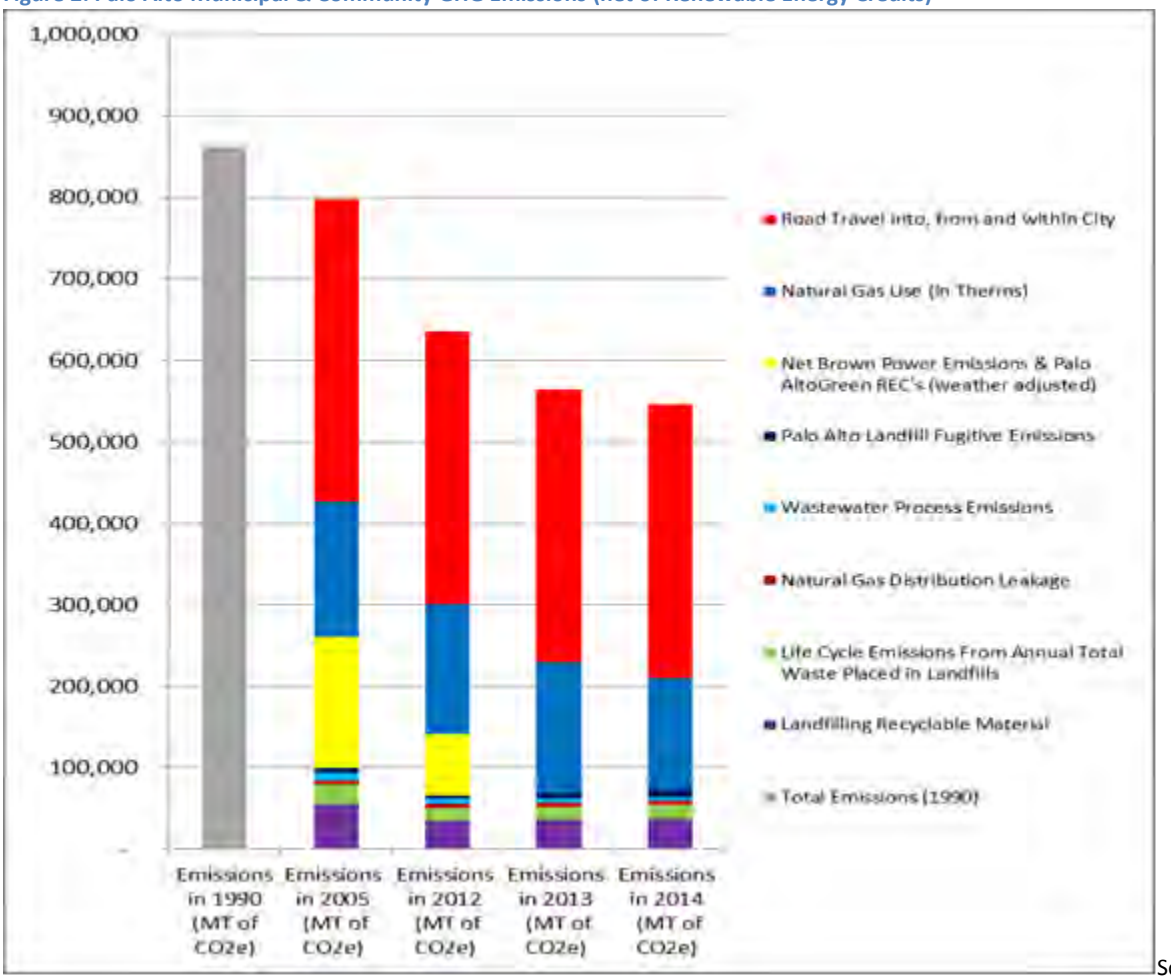
the LEED construction of the Mitchell Park Library and Community Center (which is awaiting LEED platinum certification) and the Rinconada Library expansion, low-water landscaping at Eleanor Pardee Park which is projected to save 360,000 gallons of water per year—from a 2014 baseline of 3.3 million gallons, and a storm water runoff mitigation program at Green Street in the Southgate Neighborhood.

Combined GHG Emissions from City & Community Activities

Combined City and community emissions continue to decline, as a result of CPAU efficiency programs and exogenous factors, though there has been some fluctuation in City facility resource use as a result of various construction programs that have taken buildings out of service and back into service.

Figure 2 shows the greenhouse gas impacts across the Palo Alto Community:

Figure 2: Palo Alto Municipal & Community GHG Emissions (net of Renewable Energy Credits)[18]



Source: 2014 City Accounts Utilities Usage

The emissions shown are net of the RECs purchased by CPAU and reflect the emissions that will be reported (after third-party verification) to The Climate Registry according to the Electric Power Sector protocol.

(Note: Road travel emissions in this chart use a calculation generated by transportation consultants Fehr & Peers in 2012 for 2013 and 2014 as well. New analysis of 2014 transportation emissions is now underway, and will be updated for the April 20 study session.)

[18] Net Brown Power (fossil fuel-based) electricity emissions taper down and are not present in 2013 because the CPAU began purchasing RECs to offset the all GHG emissions for this power source. This will continue as CPAU's carbon neutral energy strategy until 2017, when the utility has secured renewable energy contracts for a "native" carbon made up of renewable and hydroelectric power, and thus carbon neutral without application of RECs. But the purchase of RECs may have to be resumed if hydropower cannot provide sufficient electricity because of continued drought conditions.

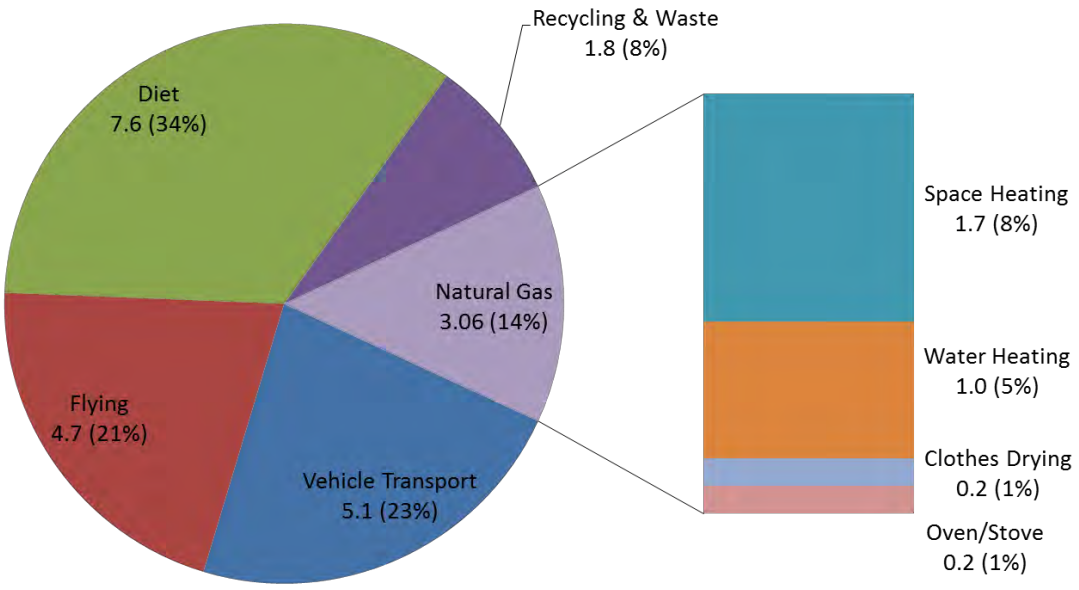
The majority of these emissions are not from City fleet vehicles—and Fleet Services is reporting a steady reduction in fuel consumption and emissions over the past years; these are emissions from residents, workers, and people moving to and from, and doing business in, Palo Alto. There's no getting around the fact that a large percentage of emission reductions will have to come from changing behavior and reducing vehicle miles traveled (VMT). The State's fuel efficiency standards and clean fuel initiatives will reduce vehicle emissions somewhat over time, as will a shift from fossil fuels to hybrid and electric vehicles. The City can't control the cars, which will continue to get more efficient and more electrified, but it can influence the driving environment. The S/CAP is exploring multiple strategies to help people shift from using single occupancy vehicles (which dominate the commute and around town traffic flows) to a comprehensive suite of attractive mobility options. The Office of Sustainability is working with its partners in the Planning Department, Development Services, Fleet Services, regional business and regional agencies, and the community to envision a spectrum approach for transforming mobility within the City, inspired by Finland's "mobility as a service" (MaaS) initiatives.

The second largest component of the community's GHG emissions is Natural Gas, which is discussed under "Electrification" below.

This report does not include such significant "scope three[19]" emissions (indirect emissions not owned or controlled by the reporting entity) as impacts of community air travel and purchases, and most notably of food. These have not been included in prior staff reports, but, as shown in Figure 3, they represent significant emissions sources. These sources are much larger than the transportation and natural gas emissions on which discussion has focused to date, and Council may want to discuss how to address them in the S/CAP and subsequent reports.

[19] The GHG Protocol further categorizes these direct and indirect emissions into three broad scopes: Scope 1: All direct GHG emissions. Scope 2: Indirect GHG emissions from consumption of purchased electricity, heat or steam. Scope 3: Other indirect emissions, such as the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g. T&D losses) not covered in Scope 2, outsourced activities, waste disposal, etc. http://www.ghgprotocol.org/calculation-tools/faq

Figure 3: Example Estimated Annual Household GHG Emissions (MT CO2e)



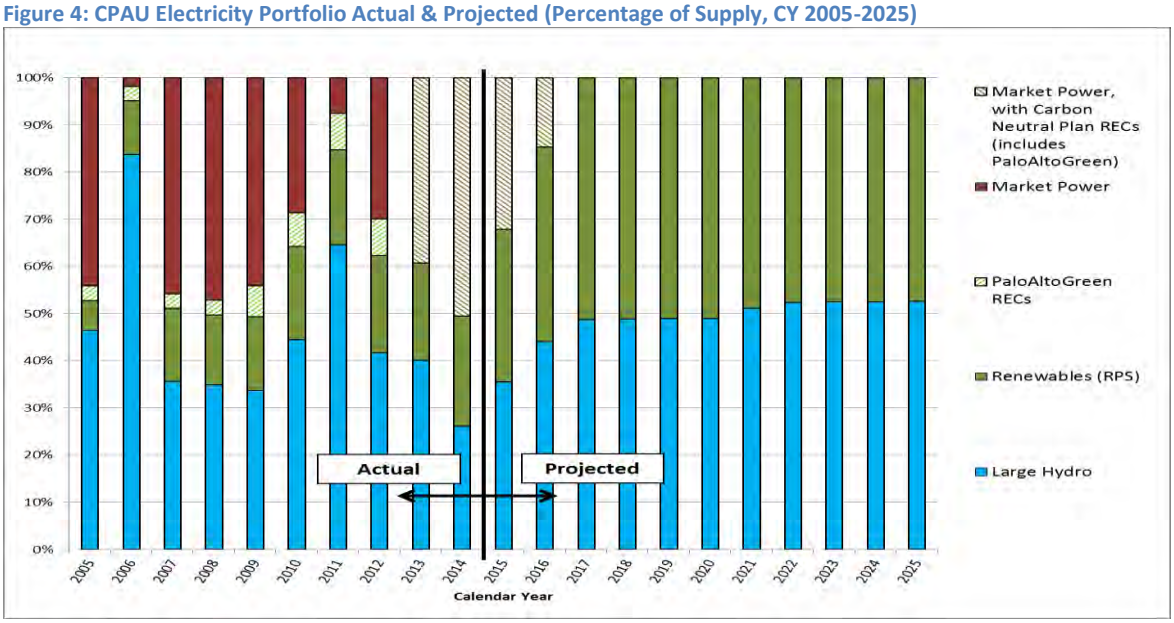
Source: CPAU

GHG Emissions from City of Palo Alto Utilities

Palo Alto's biggest source of leverage to increase resource efficiency and reduce carbon impacts resides with its largest municipal business entity: City of Palo Alto Utilities (CPAU).

In 2013, the Palo Alto City Council committed to pursuing only carbon-neutral electric resources. CPAU is currently achieving "carbon neutrality" for its electricity by purchasing RECs to offset the GHG impacts of the market power in its energy mix, as a bridge to 2017 when CPAU electricity will be generated entirely from hydroelectric and renewable sources, with no RECs needed except in the event of shortfalls such as droughts.

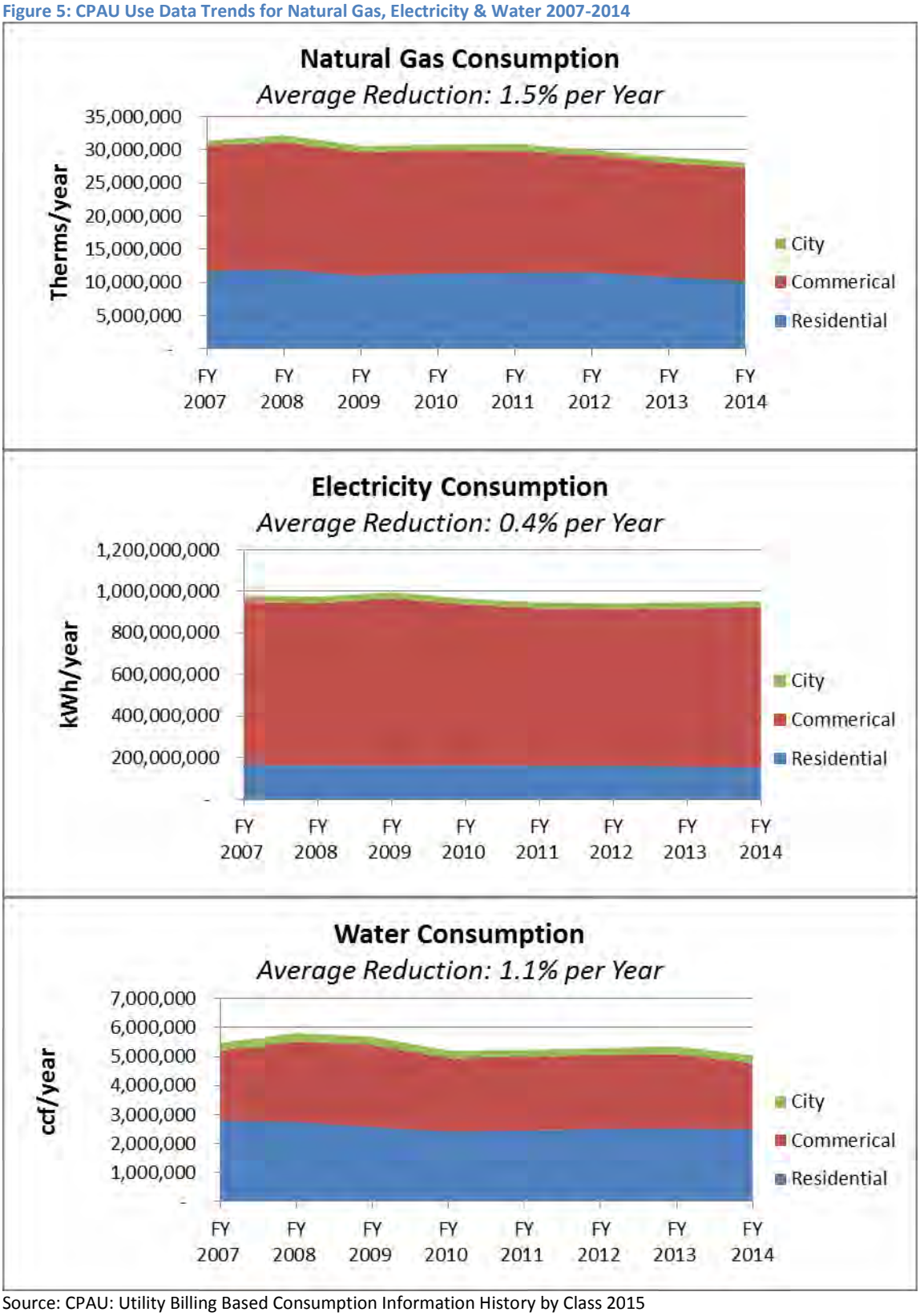
Figure 4: CPAU Electricity Portfolio Actual & Projected (Percentage of Supply, CY 2005-2025)



Source: CPAU: Resource Management

CPAU reports cumulative electricity savings of 5.2% and cumulative natural gas savings of 2.6%--with a combined reduction of 15,233 MT CO_2e—from 2006-2014. These savings are reductions from the total energy load for all Municipal, Residential, and Commercial accounts. **While respectable, these reduction rates are not sufficient to reduce natural gas 80% by 2050.**

Figure 5: CPAU Use Data Trends for Natural Gas, Electricity & Water 2007-2014

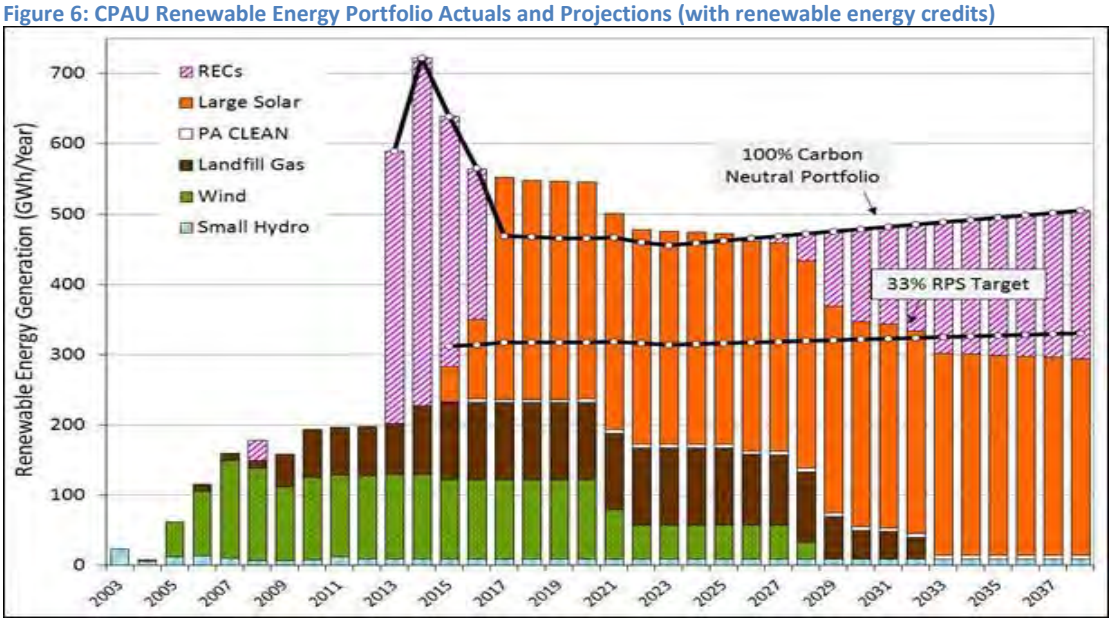


Source: CPAU: Utility Billing Based Consumption Information History by Class 2015

CPAU purchased PaloAlto**Green** RECs to offset a percentage of the market power during the years 2005-2012 (as a result of ultimately 22% of customers participating in this voluntary program) and began offsetting all market power purchases starting in 2013. CPAU purchases market power to fill the gap between the renewable and hydropower provided to customers, and the total demand of nearly 1000 Gigawatt hours per year (GWh).

The use of market power with RECs is a transitional step to the fully carbon neutral electricity (without RECs) slated to be in place by 2017 (See Figure 6.) This projection of the renewables portfolio in Figure 6 does not include expected local rooftop solar power generation ("local PV"), and does not show the base supply of large hydro energy (about 40-50% of supply in an average year), or the possible future use of market power to fill any gaps between energy demand and hydroelectric and renewables supply.

Figure 6: CPAU Renewable Energy Portfolio Actuals and Projections (with renewable energy credits)



Source: CPAU

In addition to its plans to expand the renewable energy portfolio, the City is developing strategies for exploring two potential future scenarios: Electrification and Facilitating Electric Vehicles.

> **Electrification**: Palo Alto's use of RECs and expansion of its renewable energy supply makes its electricity "cleaner" than natural gas. Removing this significant source of GHG emissions (more than 30% of the total) would enable would enable CPAU to deliver carbon neutral energy, not just carbon neutral electricity. At Council's direction, CPAU, The Office of Sustainability, Public Works, Development Services and other departments are exploring and evaluating potential options for replacing natural gas appliances (for example for water and space heating, cooking, clothes drying) with electric, in addition

to encouraging electric vehicles.[20] This approach, if adopted, could require an innovative approach to CPAU's business model to enable the Utility to stay profitable and deliver a high quality service as it replaces one of its current revenue streams (natural gas) and expands another (electricity). The transition challenges, across a number of fronts, should not be underestimated. In the short term, the newly launched PaloAltoGreen Gas program has a goal of enrolling 20% of existing natural gas customers into an offset program with a target of purchasing high quality carbon allowances to offset 16,000 metric tonnes of greenhouse gas (MT GHG)—about 10% of natural gas load—by 2020. Long term, CPAU will also need to explore how it will maintain existing gas infrastructure in the face of declining gas revenues.[21]

- **Facilitating Electric Vehicles**: The projected increase in EVs used by residential and commercial customers will have significant impact on grid demand and the potential need for energy storage capacity. CPAU is working to keep pace with demand and infrastructure needs, and CPAU and Development Services are working together to ensure that building codes and energy strategy are in sync, since electrical panels in existing homes will need to be upgraded to handle the increased power requirements from charging an EV.

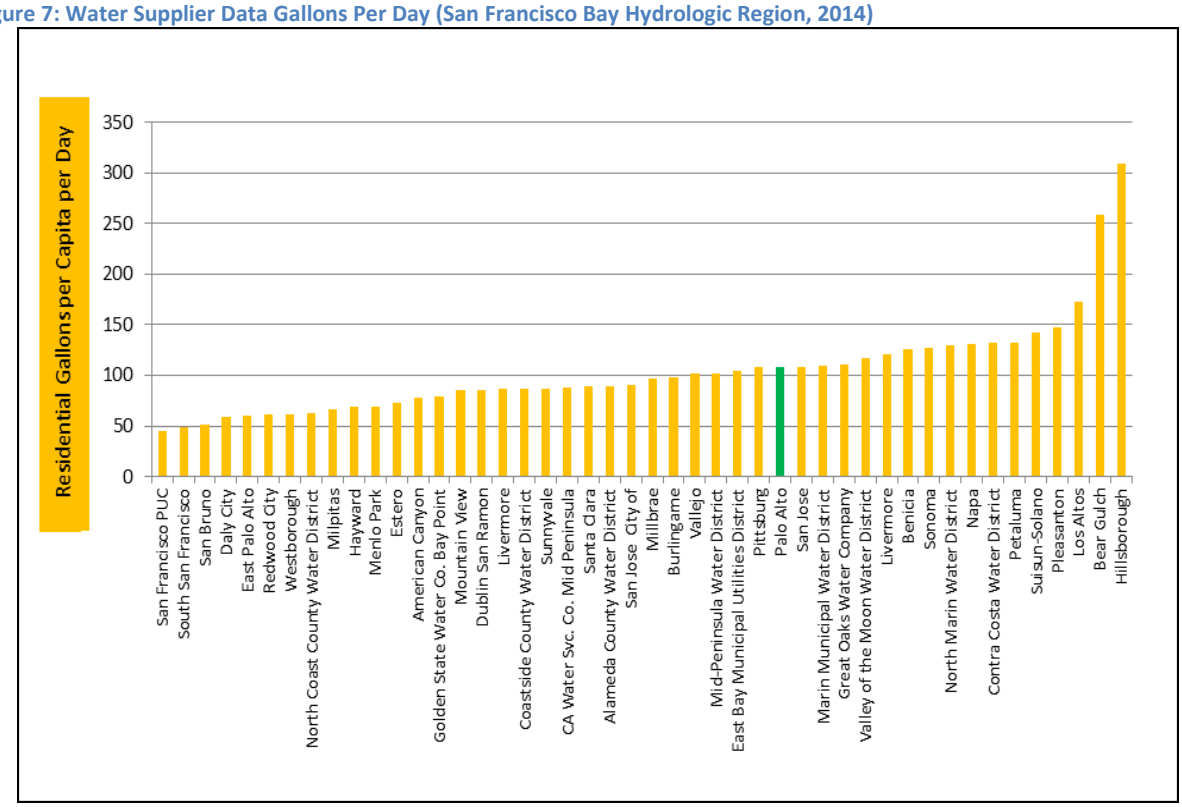
Water Consumption

Just as CPAU's supply of electricity from large hydro has been reduced due to drought conditions, the City's drinking water supply is under pressure as well. Figure 7 provides a snapshot from August 2014 of residential water consumption (in gallons per day per capita) for the municipalities and water districts in the San Francisco Bay hydrologic region, based on data from the California Environmental Protection Agency. Hillsborough is at one end of the spectrum, with high consumption and low population, and San Francisco is at the other end, with a large population and very low consumption. Palo Alto is in the middle with similar per capita residential consumption to San Jose and the East Bay Municipal Utilities District (EBMUD).

[20] http://www.cityofpaloalto.org/civicax/filebank/documents/45640

[21] Any proposed funding, incentive or other design elements in this area must be specifically analyzed and considered in the context of all applicable legal, statutory and regulatory requirements and guidance, including, for instance, constitutional limitations on utility rates imposed by Californians when they adopted Proposition 26, obligations set forth in the Cap-and-Trade regulations adopted by the California Air Resources Board, and other miscellaneous requirements embedded in the California Public Utilities Code.

Figure 7: Water Supplier Data Gallons Per Day (San Francisco Bay Hydrologic Region, 2014)



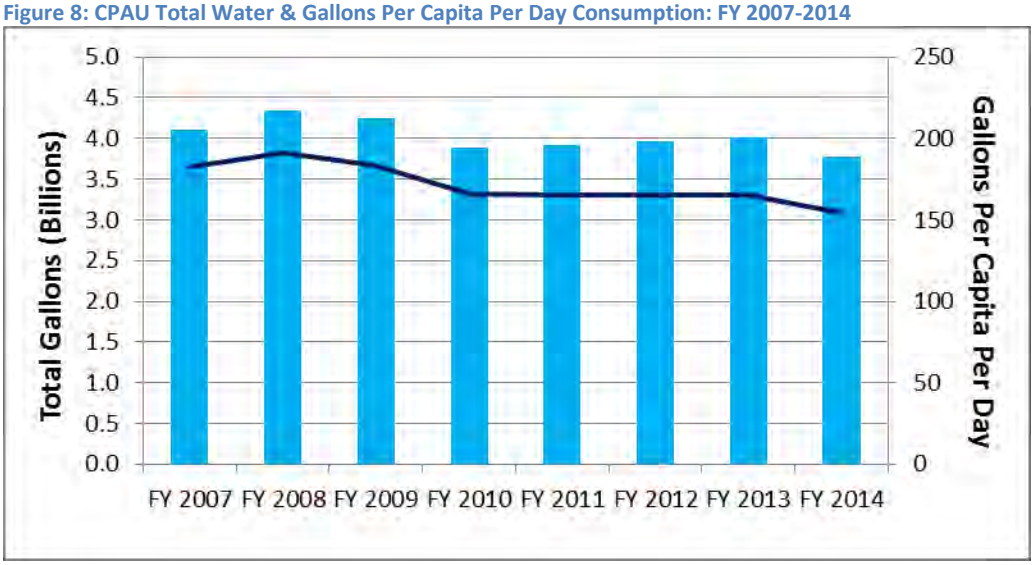
Source: California Environmental Protection Agency, State Water Resources Control Board

CPAU data shows that total water consumption declined 9% from 2007 to 2013, and an additional 16% over 2013 usage for the period from January 31, 2014, when the SFPUC requested a 10% cutback, to the end of 2014. The utility is on target to meet its long term 20% per capita reduction by 2020 goal (set by the State Water Conservation Bill of 2009 (SBx7-7)[22], and is updating its Urban Water Management Plan,[23] which is the long term policy document with projections for demand, population and supply resources. In addition, CPAU and other departments are actively working to meet the Governor's directive of 25% reductions[24], and even greater reductions if the drought continues.

[23] 2010 Urban Water Management Plan: Cityofpaloalto.org/UWMP

[24] Note that the Governor's Executive Order calling for a statewide reduction of 25% for urban potable water use does not necessarily mean 25% for Palo Alto. The State Board released its regulatory framework April 7 2015 and the target for Palo Alto was 20%.

Figure 8: CPAU Total Water & Gallons Per Capita Per Day Consumption: FY 2007-2014



Source: CPAU: Utility Billing Based Consumption information history by class 2015

Water presents multiple challenges:

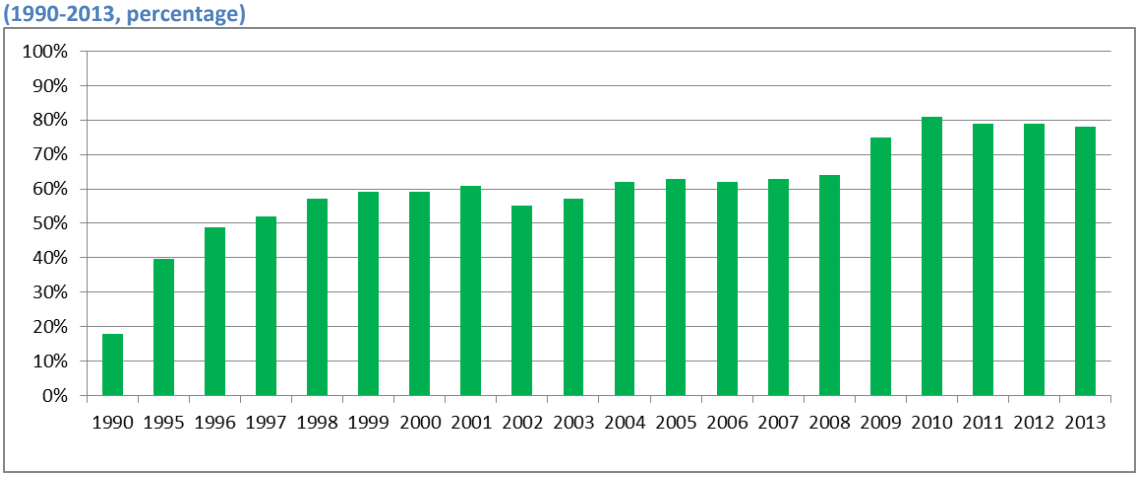
- Are we conserving enough to adapt to drought conditions? If the current drought represents a long term shift in California's precipitation regime, there could be impacts on potable water supply, hydroelectric power capacity and even California agriculture. Santa Clara Valley Water District has already set a new target of 30% reduction; Livermore and Dublin have targeted 50% and 60% reductions in outdoor water use.
- CPAU does not have detailed local data on how water is used; "…according to the state water board, outdoor irrigation makes up 44% of the state's urban and suburban water use."[25] Better data might support more effective conservation programs.
- Most of Palo Alto's economic urban forest is made up of species that are neither native nor drought-adapted. How will Palo Alto preserve and protect this resource in the face of climate change, beyond the measures addressed in the Urban Forest Master Plan?
- Successful conservation programs result in reduced utility revenues; regional water agencies are considering up to 30% rate increases this spring to make up the shortfall.

Zero Waste

The City is on track to meet its 2021 goal of 90% diversion of recyclable and compostable material from landfill; since 2010, the diversion rate has been steady at or just below 80%. Food scraps and food soiled paper, currently being landfilled, provide the greatest diversion opportunity. The collection of residential food scraps co-mingled with yard trimmings is scheduled to begin in July 2015. A commercial Recycling and Composting Ordinance was approved by Council for implementation in early 2016. Both the residential and commercial reduction productions would lower emissions from landfilled food waste by 35% from 2013 levels.

[25] http://www.mercurynews.com/drought/ci_27772022/santa-clara-valley-water-district-considers-upping-its

Figure 9: Diversion of Recyclable & Compostable Material from Landfill (1990-2013, percentage)



Source: Public Works

Highlights and Accomplishments from City Departments

Staff is implementing more than 150 sustainability programs across the city. This section provides a summary of key activities.

In 2014 Council approved the Local Solar Program designed to increase local power generation more than four-fold; in 2015, it launched the PaloAlto**Green** Gas voluntary program to invite customers to offset residential natural gas emissions. CPAU projects that 10% of customers will enroll in the program in its first year.

The City has a robust green building program, with a new Green Building Ordinance and an Energy Reach Code coming to Council this Spring, and a commitment to continue to advance our green building ahead of California standards with each three-year code cycle. We have continued our commitment to electric vehicles with Code requirements for EV readiness in new construction and significant retrofits, an EV preference policy for City fleet, additional charging capacity at City facilities, and a forthcoming update to the City's EV infrastructure policy.

Staff is working with procurement systems and key vendors to improve implementation of the City's Environmentally Preferable Purchasing (EPP) policy and institute "default to green" policies and systems for key procurement categories. This has already been implemented for key office products purchases and implementation is in process for city fleet electrification (initial analysis estimates 20% savings in Total Cost of Ownership for light duty vehicles.)

Finally, as mentioned in part earlier in this report, the Office of Sustainability engaged consultants at DNV-GL and Rocky Mountain Institute to work with the City to develop a new Sustainability and Carbon Action Plan (S/CAP), a first draft of which will be brought to Council in spring 2015. This plan engages all City departments and articulates a wide spectrum of bold goals to achieve significant GHG reductions, promote operational and resource efficiency through City policies and programs, and engage the public, institutional, and business communities in contributing to a low-carbon, high quality of life for all Palo Altans. The S/CAP is

being developed in parallel with the Comprehensive Plan, and efforts are underway to further integrate sustainability strategy into the City's overarching policy document, which both sets forth a collective vision or blueprint for the community, and informs day-to-day decision making about land use and development, infrastructure investments, and related issues.

The City continues to gain acknowledgement for its leadership. Some of the awards won in the last year include[26]:

Date	Organization Giving Award or Recognition	Person/Program Receiving Award or Recognition	Title and Description of Award or Recognition
2015	Acterra	City of Palo Alto	Business Environmental Award, in recognition of the City's overall approach, commitment and leadership in sustainability.
2014	Solar Electric Power Association (SEPA)	City of Palo Alto Utilities	Public Power Utility of the Year
2014	Institute for Local Government	City of Palo Alto	Beacon Award – Silver Level for leading in implementing innovative energy efficiency and resource conservation programs, achieving notable greenhouse gas emissions reductions.
2014	SAP EV Ready Award	City of Palo Alto	Small Community Award
2014	Annual Solar Power Generation USA Congress	City of Palo Alto	Best Solar Collaboration Award
2014	Silicon Valley Water Conservation Awards Coalition	City of Palo Alto Utilities	Water Utility of the Year, for a range of consumer facing efficiency and monitoring programs:
2014	American Public Power Association (APPA)	City of Palo Alto Utilities	Reliable Public Power Provider (RP3) - for proficiency, sound business practices, and a utility-wide commitment to safe and reliable delivery of electricity, system improvement, energy efficiency and workforce development
2014 (for 2013 Achievements)	National Resource Electric Laboratory (NREL)	PaloAlto**Green**	Ranked Number One in the Nation for Participation Levels and Number Five in the Nation for Total Per Capita Electric Sales

[26] http://www.cityofpaloalto.org/gov/depts/utl/about/awards.asp

Expanded departmental reports, including goals, activities and challenges, can be found in Attachment D for:

- City of Palo Alto Utilities (CPAU)
- Environmental Services Division Landfill Operations
- Development Services
- Planning
- Fleet Services
- Watershed Protection
- Urban Forestry
- Administrative Services Department Purchasing Division
- Office of Emergency Services
- Economic Development
- Office of Sustainability

The City Manager has been clear in insisting that in City Operations, "we go first"—ensuring that the City model the actions and programs that we challenge the community to undertake. So far, our record is good but needs to be accelerated:

Issue	Status	Program/Plan/Need
The City is undertaking new construction and building retrofits with a commitment to environmental efficiency but without confidence that we are doing all that can be done	City Facilities have not received performance audits in 10 years	City will bring in Environmental Defense Fund Climate Corps intern this summer to assess key City facilities and propose ongoing resource efficiency program. Program will fall under the purview of new Facilities Manager to be hired FY16.
Data across all City operations not transparent and not being used to manage for resource efficiency	Sustainability data collection and analysis is often manual, annual, and used more for reporting that for management	Staff is deploying a comprehensive sustainability dashboard to make timely, automatic performance tracking easily available to council, staff and community
Many sustainability policies exist, but are not easily found, tracked and evaluated	Resource and energy reduction initiatives at City department level not integrated with Citywide operations	Staff is reviewing, consolidating and, where warranted, updating sustainability-relevant policies, and implementing "default to green" in City procurement

Observations

Leadership, but not adequate to the challenge before us

Palo Alto has done better than most communities. Bold actions like carbon neutral electricity have put Palo Alto in the forefront of actual GHG reductions—not just goals—internationally. But our present GHG reduction trajectory will not take us to California's stated goal of 80% reduction by 2050—much less to the steeper reductions that will be required. Meeting that goal—or the "moonshot" goal of carbon neutral in ten years or less—will require courage, focus and momentum, and a commitment to data-driven agility that is rare in most organizations.

And it will require adequately resourcing the sustainability and climate commitments the City decides to make.

Significant risks
Palo Alto faces substantial risks in relation to climate change, but of the most difficult sort to address: risks that are of relatively low (or debatable, or distant) likelihood but are of relatively large potential impact. These include disruption of water supply, disruption of hydroelectric supply, sea level rise and rising temperatures—each of which could have implications for operations, infrastructure and public health. It's hard to justify significant investment in mitigating risks that are seen as small or distant; it's certainly problematic to go "all in" on such risks. But it's also not prudent to ignore risks with impacts as potentially large as significant, long tern disruption of the climatic regime on which California's prosperity depends.

Opportunities
Fortunately there are ways to address these concerns—in many cases with considerable benefit. Efficiency, for example, does not necessarily require sacrifice. Approached intelligently, Palo Alto can approach the climate challenge in ways improve City's governments operational and financial effectiveness, while improving quality of life for all Palo Altans.

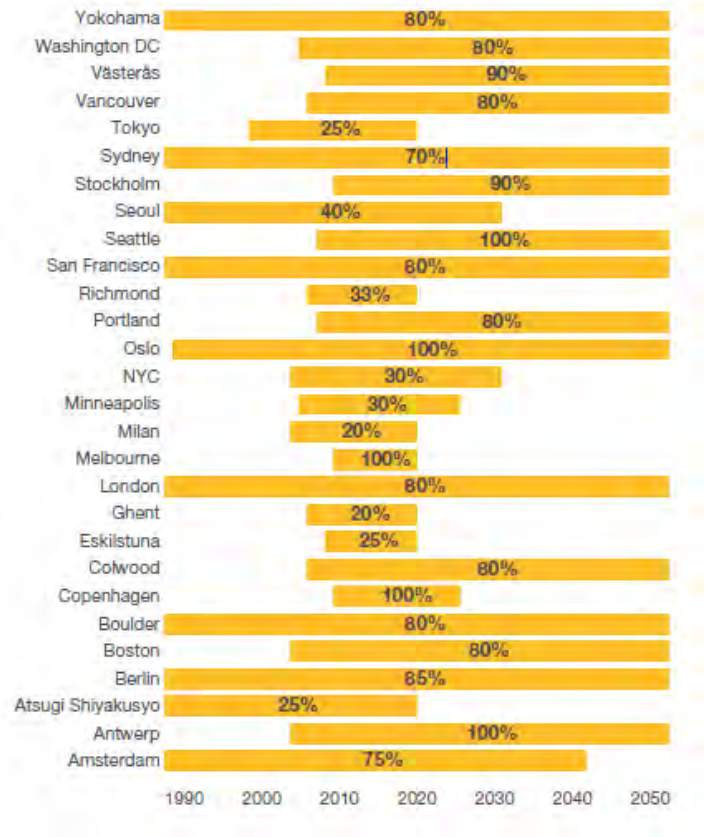
The City can learn from other cities, and major companies around the world, that are developing strategies that make sense both by today's criteria and by the criteria that one of the "low risk, high impact" futures would require.

The City's full potential will be achieved with coordinated, interdepartmental cooperation. We are making progress but any such transformative systems effort requires a degree of integration and alignment that is rare and challenging in any organization. We will need to lead in this regard also, to meet our goals.

Future Vision
The GHG reductions in 2014 (and 2013) have come from the purchase of RECs, improvements to wastewater treatment processes, lower natural gas consumption community-wide and long-standing efficiency programs. The results have exceeded the initial targets set in the 2007 Climate Protection Plan.

To put Palo Alto's performance in context with other US and international cities, this chart from the C40 Cities Climate Leadership Group shows a representative sample of emissions reduction targets (percentages represented planned reductions, and bars begin at start of reduction period).

Figure 10: C40 Cities Climate Leadership Group
Representative Sample of City Emission Reduction Targets



Source: C40

Palo Alto's current performance is in line with many cities, but leading cities (including 17 members of the Carbon Neutral Cities Alliance) are setting a high bar as they commit to carbon neutrality by 2050, or in the cases of Melbourne and Copenhagen, decades earlier. Setting goals versus achieving them are very different matters. But goals are a necessary prelude to accomplishment.

The Office of Sustainability is approaching its work for the City as a provocative force for thoughtful transformation within a community that has never regarded "business as usual" as a guiding principle. Its mandate is to develop the strategy, guide the implementation, and spark the innovation that will allow all Palo Altans to thrive in a changing economy and climate.

The development of the S/CAP strategy is happening in parallel with the update to the City's Comprehensive Plan. As the S/CAP is revisits and expands upon the existing action plan created in 2007, the new document will reflect the latest policy, technology, and community input, in addition to the policies adopted by City Council. To plan for the implementation of these new goals, the OOS and its S/CAP consultants are working closely with the Planning Department to integrate sustainability into the vision for Palo Alto 2030 is being drafted.

Implementing a world-class sustainability strategy across the city means paying close attention to operations, policies, and engagement for staff, and community members. The Office of Sustainability is working with other departments to make doing the right thing—such as implementing Council's environmentally-preferable purchasing policies—the norm rather than an extra effort. From procurement to performance data analysis, the focus should be on finding the easiest way for Staff to make the right choices every day, and then to track our progress toward our shared goals. This is true for City Staff responding to the City Manager's "we go first" challenge, and for Community members who can benefit from better systems that deliver better service to citizens without the carbon impacts and resource consumption that they currently generate.

Next steps

In the coming year, in addition to the initiatives summarized above, staff will

- deploy a comprehensive sustainability dashboard to make timely performance tracking easily available to council, staff and community;
- engage Council and community in discussion of the S/CAP, and propose initiatives, budgets and financial strategies to implement it;
- evaluate electrification to shift energy loads from natural gas (currently more than 30% of our carbon footprint) to CPAU's carbon neutral electricity[27];
- explore the development of local and regional pilots of "mobility as a service" (to address the more than 60% of our carbon footprint generated by transportation;
- explore implications of these dramatic changes for CPAU's business models;
- begin discussion on another reach code that would drive new residential construction toward net zero energy; and
- pursue the development of complementary funding strategies to finance the strategies that the community chooses to pursue.

But Palo Alto's biggest challenge may be making fundamental shifts in perspective as we determine how to address the opportunities before us:

A big challenge demands bold moves.

Palo Alto may not face locally the severity that climate chaos threatens to bring to other communities, but it is a part of the regional and global community—and has long seen itself as a leader, and been acknowledged as a leader. That fact, plus our relative privilege, as well as the very real risks we do face, demand that we take bold action in face of the challenges ahead.

[27] Any proposed funding, incentive or other design elements in this area must be specifically analyzed and considered in the context of all applicable legal, statutory and regulatory requirements and guidance, including, for instance, constitutional limitations on utility rates imposed by Californians when they adopted Proposition 26, obligations set forth in the Cap-and-Trade regulations adopted by the California Air Resources Board, and other miscellaneous requirements embedded in the California Public Utilities Code.

But our present GHG reduction trajectory will not take us to California's stated goal of 80% reduction by 2050—much less to the steeper reductions that will be required.

Moonshot
A big, time-bound, aspirational goal—"let's go all the way," in addition to the usual "let's make things a little better"—can provide both an innovation driver and a rallying point than can enable breakthroughs in policy and performance.

The "California moonshot" target under consideration in the S/CAP—climate neutral in ten years or less (a goal already set by Copenhagen and Melbourne)—as well as the more "modest" goal of 80x50, will require each require multiple initiatives, each of them challenging, all of them necessary. Here are some of the key potential initiatives staff is studying, and will bring to Council and community for further discussion:

Mobility as a Service (MaaS)
User-centric, all-in design, designed to *solve* the transportation/congestion/parking problem, with multi-modal, subscription based, service-level solutions (like the systems being developed by Finland, and large and small companies around the world) to make it "more convenient for anyone, anywhere at any time, to not have to get into a car and drive." (This user-centric, systems design approach may be applicable in many domains besides transportation.)

Electrification
Staff is exploring whether it is feasible to eliminate the 30% of Palo Alto's carbon footprint that's attributable to natural gas by taking advantage of Palo Alto's carbon-neutral electricity and systematically switching water heating, space heating, clothes drying, cooking to electric. As previously noted in this report, any proposed funding, incentive or other design elements in this area must be specifically analyzed and considered in the context of all applicable legal, statutory and regulatory requirements and guidance, including, for instance, constitutional limitations on utility rates imposed by Californians when they adopted Proposition 26, obligations set forth in the Cap-and-Trade regulations adopted by the California Air Resources Board, and other miscellaneous requirements embedded in the California Public Utilities Code

Becoming Future Fit[28] (including biology, water & the common wealth)
Develop de-risking strategies to address "low likelihood, high impact" risks such as ongoing disruption of rainfall patterns in ways that enhance community resilience and build the common wealth of our biological, built and social infrastructure.

Net Zero/Net Positive
Use performance based, rather than prescriptive approaches, to building and energy conservation regulations in order to encourage innovation focused on the outcomes the community wants, not necessarily on the pathways to achieve those outcomes. Consider the same approach for planning and development, such as programmatic mitigation measures

[28] See, for example, http://www.futurefitbusiness.org

requiring outcomes and impacts, while being as flexible as possible on the best ways to achieve those outcomes.

Agile government
Encourage rapid experimentation and rapid learning, inspired by the "lean startup" business model. Consider pilot projects where Council gives staff greater operating discretion within a small set of clear boundaries and reporting requirements, to enable experimentation and learning cycles on the order of weeks and months rather than years.

City/Community dashboards
In keeping with the City's open data commitment—and the reality that "to be in a state of self-control, person needs to know what's expected of them, how well they're doing, and what resources are available to do differently"—deploy visual dashboards that provide "closer to real time" performance feedback and steering to staff, Council and community.

Behavior change at scale
Encourage neighborhood and district based collaboration, such as the Cool City Challenge ("one cool block at a time") and eco-districts, to support rapid *horizontal* scaling of sustainability initiatives. This approach will support the community as a whole to make changes on a personal, neighborhood and city-wide scale, by embracing new technologies, leaving the car at home and supporting changes in the built environment to reduce reliance on the automobile.

Financial acceleration
Investigate both new capital resources and new financial management tools, such as internal carbon pricing, municipal carbon taxes and new utility business models, to enable the City to achieve its sustainability goals—not just for reduced emissions, but also for more quality of life, prosperity and resilience—in financially sound ways. Pursuit of carbon pricing strategies, municipal carbon taxes and new or alternate utilities business models must also be specifically analyzed and considered in the context of all applicable legal, statutory and regulatory requirements and guidance prior to any staff recommendation or Council decision to move forward.

In conclusion
Staff closed the 2014 Earth Day report with three questions that are still relevant for the City and the community to consider, both for our own well-being, and for the contribution one small, innovative city can make to the sustainability revolution:

- How good do we really want it to be?
- What would it take—in technology, investment, innovation and personal change—to get there?
- In view of those requirements, are we willing to do it—to make the necessary commitments, and to act to deliver the world we want?

Attachments:

- Attachment A: Summary of 2007 Climate Protection Plan (PDF)

- Attachment B: City Municipal Operations Emissions (PDF)
- Attachment C: Palo Alto Community and City Municipal Operations GHG Emission (PDF)
- Attachment D: Highlights of Sustainability Initiatives by City Municipal Operations (DOCX)
- Attachment E: Sustainability Policy and Organizational Structure (PDF)

Summary Description of the 2007 Climate Protection Plan

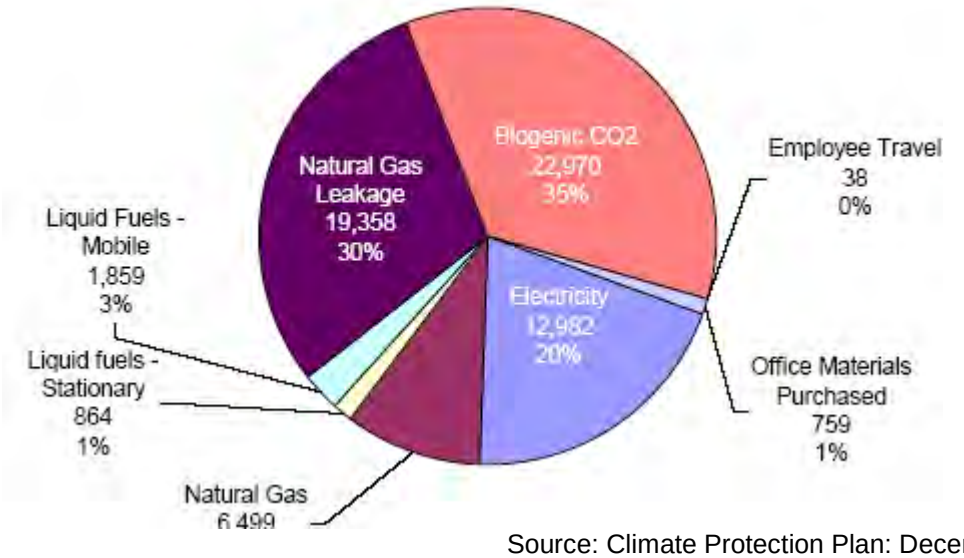
NOTE: Emissions estimate have been updated since 2007, and is reflected in the body of the report. This summary is for reference purposes only.

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 tons 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.)

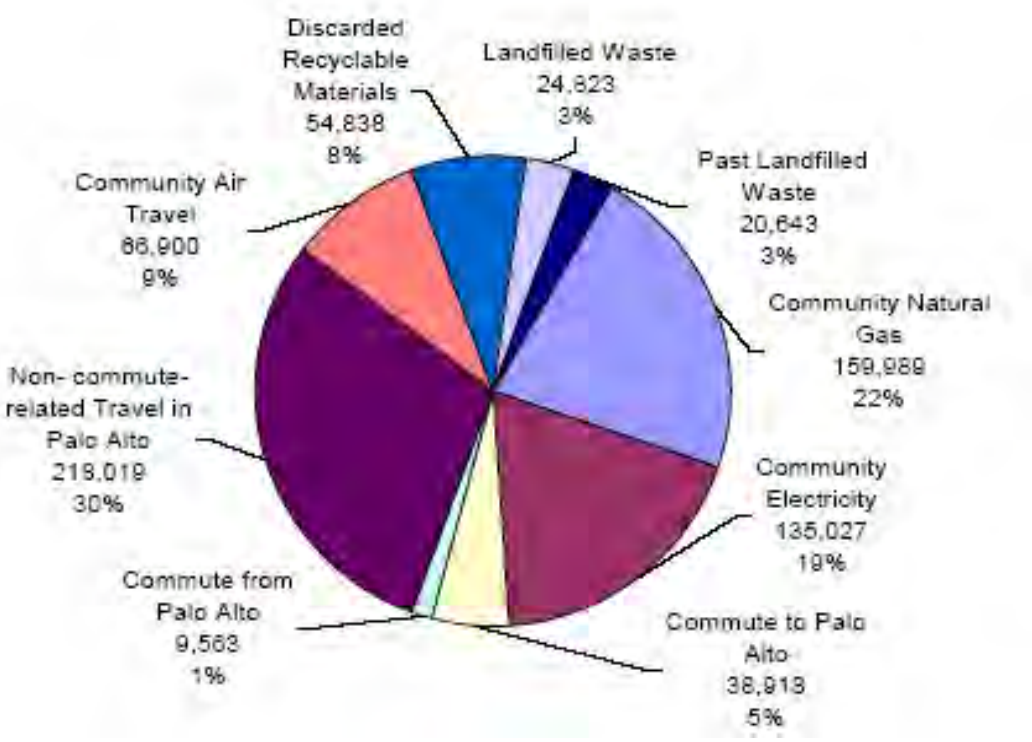
Figure 1: Municipal (City Operations) GHG Emission Sources in 2005 (65,329 MT CO_2e)



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.

April 2010 Update

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

Updated 2012 GHG Reduction Goal for the City

Based on the progress made since 2007, City Council in 2010 increased the City municipal GHG reduction goal to 20% below 2005 levels by 2012.

Attachment B: GHG Emissions of City Municipal Operations: Comparison Data

City municipal operations related emissions drivers and associated emissions are shown below.

Table B1: City Operations GHG Emission in 2005, 2012 & 2014 (in MT of CO_2 equivalent)

– Biogenic and Anthropogenic, no adjustment for hydro conditions of PAG purchases -

	2005			2012			2013			2014		
	Scope 1	**Biogenic**	**Scope 2**	**Scope 1**	**Biogenic**	**Scope 2**	**Scope 1**	**Biogenic**	**Scope 2**	**Scope 1**	**Biogenic**	**Scope 2**
Buildings and Other Facilities	8,723	0	1,819	7,016	0	1,155	5,365	0	0	8,175	0	0
Streetlights and Traffic Signals			689			534			0			0
Water Delivery Facilities	2	0	67	34	0	42	91	0	0	41	0	0
Wastewater Facilities	8,504	16,689	2,546	6,414	15,602	1,950	5,024	11,183	0	4,616	11,385	0
Vehicle Fleet	2,835	1	0	2,546	0	0	2,399	0	0	2,346	0	0
Power Generation Facilities	0	0	8,570	227	0	3,839	0	0	0	23	0	0
Solid Waste Facilities	6,846	5,853	29	4,336	3,827	19	6,642	5,789	0	8,470	7,520	0
Other Processes & Fugitive Emissions	3			9			4			4		
	26,912	**22,543**	**13,720**	**20,582**	**19,429**	**7,539**	**19,525**	**16,972**	**0**	**23,674**	**18,905**	**0**

Scope 1 and Scope 2 emissions are non-biogenic emissions and caused by human activity. Biogenic emissions are assumed to be net carbon neutral and not reported under GHG emission reporting protocols. Scope 2 emissions from electricity were eliminated in 2013 by the purchase of Renewable Energy Credits (REC's). Table B2 below shows the transformation of the Table B1 above by excluding biogenic emissions, and shows an emissions reduction of 41.7% from the 2005 baseline.

Table B2: City Operations GHG Emission in 2005, 2012, 2013 & 2014 (in MT of CO_2 equivalent)

Excludes Biogenic, not normalized for hydro conditions of PAG purchases

GHG Emissions comparison (Scope 1 & 2)	*2005*	*2012*	*2013*	*2014*
Water Delivery Facilities	69	76	91	41
Wastewater Facilities	11,049	8,364	5,024	4,616
Vehicle Fleet	2,835	2,546	2,399	2,346
Streetlights & Traffic Signals	689	534	0	0
Solid Waste Facilities	6,876	4,354	6,642	8,470
Power Generation Facilities	8,570	4,067	0	23
Buildings & Other Facilities	10,542	8,172	5,365	8,175
TOTAL	40,629	28,112	19,521	23,670
Percentage reduction from 2005 baseline		30.8%	52.0%	41.7%

Table B2 does not include the effects of the purchase of PaloAltoGreen resources and the normalization of the vagaries of hydroelectric supply conditions. The Table B3 below accounts for these two effects and shows a 43.4% reduction in emissions from the 2005 baseline year.

Table B3: City Operations GHG Emission in 2005, 2012 and 2013 (in MT of CO_2 equivalent)

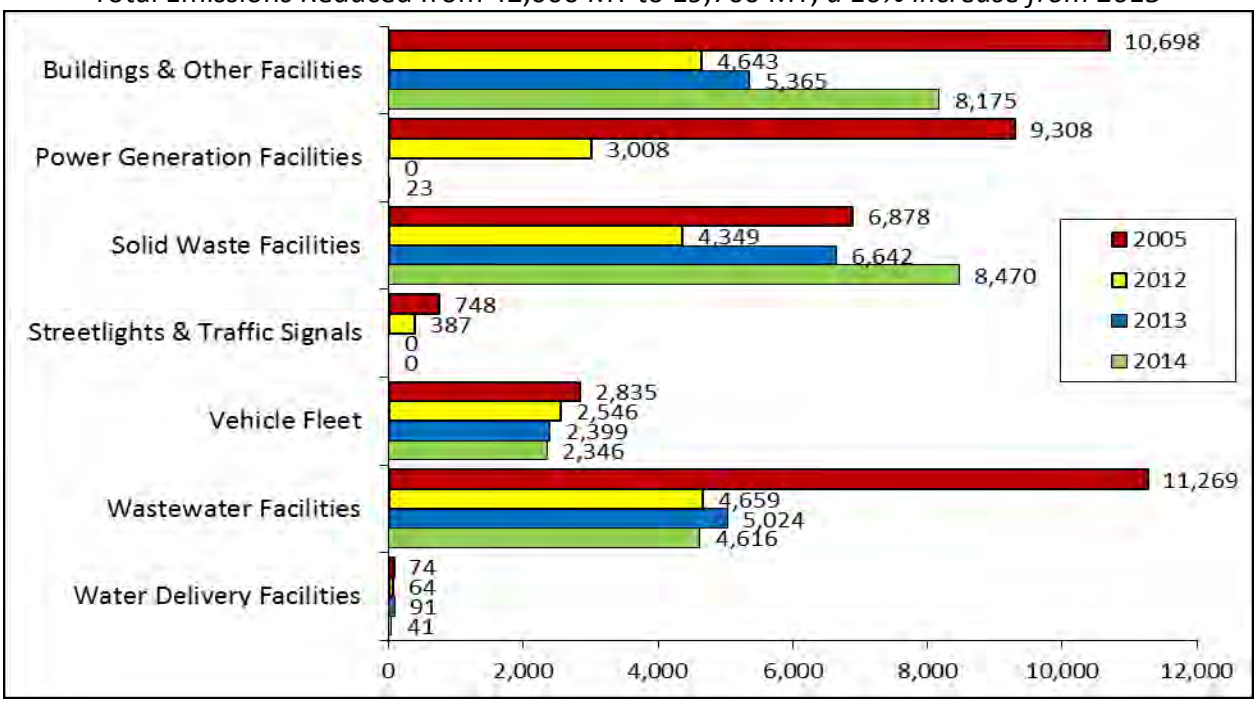
Excludes Biogenic, normalized for hydro conditions and PAG purchases

GHG Emissions comparison (Scope 1 & 2)	*2005*	*2012*	*2013*	*2014*
Water Delivery Facilities	74	64	91	41
Wastewater Facilities	11,269	4,659	5,024	4,616
Vehicle Fleet	2,835	2,546	2,399	2,346
Streetlights & Traffic Signals	748	387	0	0
Solid Waste Facilities	6,878	4,349	6,642	8,470
Power Generation Facilities	9,308	3,008	0	23
Buildings & Other Facilities	10,698	4,643	5,365	8,175
TOTAL	41,811	19,655	19,521	23,670
Percentage reduction from 2005 baseline		53.0%	53.3%	43.4%

Figure 1 below graphically illustrates Table B3 and is a reproduction of Figure 1 from the body of the report.

Figure 1: City Operations GHG Emissions: 2005, 2012, 2013 & 2014 (Hydro and PAG-adjusted)

Total Emissions Reduced from 42,000 MT to 19,700 MT, *a 10% increase from 2013*



The primary drivers for GHG emission reduction performance are:

- Building and Other Facilities – Due to enactment of the Carbon Neutral Plan in March 2013, all electricity consumed by the City in 2013 had zero carbon emissions. Emissions from natural gas consumption and leakage from the natural gas distribution system are the primary sources for the increased building emissions in 2014.
- Power Generation Facilities – This category accounts for transmission and distribution system losses. City divested its ownership of the COTP transmission line in 2009 resulting in lower loss allocation to the City. Distribution loss-related emissions also were eliminated in 2013 due to carbon neutral electric supplies.
- Solid Waste Facilities – Closure and capping of the landfill, resulting in less methane production and leakage in CY 2012. Higher collection and improved monitoring, combustion of biogenic landfill gas through flaring, and uncaptured methane leakage have resulted in increased emissions in 2014.
- Streetlights and Traffic Signals – No emissions are reported due to conversions to highly efficient LED streetlights (note, only metered fixtures are shown) and carbon neutral electricity supply.
- Vehicle Fleet – Fleet Services saw a slight reduction in consumption of CNG fuels.
- Wastewater Facilities – 59% emissions reduction from 2005 baseline reflects use of landfill gas for incinerator, optimized use of gas from incinerator tuning, and use of carbon neutral

electricity. The 8% decrease from 2013 was due to decreases in the volume of nitrogen effluent discharge.

- Water Delivery Facilities – There has been fluctuating energy use for water pumping, with a decrease in activity for 2014.

Attachment C: GHG Emissions of Palo Alto Community and City Municipal Operations

Palo Alto Community & City Municipal Operations GHG Emission: Reduction of 32% since 2005

City Municipal Operations* & Palo Alto Community GHG Emissions Summary

Excludes Biogenic Emissions**, All units in Metric Tons (MT) of CO2 equivalent

	Consumption Quantity 2005	Emissions in 2005 (MT of CO2e)	Consumption Quantity 2012	Emissions in 2012 (MT of CO2e)	Consumption Quantity 2013	Emissions in 2013 (MT of CO2e)	Consumption Quantity 2014	Emissions in 2014 (MT of CO2e)	Notes
Scope 1 Emissions									
Natural Gas Use (in Therms)	31,374,970	166,350	30,086,536	159,519	30,336,076	160,842	26,103,713	138,402	1
Natural Gas Distribution Leakage		4,718		4,718		4,718		4,781	2
Palo Alto Landfill Fugitive Emissions		6,811		4,336		6,640		8,470	3
Palo Alto Landfill Gas Flaring (biogenic)		5,853		3,827					3
Wastewater Process Emissions		8,504		6,414		5,024		*4,616*	*4*
Scope 2 Emissions -- Actual									
Total Electric Load in MWh	996,091		966,839		986,241		*978,561*		
Hydro Supply (MWh)	548,760		413,584		406,570		*266,026*		
Renewables Supply (MWh)	49,980		188,566		188,086		*172,139*		
Brown Power Supply (MWh)	397,352	158,427	364,689	145,404	391,585	0	*540,370*	*0*	*5a*
Palo Alto Green Purchases (MWh)	30,601	(12,201)	75,805	(30,224)		N/A		*N/A*	*6*
Scope 2 Emissions -- Weather Adjusted* **									
Total Electric Load	996,091		966,839		986,241		*978,561*		
Hydro Supply (MWh)	514,073		514,073		514,073		*514,073*		
Renewables Supply (MWh)	49,980		188,566		188,086		*172,139*		
Brown Power Supply (MWh)	432,038	172,257	264,200	105,339	284,082	113,266	*292,324*	*116,552*	*5b*
Palo Alto Green Purchases (MWh)	30,601	(12,201)	75,805	(30,224)	0	0	*0*	*0*	*6*
Scope 3 Emissions									
Commute into, from, and within City		371,870		335,390		335,390		*335,390*	*7*
Life Cycle Emissions From Annual Total Waste Placed in Landfills	69,491	24,823	43,947	15,698	45,411	16,221	*47,088*	*16,820*	*8*
Landfilling Recyclable Material		54,838		34,680		35,836		*37,159*	*8*
Total (weather adjust., biogenic excl.)		**797,970**		**635,870**		**564,671**		***545,638***	
			Emission Reduction (since 2005)	**20%**	**Emission Reduction (since 2005)**	**29%**	***Emission Reduction (since 2005)***	***32%***	

Attachment C: GHG Emissions of Palo Alto Community and City Municipal Operations

Notes

1	*Total Community supply of natural gas use/delivery.*
2	*Leakage from the natural gas distribution system- modeled result, unchanged over the period.*
3	*Calculated using total captured landfill gas, actual methane percentage; fugitive gas assumed to be 33% of captured rate. 2005 estimate has been revised to reflect current methodologies.*
4	*Represents N2O emissions from biological treatment process and release of Nitrogen.*
5	*a. Represents actual quantity of brown power related emission @879/lbs/MWh in 2005 and 2012; not applicable beyond 2012 due to Carbon Neutral electric supply.* *b. Weather normalized (for hydro electric generation) quantity of brown power. No GHG impact in 2014.*
6	*Emissions saved due to purchase of PaloAltoGreen related RECs. PAG related RECs not included in 2014 due to Carbon Neutral electric supply.*
7	*Study results from Fehr and Peer (03/19/2013) using Valley Transportation Authority regional transportation model based Vehicular Miles Travelled (VMT) and vehicular profiles - does not account for Palo Alto specific parameters related to greater penetration of alternate fuel vehicles, bicylce use, etc. Study results under review. 2014 assumed to be same as 2012.*
8	*Based on characteristics and tons of material landfilled: 2005, 2011, 2012 and 2013 figures; Landfilled amount in 2014 up 4% in 2013 compared to 2012.*
*****	*Municipal emissions related to electricity and natural gas consumption included within utility load numbers; fleet vehicle emissions also assumed to be included in community wide commute related emissions estimates made by consultant.*
******	*Table excludes biogenic emissions related to: Landfill gas flaring and WQCP sludge incineration.*
*******	*Normalized to account for the vagaries of weather on hydroelectric supplies. No GHG impact in 2013.*

Department: City of Palo Alto Utilities (CPAU)

Background: The mission of CPAU is to earn high level of customer satisfaction by providing cost competitive, safe, reliable and environmentally sustainable utility services.

Strategy:

- Continue to implement cost effective energy efficiency and water conservation programs
- Implement Local Solar Plan with objective of providing 4% of the community's electrical energy needs from local solar resources by 2023
- Maintain the City's 100% carbon neutral electric supply
- Facilitate adoption of electric vehicles (EV) in Palo Alto by providing time of use (TOU) electric rate option to residential customers and by optimally utilizing Low Carbon Fuel Standard (LCFS) revenue for the benefit of EV owners in Palo Alto
- Analyze potential for cost-effective natural gas-to-electric residential fuel switching program, including consideration all relevant policy, legal and regulatory implications of such a strategy
- Concerted effort in CY 2015 and 2016 to engage residential customers to reduce energy use to compete in the Georgetown energy prize
- Implement the new PaloAltoGreen Gas program to offset the carbon emissions associated with natural gas use in Palo Alto
- Seek and test emerging technologies that have the potential to enable CPAU to provide more effective utility services
- Examine utility retail rate structures and that have the potential to enable higher level of EV adoption and fuel switching from natural gas to electricity, including an analysis of all relevant policy, legal and regulatory implications of such a strategy

Goals: [1]

1. Reduce Electric energy use by at least 4.8% by 2023[2] (no GHG impact since electric supply portfolio carbon neutral)
2. Reduce Natural Gas use by at least 2.85% by 2023 (4,500 metric tons per year of GHG reduction by 2023)
3. Reduce Water use by at least 13% by 2030[3]
4. Generate at least 4% of electrical energy from local solar by 2023[4] (no GHG impact)
5. Achieve PaloAltoGreen Gas program subscription of 20% of natural gas customers by 2020, representing around 10% of gas load (16,000 metric tons per year of GHG reduction)
6. Continue to procure long term renewable electric supplies to maintain carbon neutral electric supplies (no GHG impact since electric supply portfolio carbon neutral)

[1] Many of these goals are included in Utilities' 10-year plan, which is re-evaluated every 4 years.
[2] For electric and gas efficiency goals, see: http://www.cityofpaloalto.org/civicax/filebank/documents/32390

[3] For City's Urban Water Management Plan, see: http://www.cityofpaloalto.org/civicax/filebank/documents/41297
[4] For Local Solar Plan, see: https://www.cityofpaloalto.org/civicax/filebank/documents/39981

Initiatives and Activities:

Top Sustainability Initiatives in 2014

Sustainability Initiative	Objective	Outcome
Electricity and Natural Gas Efficiency Programs	Promote resource efficiency to commercial and residential customers for cost savings, lowered consumption, and avoided greenhouse gas emissions.	See impact of energy efficiency programs on utility loads in Figures D-2 and D-3.
Renewable Portfolio Standard (RPS) eligible electric supplies	Achieve increases in renewable energy in CPUA portfolio	City's RPS was 20.6% in 2013, 23.3% in 2014. Executed contracts will result in RPS of 32.2% in 2015, 41.3% in 2016 and 51.3% in 2017
Local Solar Program	Increase local generation from 0.7% of total load to 4.0% by 2023.	Program to launch in 2015
Palo Alto Green Gas	Enroll 20% of all natural gas customers in a voluntary carbon offset program by 2020	Program to launch in 2015

Resource	FY 2014 Savings Goals (% of load)	FY 2014 Savings Achieved (% of load)	FY 2014 Savings Achieved
Electricity	0.60%	0.86%	8,218 MWh
Gas	0.50%	1.20%	337,079 therms
Water	0.91%	0.64%	32,324 CCF
Customer-side Renewable	**Program Goal**	**FY 2014 Achievement**	**Cumulative Achievement**
Solar Electric (PV)	6,500 kW by 2017	1,600 kW	5,600 kW since 1999
Solar Water Heating	30 systems/year	2 systems	44 systems since 2008

For more details on programs and achievements, please review report linked below:
https://www.cityofpaloalto.org/civicax/filebank/documents/43191

Data:

1. Achieved Carbon Neutrality in CY 2013 – see trend over the past 5 years http://www.cityofpaloalto.org/gov/depts/utl/residents/resources/default.asp
2. See impact of energy efficiency programs on utility loads in Figures D-2 and D-3.
3. See RPS increase since 2005 in Figure D-1.

Challenges:

1. Higher appliance standards are achieving high levels of energy efficiency savings; however, these **savings are mostly achieved when appliances are replaced at their end of life**. CPAU programs encourage early replacement of appliances and replacement with appliances that exceed the newer high standards.
2. Higher building code standards result in lower use of energy in new buildings and after major building renovations. However, **building stock turnover takes decades.** CPAU's new construction rebate programs encourage levels of efficiency greater than those required by Title 24.
3. Reduction of residential natural gas use through **switching from natural gas using appliances to electric appliances is not cost effective** (for space heating, water heating and cooking), except for new construction. However, heat pump water heaters appear to be a good candidate to begin the process of fuel switching in single family homes.
4. **Per capita water use in Palo Alto remains high compared to other cities**; economic incentives alone (even $2/square foot to remove lawns) may not be sufficient to move the needle should drought conditions continue.
5. Hydroelectric power as well as potable **water supplies could be at risk in potentially disruptive climate change scenarios.**
6. Disruptive innovation in local PV generation, distributed energy storage (including rolling storage provided by growing EV fleets) and net zero buildings may require **re-examination of CPAU business models.**
7. Cost of service based retail rate making processes **may limit the options available to encourage electrification through retail rate structures.** (Note: Any proposed funding, incentives, or other design elements of/for the programs under consideration here that involve the use of ratepayer funds will need to be specifically analyzed and considered in the context of legal, statutory and regulatory requirements.)
8. While CPAU is delivering efficiency gains generally ahead of targets, greater progress will be needed to achieve California's 80% by 2050 GHG reduction goals**. "Low hanging fruit" efficiency gains may have reached saturation,** so deeper gains may require new approaches.
9. If Fuel switching/Electrification generate rising electricity demand and shrinking natural gas demand, **CPAU will have to maintain natural gas system** in the face of potentially declining natural gas revenues .

Supplemental Graphs:

Figure D-1: Electricity Portfolio: 2005-2025 (Actuals and Projections)

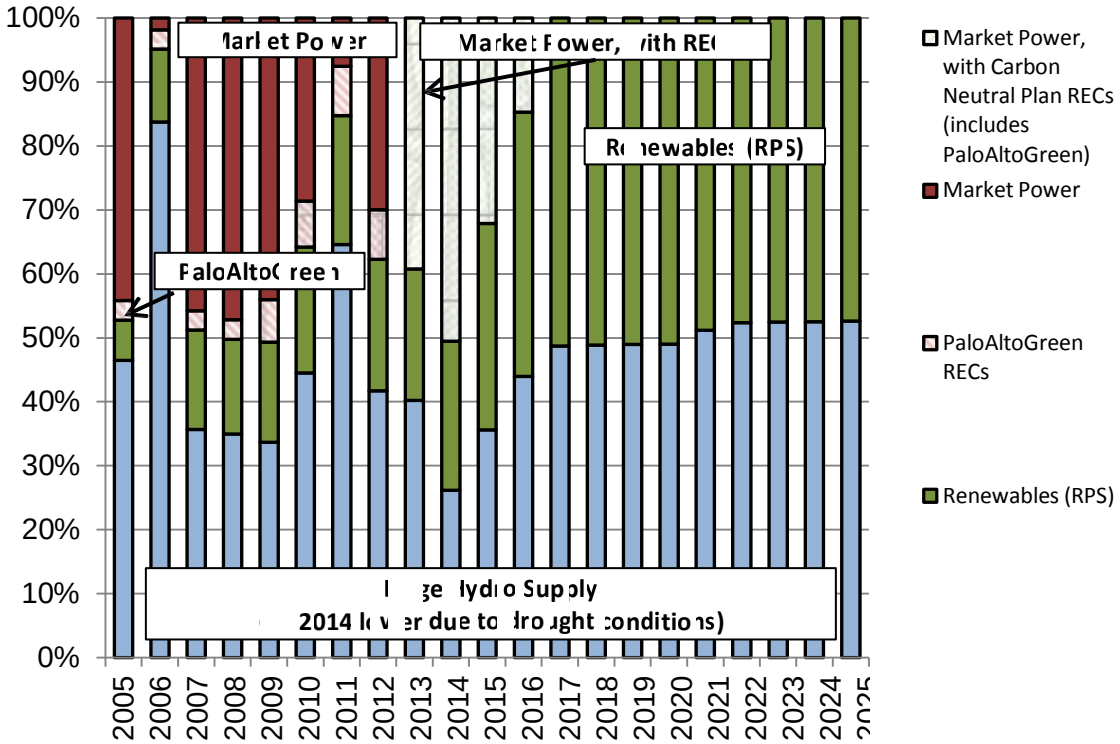


Figure D-2: Impact of Energy Efficiency on Electric Sales

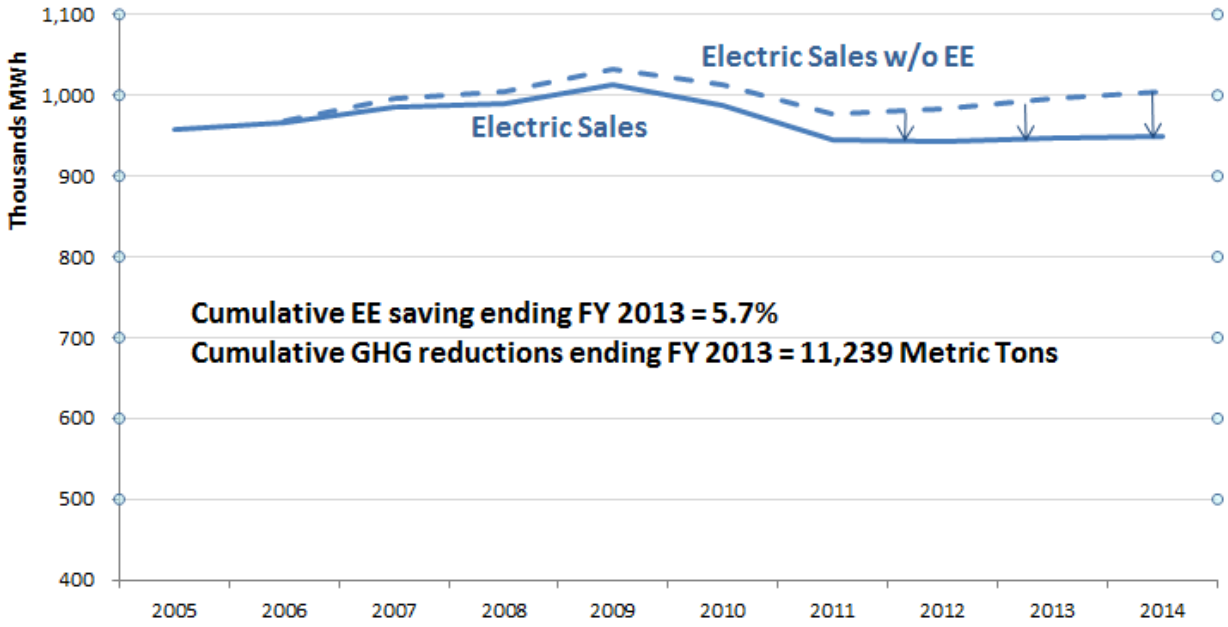


Figure D-3: Impact of Energy Efficiency on Gas Sales

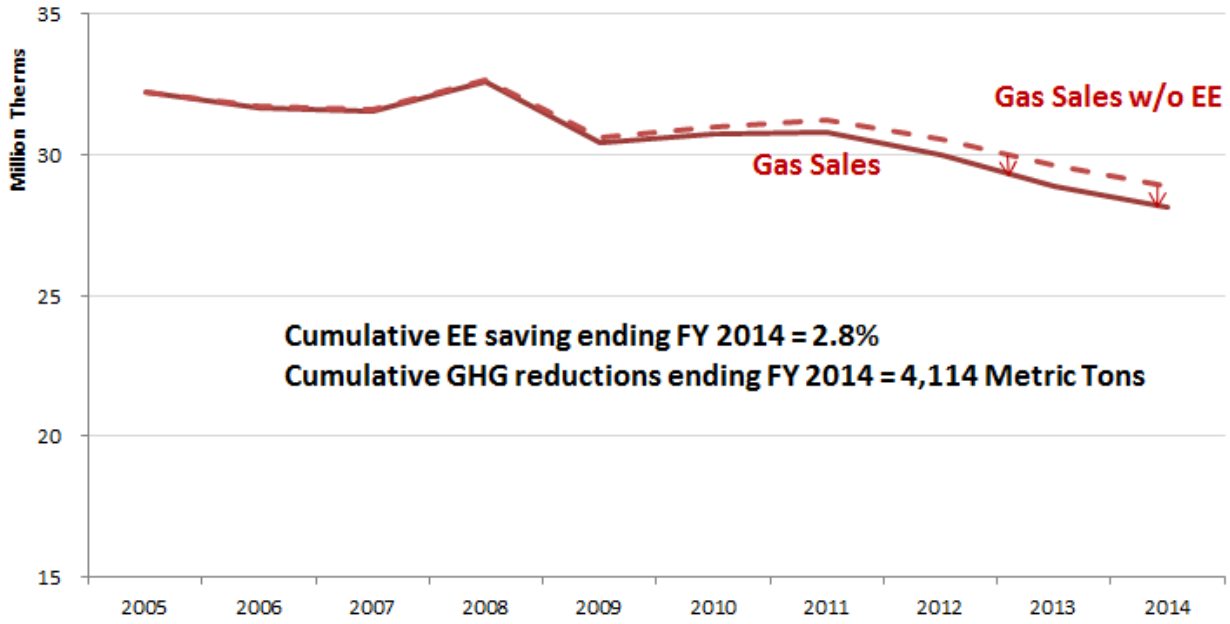
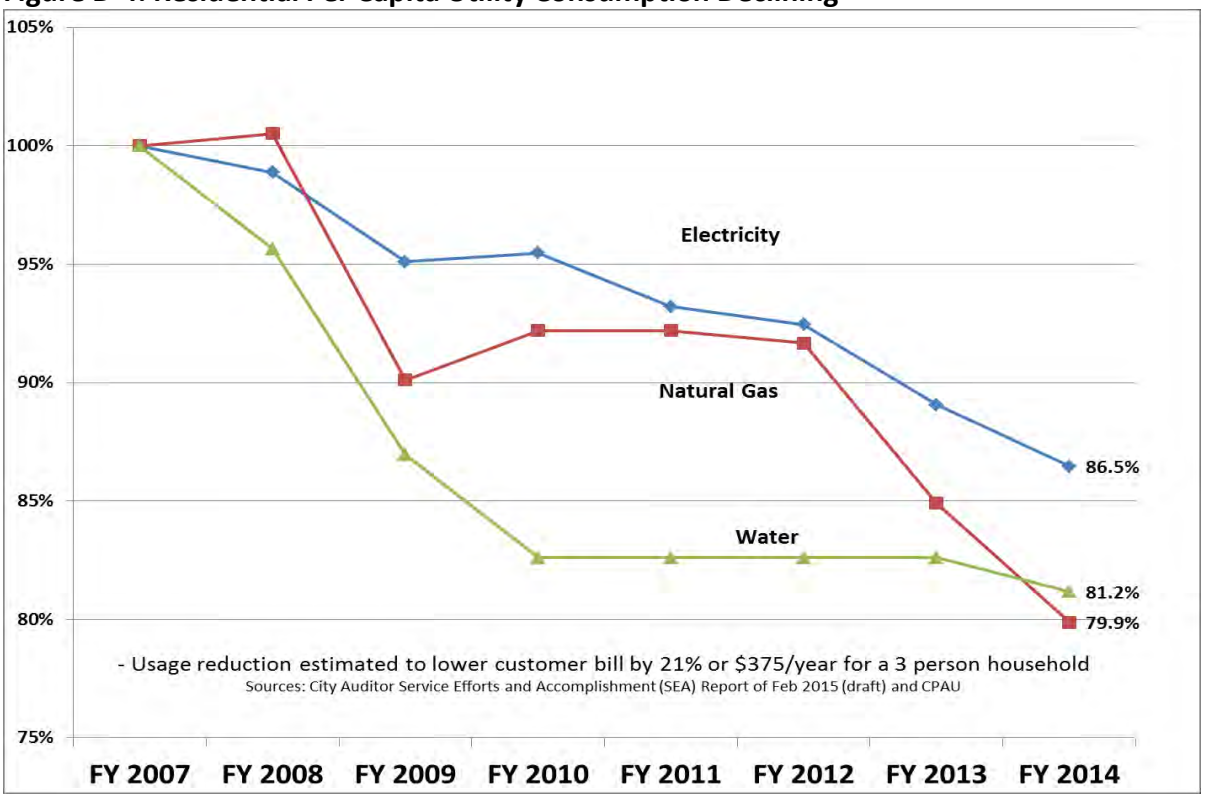


Figure D-4: Residential Per Capita Utility Consumption Declining



Department Name: Public Works Environmental Services Division, Zero Waste and Landfill Operations

Background: The City of Palo Alto adopted a Zero Waste policy in 2005. Since then, the City as a whole dramatically has reduced the amount of material going into landfills. The City now has a waste diversion rate of 78%, up from a 63% diversion rate in 2005.

The City's solid waste related greenhouse gas emissions stem primarily from two sources: (1) the fugitive emissions from the landfill where materials are buried; and (2) the emissions that are a result from having to mine or fabricate new resources (e.g., aluminum, glass, paper, plastic, etc.) instead of recovering these resources from recycled materials. Simplifying the residential recycling collection process, collecting and composting commercial food scraps, and engaging the community with effective zero waste marketing campaigns, are programs that have helped the City progress towards its its greenhouse gas emissions reduction goals as well as zero waste goals.

While economic activity and construction have an impact on the overall amount of material disposed, Zero Waste programs have helped keep tens of thousands of tons of material out of the landfill. In 2008, 68,228 tons were disposed in landfills. By 2013, that amount was reduced to 47,088 tons. Many more tons are now recycled or composted at homes, businesses, and construction sites. The amount of recyclable materials collected and diverted from the landfill increased from about 13,000 tons diverted in 2008 to 18,707 tons in 2013. Commercial compost collection, which started in 2009, diverts over 11,000 tons per year of food scraps and food soiled paper from the landfill. For new construction, 75 percent of all material must be recycled or reused on site as part of the City's Green Building Program put into place in 2013, which superseded the Construction and Demolition Debris Ordinance of 2004.

The Palo Alto Landfill is owned, monitored and maintained by the City of Palo Alto. The municipal solid waste landfill operated from the 1930's to 2011 and is now in the closure/post-closure phase. The long-planned end use of the landfill is parkland. The Environmental Services Division in the Public Works Department is responsible for the closure and post-closure care of the landfill. By law, the City is required to monitor the landfill for a minimum of 30 years to assure it does not pose an environmental hazard resulting from the release of landfill gas or the creation/release of *leachate*—the liquid that is created inside the landfill that must be pumped out for treatment at the Palo Alto Regional Water Quality Control Plant (RWQCP). Landfill gas is collected and either combusted in the RWQCP sludge incinerator facility or flared.

Strategy:

The zero waste strategy seeks to eliminate waste wherever possible, and then manage the discards we do create through reuse and recycling. Cities tend to focus on "end of pipe" solutions to recover materials for recycling and/or composting. Palo Alto goes even further by emphasizing the elimination of waste with programs like the food waste reduction program and internal environmentally preferred purchasing policies.

For the landfill, staff has pursued two strategies to reduce greenhouse gas emissions: 1) capping the landfill; and 2) beneficially reusing the landfill gas.

Goals:

- Achieve a 90 percent diversion rate by 2021.
- Improve consumption habits and reduce the total amount material sent to the landfill.
- Provide local recycling and composting resources.
- Finalize landfill closure and conversion to parkland
- Maximize the amount of landfill gas sent to the Regional Water Quality Control Plant.

Initiatives and Activities:

Food scraps and food soiled paper, currently being landfilled, provide the greatest diversion opportunity. The collection of residential food scraps commingled with yard trimmings is scheduled to begin in July 2015. The project should yield GHG emission reductions of approximately 1,140 MT CO2e per year. A Recycling and Composting Ordinance for commercial customers, which would require commercial customers to subscribe to compost service and properly sort both their recyclable and compostable materials, was approved in concept by the Finance Committee March and will come before Council later this year. The proposed ordinance– currently planned for phased implementation beginning in early 2016, may yield GHG emission reductions in excess of 2,500 MT CO2e per year. Both the residential and commercial reduction productions, taken together, would lower emissions from landfilled food waste by 35% from 2013 levels.

The landfill is going through final closure. The closure work includes capping the remaining landfill phase by the end of 2015. Capping will reduce the amount of fugitive landfill gas emissions. In addition the landfill continues to send landfill gas to the Regional Water Quality Control Plant where it is used in their incinerator. This reduces the amount of carbon dioxide emitted by the combustion of landfill gas.

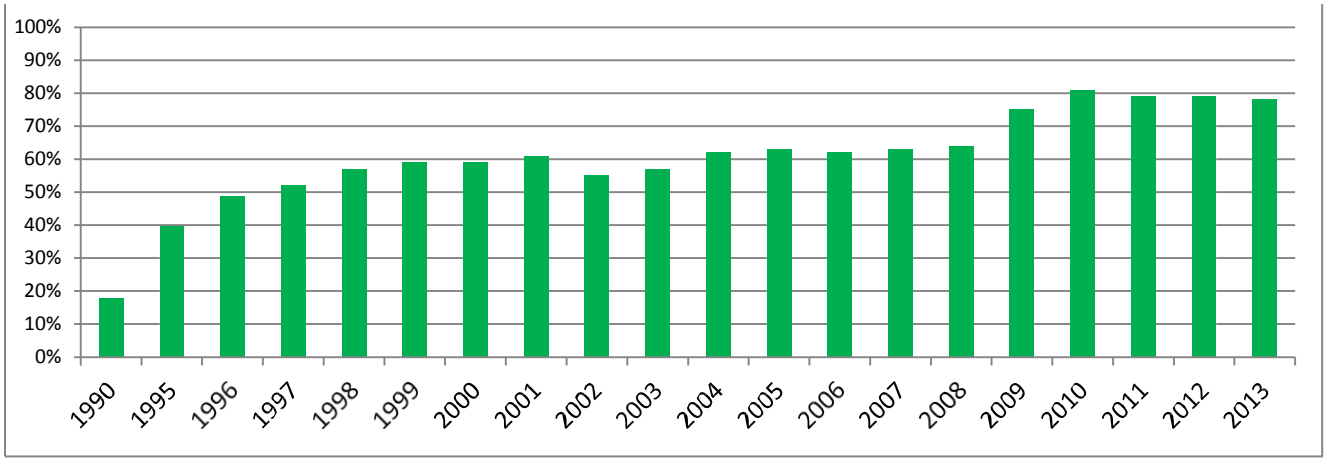
Top Sustainability Initiatives in 2014

Sustainability Initiative	**Objective**	**Outcome**
Food Waste Reduction program	Deliver outreach messages and tools to residents and businesses on how to reduce the amount of food wasted.	The quantity of waste diverted is not currently measured by the City's implementation partner.
Evaluate whether local handling of all City organics, food scraps, yard trimmings, and biosolids should be completed on the Measure E parcel at Byxbee Park.	Reduce transportation-related GHG emissions from organics processing and generate renewable energy.	Council chose not to pursue an energy or compost project on the Measure E site, mainly because of cost. Staff will propose processing residential food scraps and yard trimmings along with commercial food scraps at the Zero Waste Energy Development dry anaerobic digester in San Jose. This facility is only 15 miles away while the current composting facility is over 50 miles away.
Cap the landfill	Cap the last phase of the landfill	More than 50% of the final

	(Phase IIC) that will reduce fugitive landfill gas emissions.	landfill phase has been capped as of December 31, 2014. The remaining cap will be constructed by the end of 2015.
Increase beneficial reuse of landfill gas	Modify controls at the flare station and incinerator	Better control and metering of landfill gas to the incinerator

Data:

Annual Diversion Rate, 1995-2013



Note: Diversion rate percentages from **2008-2013 include a composite percentage calculating diversion rates for both the commercial and residential sectors.** Percentages prior to 2008 only reflect the residential sector.

Forecast: Solid Waste Related GHG Emissions in metric tons (MT) carbon dioxide equivalents (CO_2e) for the Palo Alto Landfill.

Emissions Source	2015 Emissions	2016 Emissions	2017 Emissions
Palo Alto Landfill fugitive emissions during the year	11,350	13,580	13,810

Trend: Solid Waste Related GHG Emissions in metric tons (MT) carbon dioxide equivalents (CO_2e).

Emissions Source	2005 Emissions[1] (*baseline)*	2011 Emissions	2012 Emissions	2013 Emissions	2014 Emissions *(current)*	Difference (current-baseline)	Percent Difference
Palo Alto Landfill fugitive emissions during the year[2]	6,811	9,750	4,745	7,250	9,281	2,470	36
Life cycle fugitive emissions[3]	24,823	11,586	12,725	16,221	18,474	(6,349)	26
Landfilling recyclable materials[3]	54,838	25,595	20,702	35,836	27,000	(27,838)	51

[1] *2005 GHG Emissions are baseline calculations.*

[2] *Local Government Operations Protocol (LGOP) model used to calculate greenhouse gas emissions produced by Palo Alto Landfill.*

[3] *EPA WARM model using CalRecycle landfill data used to calculate greenhouse gas emissions produced by handling and disposal of City generated solid waste.*

Challenges:

- While the amount of landfill gas that is beneficially reused by the Regional Water Quality Control Plant incinerator has been increasing, the City has hired a consultant to help analyze and optimize incinerator operation. By controlling the process, the plant will be able to improve its metering of landfill gas from the landfill flare station to the incinerator.
- Product design and packaging development is largely outside of the City's control. The City has implemented a number of internal programs to reduce packaging and waste including the banning polystyrene packaging for City purchases.
- The audience with the most control over waste sorting--janitorial and custodial staff--is challenging to reach, train, and keep informed of new programs. To address this audience, Staff, along with Spanish-language support from the City's contract trash hauler GreenWaste of Palo Alto, conducts regular trainings for employees of City facilities.
- In keeping with a City-wide "we go first" strategy, the municipal diversion rate should be equal or higher to the residential and commercial waste streams. Staff is providing training and improved signage to City departments, and has begun internal benchmarking to build awareness and engagement.

Department Name: Development Services

Background: Development Services is committed to the design and construction of high-performance green buildings that reduce the impact on natural resources and provide healthy environments to live and work.

Strategy: Development Services will continue to provide leadership in the area of green building programs and enforcement protocol. We will develop green building policy for new and existing building stock that leads the State in incorporating high performance, resource efficient buildings, net-zero energy and carbon neutral strategies, and encouraging deconstruction and recycling of construction waste, Our policies, programs, and incentives will promote energy, water, and resource efficiency across our community, resulting in occupant comfort, better indoor air quality, and better environmental quality.

Goals: Calendar year goal is to improve annual water use reduction, annual energy use reduction, and metric tons of CO2 avoided by 25% over the FY2014 data of in the area of. Our target equals a total water use reduction amount of 3.9M kBTu/year, 9.6M gallons/year of water, and 90.1 metric tons of CO2 (compared to 2014 performance data reported below). We will publish a green building survey to better track these building metrics related to building permit applications.

Initiatives and Activities: Deliver interdepartmental training enabling all development review staff and community to answer basic green building questions to the community. Gain approval on two sustainability ordinances related to green building, including the green building ordinance and the energy reach code ordinance. Continue to meet with Green Building Advisory Group for future code cycles and to resolve issues from previous review cycles. Publish a streamlined website promoting design clarity in green building policy and enforcement expectations.

Top Three Sustainability Initiatives in 2014

Sustainability Initiative	**Objective**	**Outcome**
New Green Building Ordinance	Expand and update the existing green building ordinance with new criteria that reflects current building technology.	A new green building code will be proposed to the City Council during the second quarter of 2015.
New Energy Reach Code	Conduct a cost-effectiveness study enabling the requirement of enforcing a 15% improvement beyond the energy code.	A new energy reach code will be proposed to the City Council during the second quarter of 2015.
New Green Building Compliance Process	Educate, train, and delegate green building enforcement responsibilities to staff within the Planning, Plan Check, and Inspection teams.	The new green building compliance process will be rolled out during the first quarter of 2015.
Training and Outreach	Solicit input on future building code amendments, enforce existing codes, and support	Successful outcomes include improved code compliance and increased capacity from our

	awareness and compliance with existing codes	community partners.
Electric Vehicle and Photo Voltaic (PV) Installation Permitting Streamlining	Process to move from over-the-counter permitting to on-the-web.	To be implemented in 2015
Study PV as Default for New Construction	Explore feasibility of developing "default to solar" codes and policy	To be conducted in 2015

Data:

Performance Measure Name	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
Green Building - revenue $	-	$25,808	$73,895	$94,113	$127,186	$89,911
Green Building valuations with mandatory regulations $	$80,412,694	$81,238,249	$187,725,366	$543,237,137	$569,451,035	$349,128,085
Green Building square feet with mandatory regulations	666,500	774,482	1,249,748	1,342,448	2,441,575	3,432,025
Energy savings (kBtu/yr) (sf)	0	449	3,399	1,701	1,922,532	3,141,510
Water reduction (gallons/yr)	119,500	84,539	2,119,485	4,976,775	5,580,485	7,730,840
CO2 emissions reduction (metric tons)	200	1,013	2,818	21	19,269	72,168

Challenges:

Development Services faces continuous change in the area of state, local, and federal policy—particularly policies that don't align with the specific needs of Palo Alto.

Statewide regulatory processes designed for non-carbon-neutral electricity regimes, plus problems with mandated cost-effectiveness analysis software can slow adoption of Palo Alto- appropriate green building innovations.

Maintaining an educated community of city staff, local architects, and contractors is a concern that impacts our green building and energy policy.

Development Services will be rolling out a comprehensive green building training protocol to address this challenge amongst staff and the community.

Cost effectiveness analysis that accounts for environmental costs needs to be performed to support reach codes.

Department Name: Planning

Background: The Planning and Community Environment (PCE) Department aspires to create a safe and beautiful City with diverse housing opportunities and multi-modal transportation solutions, where the natural environment is protected, where it's a good place to do business, where excellent services are provided, and where citizens have a say in government. The department is responsible for:

- maintaining and overseeing compliance with the City's Comprehensive Plan
- monitoring and enhancing the City's transportation infrastructure
- gathering and analyzing data in support of land-use and transportation policy
- reviewing projects for potential environmental impacts on the City and its residents
- complying with and enforcing the Zoning Ordinance
- reviewing commercial and home project applications
- implementing programs that support alternatives to the private automobile
- administration of the City's Community Development Block Grant (CDBG) programs
- management and implementation of the City's Housing Programs
- and oversight and implementation of the City's Historic Preservation Ordinance

Strategy: 1-2 year: Prepare an update to the Comprehensive Plan for Palo Alto, with active community input, that addressing issues related to:

- Land Use
- Transportation
- Natural Environment
- Community Services and Facilities
- Business and Economics
- Governance
- Housing

Goals: PCE's goals for the current year are:

- Incorporate the concept of sustainability into the Comprehensive Plan where appropriate and incorporate by reference the stand-alone Sustainability/Climate Action Plan that is being prepared concurrently.
- Quantify anticipated GHG emissions in the Draft Environmental Impact Report (EIR) for the Comprehensive Plan Update and identify mitigation measures that can be included policies and programs in the Plan.
- Concurrently implement transportation programs to address traffic congestion and parking demand generated by single occupant vehicles.

Initiatives and Activities: *Top Three Sustainability Initiatives in Progress*

Sustainability Initiative	Objective	Desired Outcome
Free Shuttle Service	Provide free and accessible transportation on three routes for trips through Palo Alto	Strategies are being developed to increase trip frequency and ridership, and conduct community outreach (1 year planning phase)
Parking Management	Provide parking to visitors and customers to business districts in off-street lots and parking garages	Evaluation of technologies and policies to improve management of parking in neighborhoods near business districts (2 year planning phase)
Transportation Management Association formation	Address transportation and parking concerns in Palo Alto	Opportunities to reduce the need for single occupancy vehicle trips (SOV), and provide incentives to businesses, residents, and the regional community (3 year planning phase)

In addition, PCE will:

- Begin implementation of the 2015-2023 Housing Element, which was certified by the state in January 2015.
- Examine, as part of the Comp Plan Update, whether to eliminate housing sites in south Palo Alto, and instead increase densities in Downtown and other areas with more transit accessibility and services.
- Undertake zoning initiatives to ensure the preservation of neighborhood retail and services, which contribute to the "walkability" of our neighborhoods, and we will be continuing projects to implement the City's 2013 Bicycle and Pedestrian Plan, with two dozen separate priority projects.

Challenges:

Staffing: PCE recognizes the importance of its sustainability-related initiatives, and has been challenged to hire the staff needed to implement these programs.

Comprehensive Plan Engagement: The public process for the Comprehensive Plan is the department's priority. Enrolling City department, residential, and commercial stakeholders in creating a vision for the future of Palo Alto, and developing policy that expresses that vision, takes precedence over the launch of any new programs.

Metrics and Performance Indicators: PCE recognizes the importance of using meaningful metrics to track performance of programs to meet intended resource conservation, energy/fuel consumption, or carbon

impact targets. The department is building performance tracking capacity into the programs it is currently developing (especially for mobility issues like transit, mode shift to cycling or walking, and parking) to have quantifiable evidence for program effectiveness and outcomes.

Supplemental Materials: For more information about the work being done by PCE to guide the preservation and development of Palo Alto, please explore the website to the Comprehensive Plan:

Our Palo Alto 2030: http://www.paloaltocompplan.org/

Department: Public Works– Fleet Division

Overview: The Public Works Fleet Division is responsible for maintenance, repairs, and compliance of all City of Palo Alto vehicles and equipment. The division is charged with meeting all local, state, and federal air pollution requirements and vehicle safety standards. It also conducts the proper disposal of declared surplus and acquisition of replacement vehicles and equipment. The division's mandate is to:

1. Maintain fleet availability by providing the vehicles and equipment to all of the departments daily in order for the departments to be able to provide the services to the city of Palo Alto.
2. Work with all operators, managers and departments to prevent air pollution by training the drivers on reducing idle time as well as demonstrate the proper and safe use and operation of the vehicles and equipment
3. Perform preventive maintenance inspections and repairs on a daily basis to all of the vehicles and equipment
4. Ensure regulatory compliance with the BAAQMD, BAR, CHP, DOORS, OSHA and CAL OSHA
5. Perform vehicle and equipment usage analysis to be able to identify underutilized vehicles and equipment and recommend right-sizing the number of vehicles and equipment needed in the city of Palo Alto.

Strategy: Improve fleet efficiency and reduce vehicle and equipment emission by electrifying the fleet, maintaining it in top operating conditions, and training staff in safe and efficient operation.

Goals: The Fleet Division is moving toward a low-emission transportation future with these department goals:

1. Identify new technologies and bold strategies to **reduce fleet GHG emissions 80% from 1990 levels by 2050**
2. **Reduce unleaded fuel consumption by at least 10% each year,** by scheduling replacement of all vehicles older than 10 years with current energy efficient, low emissions models**.**
3. **Meet or exceed all** regulatory requirements for air pollution reduction and air emissions required by BAAQMD, BAR, DOORS, PERP and EPA **while providing an increasingly high level of service to all members of the Palo Alto community**

Initiatives and Activities: Fleet Services is has been replacing gasoline-powered vehicles and other equipment with cars and trucks that use alternative fuels, such as compressed natural gas, or electric vehicles (EV). The City invested in a compressed natural gas (CNG) fueling station at the Municipal Service Center for the 10% CNG vehicles in the fleet. However, choices for vehicle types are limited from manufacturers. We have added some hybrid vehicles, running on 87-octane unleaded fuel, and have budgeted to replace four older sedans with hybrids in the 2015 fiscal year. We have developed a new policy (early 2015) to preference the purchase or lease for EVs over CNG, where appropriate, to take advantage of the City's carbon-neutral electricity.

Top Sustainability 2014 Initiatives and Activities:

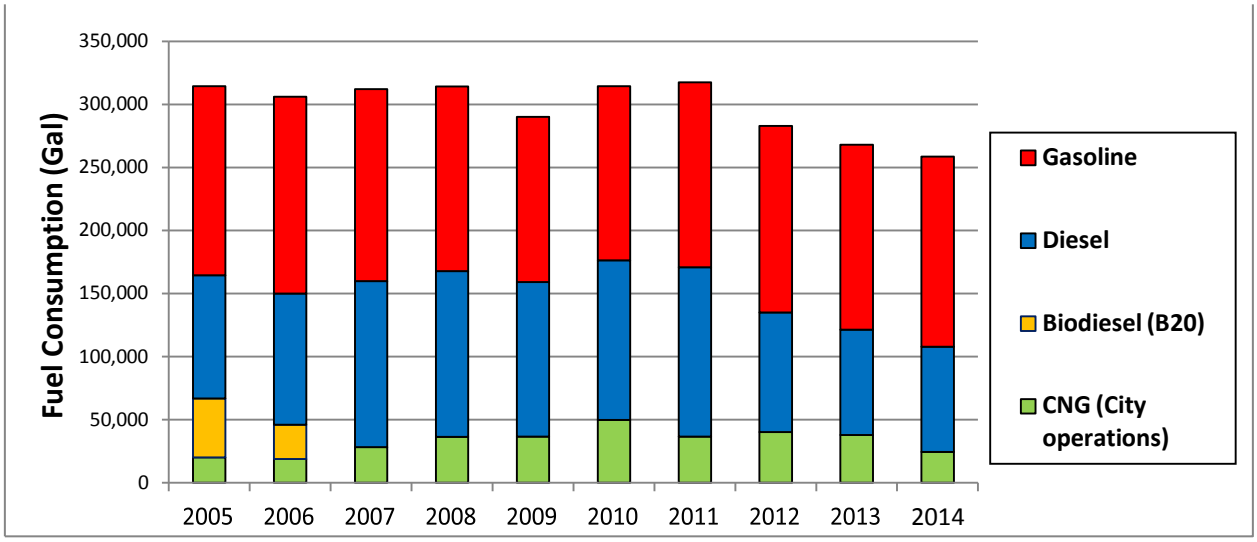
Sustainability Initiative	**Objective**	**Outcome**
Reduce Greenhouse Gas emissions	Monitor and reduce GHG emissions associated with vehicles and equipment	• Number of vehicles purchased and gas powered vehicles retired (data in progress) • 15% GHG emissions reduction from 2005 baseline through 2014?
Reduce unleaded and diesel fuel consumption in the fleet	Establish policy and procedure for the operators to minimize the idle time on the vehicle and equipment they are using. Reduce the number of vehicles and equipment in the fleet by performing a vehicle utilization analysis and identify those vehicles that could be declared surplus and sold at auction.	The City has been increasing its unleaded fuel use since 2009, and its diesel consumption has been flat for the past two years. Additional measures are needed to reduce the Fleet Services' reliance on fossil fuels—which can best be achieved by replacing older vehicles with current models.

Data:

Table: Fuel Use by Type (Gallons), 2005-2014)

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
Gasoline	149,861	156,142	152,153	146,398	131,096	137,850	146,595	147,849	146,479	**150,732**
Diesel	97,676	103,888	131,810	131,423	122,341	126,500	134,262	95,036	83,539	**83,535**
Biodiesel (B20)	46,667	27,261	0	0	0	0	0	0	0	**0**
CNG (City operations)	20,217	18,799	28,197	36,387	36,713	49,948	36,554	40,136	37,854	**24,427**
CNG (PASCO, PAUSD)	44,273	60,928	80,491	88,088	86,786	87,635	85,872	91,125	86,570	**51,492**

Fuel Use by Type (Gallons), 2005-2014



Fleet GHG Emissions (Metric Tons of Carbon Dioxide Equivalents, CO_2e), 2005-2014

Fuel Type	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Gasoline	1,316	1,371	1,336	1,285	1,151	1,210	1,287	1,298	1,286	1,323
Diesel	997	1,061	1,346	1,342	1,249	1,292	1,371	970	853	853
Biodiesel (B20)	381	223	0	0	0	0	0	0	0	0
CNG (City operations)	139	129	193	250	252	343	251	275	260	168
CNG (including PASCO, PAUSD)	304	418	552	604	595	601	589	625	594	353
Total Emissions	**2,833**	**2,783**	**2,875**	**2,877**	**2,652**	**2,845**	**2,909**	**2,544**	**2,399**	**2,344**
Percent Change from 2005 baseline	-	-1.8%	1.5%	1.6%	-6.4%	0.4%	2.7%	-10.2%	-15.3%	-17.3%

Challenges:

Existing fleet fueling data system is unable to consistently provide information needed to effectively manage fuel use, and requires upgrade. The department is exploring the feasibility of identifying a fleet and fuel management software solution. The least expensive option may not be the most effective option on a “total cost of operation” [TCO] basis.

Programs designed for traditional fleet maintenance goals haven’t been focused on meet the bold target of 80% GHG reduction by 2050; the department needs to develop new programs and manage its performance to achieve its incremental annual reduction targets.

Fleet’s vehicle replacement was developed when CNG fueling was the environmentally preferred option; with the advent of carbon-neutral electricity, EVs are now preferred from an environmental perspective.

However they can be less desirable replacement options than current model gas-powered vehicles for many service requirements. Lowest first cost requirements and separation of capital costs and operating costs can prevent acquisition of most the cost effective fleet, so staff is developing operating policies to prudently preference EVs where appropriate. As price/performance factors improve, it may be appropriate to revisit and in some cases accelerate existing replacement cycles.

Supplemental Materials:
Greenhouse Gas Reduction from Fleet Division: Section 12 in 2015 Clean Bay Plan, available at cleanbay.org.

Reduced unleaded and diesel fuel consumption in the fleet: Section 12 in 2015 Clean Bay Plan, available at cleanbay.org.

Compliance with regulatory and policy requirements to reduce other priority air pollutants in the atmosphere: 2015 CleanBay Plan report, located at cleanbay.org.

Department: Public Works–Watershed Protection

Background: The Public Works–Watershed Protection Division assists the Regional Water Quality Control Plant (RWQCP) in reducing pollutants entering the Bay through award winning pollution prevention, pretreatment, stormwater and air management programs. Since 1990, the goals of Watershed Protection have been to:

1. Treat wastewater from the RWQCP six-community service area of East Palo Alto Sanitary District, Los Altos, Los Altos Hills, Palo Alto, Mountain View, and Stanford;
2. Work with industry and businesses to prevent pollution;
3. Ensure regulatory compliance with the RWQCP wastewater permit, air permit, and as a co-permittee in the Municipal Regional Stormwater Permit shared by all municipalities in the nine-county Bay Area, and;
4. Provide residential services and education to prevent pollution in Palo Alto's creeks and San Francisco Bay.

Strategy: Given strict stormwater and wastewater permit requirements, Palo Alto must explore all feasible methods of reducing its metals and toxic organic pollutant discharges to San Francisco Bay. After initially focusing on pretreatment programs at major industrial facilities, the RWQCP expanded its efforts to include commercial and residential programs. Strategies include:

- Commercial and industrial: Integrating pollution prevention into business requirements via ordinance and incentives such as the Clean Bay Business Program.
- Residential: Providing programs with collection services for pollutants of concern (e.g., pharmaceuticals and sharps) and extensive public outreach including., classroom presentations throughout the RWQCP service area ongoing informational campaigns coordinated locally, regionally and state-wide; workshops, tours and special events.

Key 2014 Goals: The RWQCP had several 2014 goals to reduce industrial and residential pollutants for stormwater and wastewater, including the following higher-profile efforts:

1. Identify strategies to reduce greenhouse gasses (GHGs) associated with wastewater treatment and continue to meet goal of 20% reduction from 2005 emissions;
2. Reduce salinity in RWQCP recycled water to 600 ppm total dissolved solids (TDS); evaluate other metrics of salinity that may be more appropriate and consider proposing policy revision;
3. Meet the 40% trash reduction (volume) target in Palo Alto creeks, streets and Bay shoreline as part of the Municipal Regional Stormwater Permit requirement;
4. Continue to meet regulatory requirements for additional pollutant reduction in stormwater, wastewater and air emissions as required by relevant RWQCP permits.

For a complete summary of 2014 pollution prevention efforts see the 2015 CleanBay Plan report located at cleanbay.org

Top Three Sustainability 2014 **Initiatives and Activities:**

Sustainability Initiative	Objective	Outcome
Greenhouse Gas Reduction from RWQCP	Continue to reduce and track GHG emissions associated with wastewater treatment.	1. RWQCP direct & indirect GHG emissions have reduced to 4,616 metric tons of carbon dioxide equivalents (MT CO2e), a 59% reduction since 2005. This reduction marks the continuous achievement of the goal set forth in the 2010 update to the City of Palo Alto's Climate Protection Plan: 20% reduction of City GHG emissions below 2005 emissions by 2012. 2. The RWQCP purchases carbon neutral power from the City's electricity portfolio. The RWQCP will consider purchasing natural gas from the new green gas portfolio in 2015. 3. In early January, 2015, Council approved a contract with CH2M-Hill to design the facilities needed to phase out the City's sewage sludge incinerator as soon as possible – a dewatering and truck off-haul facility. This is expected to greatly reduce RWQCP GHG emissions. Note: For more information, see Section 11 in 2015 Clean Bay Plan available at cleanbay.org.
Recycled Water Salinity Reduction	Reduce salinity (total dissolved solids) to 600 parts per million (ppm) per City policy to increase quality of recycled water for irrigation in Palo Alto and surrounding communities.	Salinity levels are declining. In 2014 the annual average was 841 ppm total dissolved solids down from 1,100 ppm total dissolved solids in 2008. Successes in salinity reduction are attributed to ongoing efforts to line sewer pipes in the RWQCP service area to reduce saltwater intrusion. Note: For more information, see Section 12 in 2015 Clean Bay Plan available at cleanbay.org.
Trash Reduction in creeks, streets, and along Bay	1. Meet Municipal Regional Permit Requirement of 40% trash reduction by 2014 along Palo Alto creeks and shoreline (current requirement is 60% by 2017 and 100% reduction by 2021, however, this target may change as the permit is being reissued this year). 2. Report to Council with implementation update on 2013 Bag Ordinance Expansion.	In December 2014, The Regional Board confirmed that Palo Alto had met its 40% trash reduction requirement.* The City of Palo Alto claimed 60% trash reduction. Due to evolving quantification standards, the Board is authorizing the 40% milestone and clarifying its metrics for how 60% will be achieved before authorizing Palo Alto's reported 60% milestone. The Regional Board is still in the process of verifying and reviewing the quantification standards for trash reduction. Reduction is currently quantified based on on-land visual assessments (i.e. monitoring of trash reduction activity success) and the success of product bans. 1. In early 2015, RWQCP staff confirmed several indicators of success with the 2013 expansion of Palo Alto's Bag Ordinance**: a. 76% of customers at pharmacies and large grocery stores now use reusable bags or no bag when making their purchases; b. A comparison of litter counts at the Matadero creek clean up events between 2014 and 2012 shows an 85% reduction in total plastic check out

		bag litter (151 bags compared to 23 in 2012 and 2014 respectively); c. Retailers and food service establishments are largely in compliance with key ordinance provisions. * More info located in the Long-Term Trash Plan www.cityofpaloalto.org/civicax/filebank/documents/43934 and the 2013-14 Stormwater Annual report: www.cityofpaloalto.org/civicax/filebank/documents/39505 ** For more information, see Section 7 in 2015 Clean Bay Plan available at cleanbay.org. In addition, a complete update on the impacts of the 2013 Bag Ordinance expansion is summarized in CMR #5278, March 2, 2015).

Data:

1. RWQCP GHG Emissions Data

The RWQCP GHG emissions are categorized into 3 main components: Scope 1 – direct GHG emissions from the combustion of gases and sewage sludge in the incinerator as well as emissions from the treatment process itself (i.e. process and effluent discharge emissions); Scope 2 – electricity usage GHG emissions; and Scope 3 – biogenic GHG emissions from the combustion of sewage sludge and landfill gas in the incinerator.

RWQCP GHG emissions decreased by 59% since 2005 mainly due to the increased purchase of green power electricity, increased use of landfill gas as a replacement for natural gas in the incinerator afterburner, and decreased incinerator hearth natural gas usage due to incinerator tuning (Figures 1-3). RWQCP Scope 1 and 2 GHG emissions decreased by 8% from 2013 to 2014 mainly from decreased effluent discharge emissions caused by decreased effluent nitrogen loads. RWQCP natural gas usage, and its associated GHG emissions, increased slightly in 2014 from the previous year due to the decreased availability of landfill gas for incinerator auxiliary fuel. Landfill gas is often unavailable due to maintenance and/or quality control; when landfill gas is unavailable, natural gas must be used instead. Additionally, the RWQCP runs one incinerator at a time (typically for a year) while the other is undergoing preventative maintenance. Although the incinerators are the same make and model, they vary in natural gas requirements and could explain part of the yearly differences in natural gas usage. RWQCP GHG emissions as reported to the California Air Resources Board may differ from the values presented in Table 1 due to different high heat values, global warming potentials, and/or emission factors. GHG emissions reported in Table 1 were calculated using a static document, the Local Government Operations Protocol, Version 1.1 (2010) for analysis of historical trends and reductions; in contrast, the California Air Resources Board has periodically updated their GHG calculation methods to better reflect recent advances in science and federal regulations.

Table 1: RWQCP Historical Greenhouse Gas (GHG) Emissions*

	2005	2012	2013	2014
Scope 1 & 2 Emissions – Direct & Indirect (MT CO2e)	11,269	4,659	5,024	4,616
Scope 3 Emissions – Biogenic (MT CO2e)	16,689	15,602	11,183	11,385

**Calculated using the Local Government Operations Protocol, Version 1.1; not equal to what is reported to the California Air Resources Board due to updated high heat values, global warming potentials, and/or emissions factors. GHG emissions are not normalized for hydroelectric supply and excludes Palo Alto Green Purchases.*

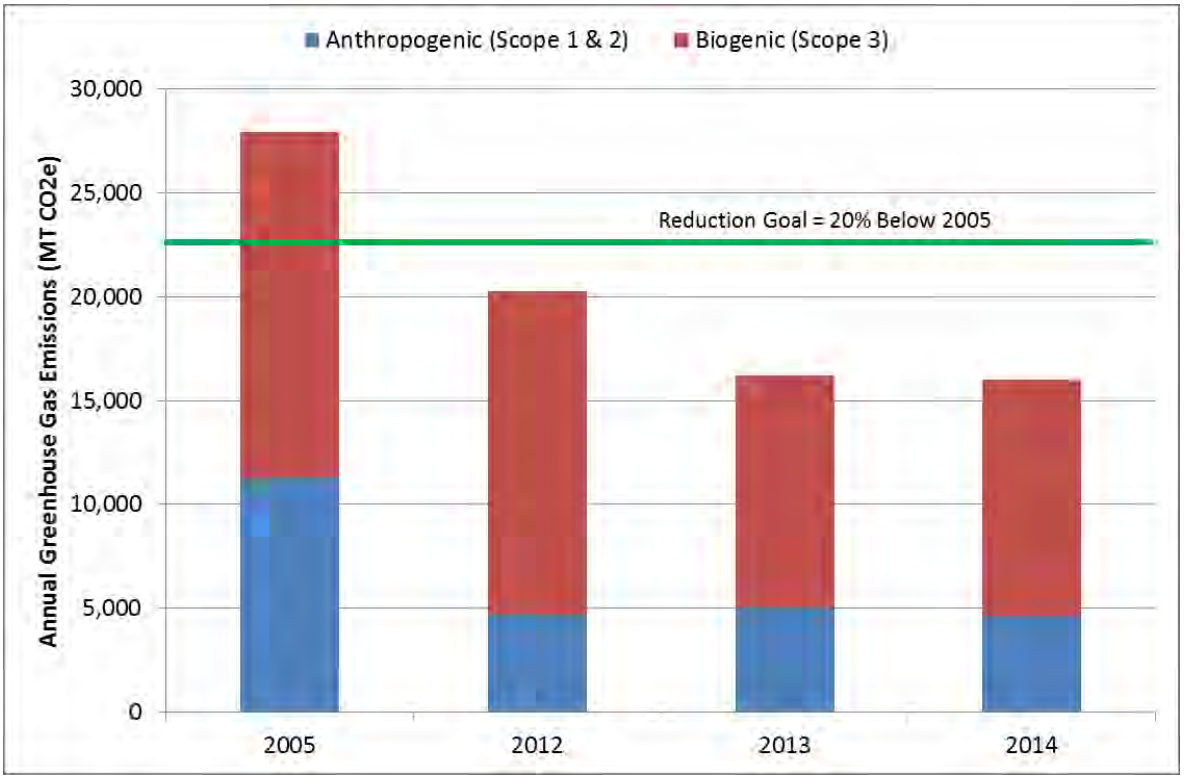


Figure 1: RWQCP Greenhouse Gas Emissions as Calculated by the Local Government Operations Protocol, Version 1.1 (2010)

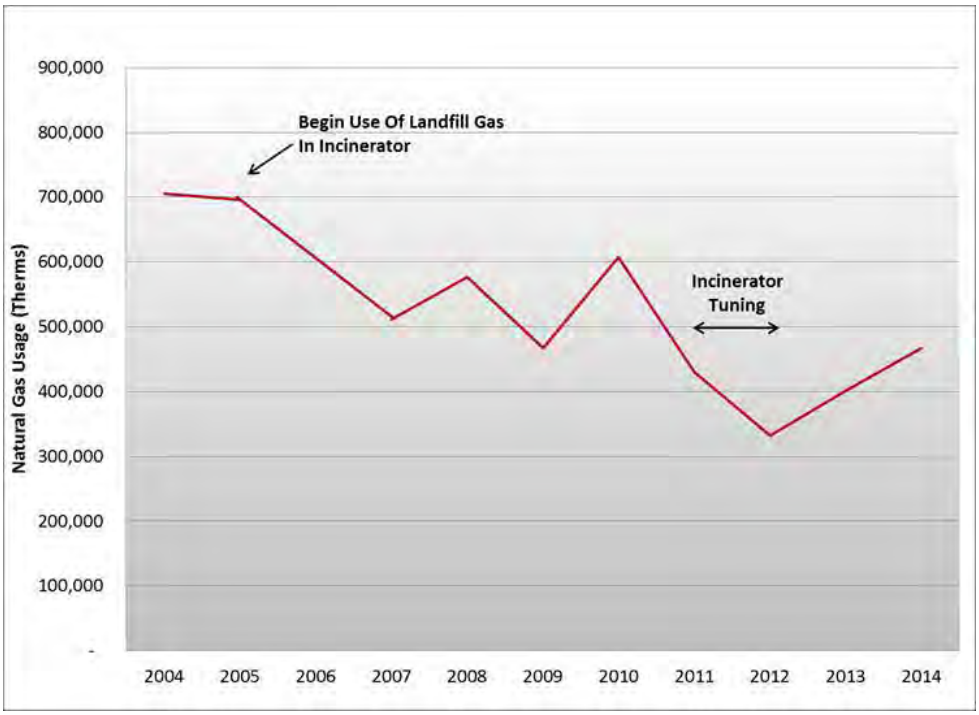


Figure 2: RWQCP Historical Natural Gas Purchased (for 2005 – 2011 data may be taken from internal meter vs. utility bills; however internal meter captures +95% of natural gas purchased)

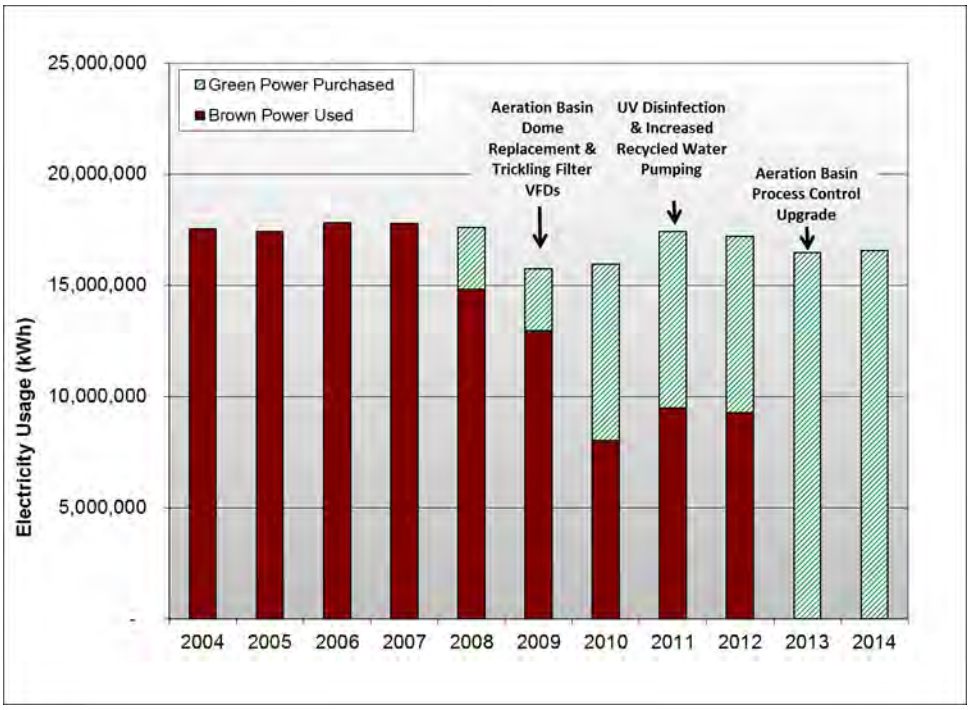


Figure 3: RWQCP Historical Electricity Usage

2. Recycled Water Salinity Reduction Data

The RWQCP analyzes Recycled Water salinity using numerous metrics: total dissolved solids (TDS), sodium adsorption ratio (SAR), and specific conductivity. RWQCP and its partner agencies (referenced above in "Background") are taking efforts to decrease salinity entering the RWQCP from their collection systems (Figure 4). For example, the City of Mountain View decreased their TDS loading to the RWQCP by 40% from 40 tons/day in 2008 to 23.5 tons/day in 2014 (Figure 5). Similar decreases were seen in Mountain View's SAR and specific conductivity.

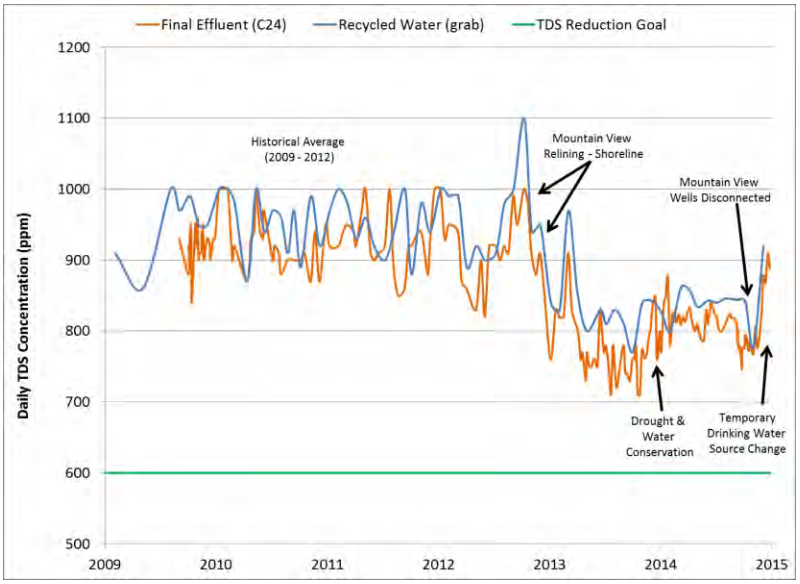


Figure 4: RWQCP Daily Total Dissolved Solids (TDS) Concentration (used as an indicator of salinity)

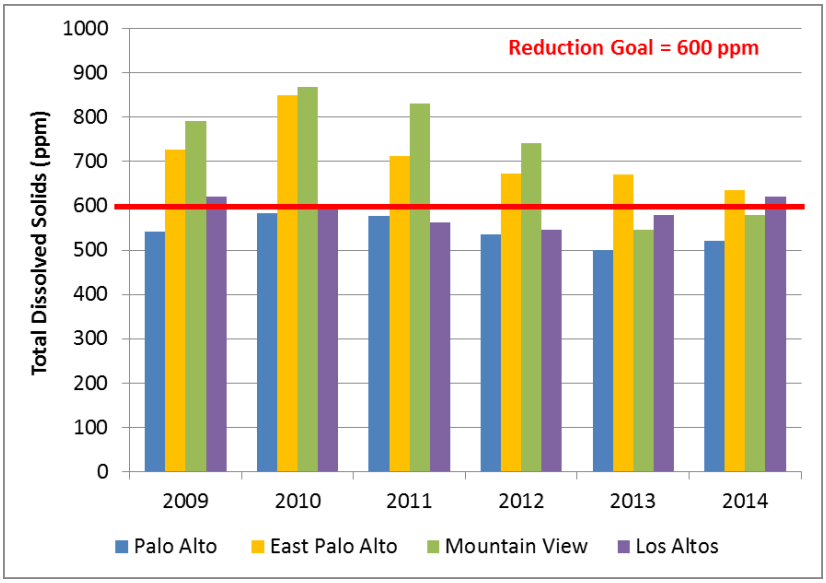


Figure 5: Average Total Dissolved Solids (TDS) by RWQCP Partner Agencies (Stanford is included in Palo Alto and Los Altos Hills is included in Los Altos data).

3. Continue to meet regulatory requirements for additional pollutant reduction- The RWQCP has many numerical and programmatic regulatory requirements for pollutant reduction. An annual report of compliance and programmatic achievements is provided at cleanbay.org.

Challenges

1. **Future GHG Reductions-–**The RWQCP has made large reductions in GHG emissions over the past 5 years due to incinerator tuning, landfill gas replacement of natural gas in the afterburner, aeration basin optimization, and installation of variable frequency drive lift pump controls for the trickling filters. Ongoing RWQCP optimization will continue, however the major GHG reductions from optimization projects have already occurred. Future GHG reductions will be largely contingent on future plans to phase out sewage sludge incineration expected in 2019, the availability of landfill gas as a replacement for natural gas in the incinerator, and the source of natural gas. Landfill gas is used as much as possible in the incinerator afterburner. However the lower quality of landfill gas requires that natural gas continue to be used in other areas of the incinerator. Additionally, maintenance requirements on the landfill gas collection and distribution system varies from year-to-year and often makes landfill gas unavailable for RWQCP use thus requiring more natural gas be used during those times. The RWQCP is considering purchasing green natural gas, however this decision would have to be approved by the RWQCP partner agencies and/or be a City-wide decision, and subject to an analysis of all relevant policy, legal and regulatory implications of such a strategy.

2. **Drought and Increased Economic Activity:** Drought conditions in the service area have increased water conservation efforts and significantly decreased flows entering the RWQCP (14% from 2009 to 2014). Additionally, the recent economic recovery and growth in the service area (for example the increase in Google employees) increases the daytime population that increases inputs to the RWQCP from toilet flushing versus more dilute inputs such as showering. Decreased flows combined with increased daytime populations have a combined impact of increased loads and concentrations of pollutants such as ammonia and total dissolved solids. Higher pollutant loading and concentrations strain the current treatment process that was originally designed for treating more dilute wastewater. As such, unexpected challenges arise. For example, the RWQCP violated its NPDES permit limit for pH in December 2014 indirectly due to the increased ammonia and decreased flow entering the RWQCP (Figure 6). The RWQCP was able to quickly install a temporary solution until a more permanent one could be designed and constructed, but this issue is anticipated to pose continued challenges with meeting permit limits and internal goals (such as salinity reduction goals) should drought become more common with predicted climate change.

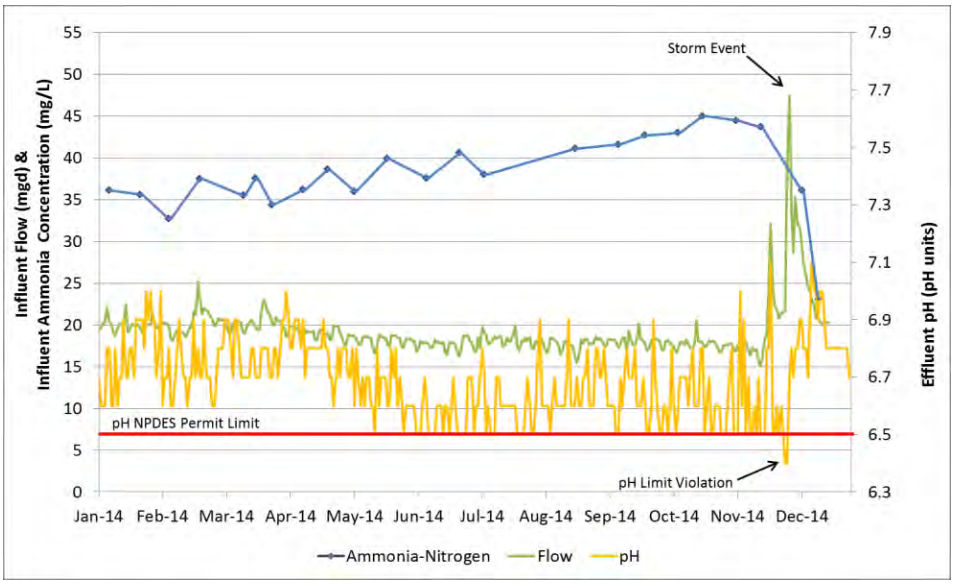


Figure 6: Example of Impacts from Drought and Increased Economic Activity on Wastewater Characteristics

3. **Recycled Water:** Primary challenges are to continue with relining targeted pipes throughout RWQCP service area to reduce saltwater intrusion, expand recycled water distribution (EIR is in process to extend to west Palo Alto), and public education on the value, high quality, and appropriate use of recycled water to accelerate acceptance of recycled water use. In addition, in 2014, the drought coupled with water conservation and increased economic activity caused the salinity (measured as total dissolved solids) to increase since there is less dilution. Refer to Challenge No. 2 for more details on drought and increased economic challenges.

4. **Trash Reduction:** The primary challenge is measuring the impact the City's programs have on the amount of trash in the creeks and Bay since trash is also transported to creeks and the Bay via wind and direct dumping and not only via the storm drain system. This is a challenge faced by all stormwater co-permittees (the regional stormwater permit is shared by cities in all nine Bay Area Counties). Palo Alto will continue its programs to manage illegal dumping and to provide clean-up events in an effort to address this challenge.

5. **Continue to meet regulatory requirements for additional pollutant reduction:** While the RWQCP continuously seeks to meet or exceed its regulatory requirements, policy commitments and sustainability goals, many pollutants are contaminants that cannot be removed through the wastewater treatment process (e.g., pharmaceutical and personal care products that are excreted or washed into the sanitary sewer system from residents throughout the RWQCP service area). Regulatory challenges restrict the ability of the RWQCP to make some desired changes (e.g., local agencies cannot restrict the sale of pesticides).

Supplemental Materials:

2015 Clean Bay Plan

Department Name: Administrative Services Department (ASD)

Background: ASD provides financial, analytical, budget, strategic and administrative support services for City departments. The Purchasing Division has lead responsibility for implementing city policies to incorporate sustainability considerations into the City's purchasing processes.

Strategy: The Purchasing Division works closely with the City's interdepartmental Green Purchasing Team to bring sustainably sourced, produced and delivered products and services to all municipal departments, and to provide track and evaluate the success and impacts of these programs.

Goals: To increase the City's purchasing of green alternatives in goods and services and to embed green purchasing into the organization in partnership with the City's Public Works–Environmental Services Division. To eliminate the use of paper for managing solicitations by moving to an entirely electronic process.

Initiatives and Activities: The City's award-winning green purchasing program has "greened" structural and landscaping pest control, custodial supplies, office supplies, certain computer and monitor standards, and copier and printer performance requirements. We have eliminated the use of certain plastic products and pesticides prohibited by City policy, and made significant strides to reduce pollutants such as mercury and dioxins that are associated with the purchase of City supplies.

Top Three Sustainability Initiatives in 2014

Sustainability Initiative	**Objective**	**Outcome**
Develop 2015-2017 green purchasing goals, objectives, tasks and timeline to further embed Green Purchasing Palo Alto operations.	Develop a three year plan building on efforts of previous years' work. Develop "default to green" options where appropriate.	Drafted a three year plan (2015-2017) which includes green purchasing goals, objectives and a timeline. *See supplemental materials for plan timeline, recommendations and related policy.*
Continue to iteratively green prioritized goods, services and purchasing operations.	Prioritize high-dollar and high carbon footprint purchases, and target opportunities to reduce waste, pollution and maximize energy efficiency.	1. Increased the purchase of green office supplies via Staples contract and blocked key items from purchase on this contract including: foam foodware, pesticides, virgin copy paper and antibacterial soaps. 2. Configured online purchasing of office supplies to simplify and encourage the purchase of 100% recycled content copy paper and remanufactured toner cartridges. 3. Increased green office supplies in FY2015 4. Began process to improve copier contract to improve performance of required preset duplexing.

Implement eProcurement	Use new eProcurement system to build in green purchasing objectives into solicitations and reduce paper use and storage.	Increase instances where green initiatives are included in solicitations with related response from vendors

Data: Data hasn't been analyzed, but partial data is available, via Staples.

Challenges

ASD is working with vendors and the Office of Sustainability to ensure that reporting systems, both internal and from vendors, provide sufficient information to evaluate and manage the initiative.

Supplemental Materials:

- Green Purchasing Recommendations
- 2015-2017 Green Purchasing Workplan
- Green Purchasing Policy

Department Name: Library

Background: In addition to bringing the Mitchell Park Library and Community Center online in 2014 – which is on track to being LEED Platinum certified (the highest level for LEED) – the Palo Alto community also enjoyed the completion of the Rinconada Library renovation in 2015, which included ecological upgrades and is also on target for being LEED certified.

The Library also provides educational opportunities that provide users with tools for reducing waste and energy.

Strategy:

The Mitchell Park Library not only works at the highest efficiency level possible, it also informs the public on conservation – through displays throughout Mitchell Park Library. As a library, information is the most critical resource we offer the public. The Library also provides space for the public to engage and discuss conservation. In addition to library buildings we offer a wide range of programs, books (that are continuously reused) and other forms of information to assist customers in learning more about their opportunities to conserve.

Here are some programs coming up:

- Meet Author, Jaimie Hicks, Planning for Community Resilience: A Handbook for Reducing Vulnerability to Disasters (February 24, 2015)
- Meet author Evelyn Hadden, Hellstrip Gardening: Create a Paradise Between the Sidewalk and the Curb (March 19, 2015)
- TBD..Author event on Tactical Urbanism

Similar programs listed under Initiatives and Activities for 2014 will also be offered in 2015.

Initiatives and Activities:

Here are some of the Library's activities from 2014:

4/16 Going Green – Worm composting for kids (Kids)

4/30 Fabulous Dishes, No Shopping Required – Using food you already have in the cupboard to make great dishes (Adults)

5/14 Green Shopping – Refresh your wardrobe the eco-friendly way (Adults)

7/26 Urban Farming with Chickens – Raising chickens and growing a vegetable garden (Adults)

Top Three Sustainability Initiatives in 2014

Sustainability Initiative	**Objective**	**Outcome**
Two new energy efficient buildings	Significantly reduce carbon footprint and waste.	See Public Works for details on conservation through better design and functioning of library buildings.
Promote conservation through library programs.	Provide participants with tools at reducing energy and waste.	Customers and staff of the Library will reduce waste and conserve as a result of the information they learn at our programs.
Promote conservation with environmental tips through digital media.	Reach all library users with tools for reducing energy and waste.	Customers and staff of the Library will reduce waste and conserve as a result of the information they learn through our media.

Challenges: The Library's books are still shipped from other systems and within the Library's system. The Library relies on vans that depend on fossil fuel. The Library, while using energy efficient equipment, nevertheless, relies on automation that requires high energy usage.

Department Name: The Office of Emergency Services (OES)

Background: The Office of Emergency Services works with all City departments to promote resilience to threats and risks of all types.

Strategy: The mission of the Office of Emergency Services is to prevent, prepare for and mitigate, respond to, and recover from all hazards. These hazards were recently codified in the Threat and Hazard Identification and Risk Assessment (THIRA) that was presented to City Council in September 2014 (www.cityofpaloalto.org/thira). The THIRA lists a number of hazards that either directly (criminal sabotage or cyber attack) or indirectly (storm that knocks out power) could endanger critical utilities and fuel supplies.

Goals: OES is working with the Chief Sustainability Officer, the Public Works Department, Utilities, and other staff to bolster "energy assurance" for key facilities. For example, OES is investigating whether the design of the new Public Safety Building (PSB) should incorporate microgrids, islanding, and other alternative energy elements to reduce dependence on 1) the power grid and 2) diesel fuel for generators, especially during prolonged incidents. OES also operates a number of vehicles and portable equipment, such as the Mobile Emergency Operations Center (MEOC). OES is investigating solar-battery generator trailers as a means to similarly improve energy resilience for those key assets. OES is even seeking to acquire an all-electric All-Terrain Vehicle (ATV) for rescue operations and routine use.

Initiatives and Activities: In addition to these energy assurance efforts, OES leads a number of other community resilience efforts, including the Emergency Services Volunteer (ESV) program that encompasses CERT, Neighborhood Watch, and other programs (www.cityofpaloalto.org/emergencyvolunteers), support of Stanford University and affiliates (such as Stanford Hospital), regional public safety planning efforts, regional training programs, coordination with private sector entities for emergency response and recovery, technology development for public safety, grant management, and other all hazards activities. OES believes that the development of local resources, including, for example, locally-grown farm-to-table food (Victory Gardens!), is not only good for the environment but will help us through a crisis.

Challenges: The department has a number of initiatives it wants to develop and implement, but could use stronger project management capacity. Enhanced interdepartmental cooperation can accelerate implementation of safety programs that interconnect across City Operations.

Department Name: Office of Sustainability, City Manager's Office

Background: The Office of Sustainability (OOS), established in December 2013, is responsible for working with other City departments to develop and implement a world class sustainability strategy for Palo Alto that improves quality of life, grows prosperity and builds resilience, while protecting and improving the living systems that sustain us—and leads Palo Alto to recognized as one of the greenest cities in America.

Strategy: OOS focus for its first year of operation was to create the platform, strategy and resources to deliver on that mission, while advancing key existing and new programs. Priorities included establishing cross-departmental governance process; conducting initial reviews and assessments of City sustainability initiatives, policies, operations and impacts, and identifying priorities for improvement; reactivating the employee Green Team; initiating a new sustainability and climate action plan (S/CAP); and engaging staff, Council and community in these efforts as appropriate.

Goals:

- Establish bold, coherent & grounded goals, strategy and plans, including the S/CAP
- Integrate sustainability programs and practices into City operations & Community actions, including management systems, procurement, finance and training.
- Foster experimentation, alliances & big leaps, such as exploration of potential opportunities for electrification, "mobility as a service," "net positive" initiatives and smart city initiatives.

Initiatives and Activities:

Strategy: Together with a great consulting team and key city staff, we have framed and are developing a new sustainability and climate action plan (the City's first since 2007), that will once again put Palo Alto in the forefront of sustainability strategy. We have held an invitational expert charrette, and an open call community "Ideas Expo" at which more than 75 people presented poster sessions and other ideas; convened an "executive advisory board"; have provided interim briefings to City Council on developing themes; are planning a community climate summit, and participation in the CompPlan Summit, this spring; and plan to present the draft plan, including roadmaps, before the end of FY15. OOS is implementing a sustainability performance dashboard to collect accurate data across all municipal activities, produce timely reports for management and the public, and provide a fact-based foundation for bold strategic thinking. This platform is designed to reduce staff time on these tasks, improve transparency and auditability, and give Council and city managers actionable and timely data to optimize their activity and drive performance.

Implementation: Reactivated the staff GreenTeam, with more than 60 people participating; worked with Development Services and Utilities to advance the City's Green Building and EV ordinances and programs; implemented "default to green" for office products procurement (for estimated savings $9,000 per year) and fleet procurement (estimated lifecycle savings of $5,000-$15,000 per vehicle);

prioritized carbon impact of city spend; developed SharePoint database of 150 city sustainability initiatives; developing SharePoint database of all sustainability policies; streamlined commute alternatives management (estimated savings TBD); initiated “lean” training for three managers; and are streamlining performance reporting processes (estimated savings TBD).

Innovation: OOS is coordinating a multi-departmental staff effort, as directed by Council[1], to evaluate the potential for a citywide electrification strategy; has convened and are supporting a region-wide strategy with Joint Venture Silicon Valley to transform transportation, collaborating with Finland's Ministry of transportation and communications "mobility as a service" initiative; is working with the Net Positive Silicon Valley project, and the Living Futures Institute, among others, to support and develop neighborhood scale pilots the demonstrate advanced sustainability strategies; conducted initial evaluation of the “scope three” GHG emissions of City operations; initiated one of two global pilots (the other is with the UN) exploring how government policies could concretize sustainability’s commitment to future generations”; works closely with peer networks such as Green Cities California and the Urban Sustainability Directors Network, including multi-city collaborations on alternative mobility, smart cities, and sustainable procurement; has submitted $1.5 million worth of funding applications, and procured the eCivis funding database to improve funding effectiveness.

Key Initiatives:

Sustainability Initiative	**Objective**	**Outcome**
S/CAP	Establish bold, coherent & grounded goals, strategy and plans for continue City leadership in climate crisis response	In development; draft late Spring 2015
Sustainability performance dashboard	Streamline collection and analysis of sustainability performance data across all municipal activities	Being deployed. Will produce timely reports for management and the public, and provide a fact-based foundation for bold strategic thinking
Operational efficiency	Embed “default to green” in Citywide operations	Initial projected savings of $9,000 per year for office products procurement and estimated lifecycle savings of $5,000-$10,000 per vehicle for fleet EV procurement
Mobility	Pilot local and regional "mobility as a service" initiatives	In development; goal: “make it more convenient for anyone, anywhere, at any time to not have to get into a car and drive.”

[1] http://www.cityofpaloalto.org/civicax/filebank/documents/45640

Challenges:

Staffing: The work has been performed by a single staff member (the Chief Sustainability Officer) until November 2014, when two hourly staff were hired to lead fundraising, outreach and data analytics. While much of OOS's work must be done collaboratively with other departments' staff, cities with comparable sustainability aspirations and commitments tend to have **larger core sustainability teams** and/or formal part-time assignment of other staff to sustainability functions.

Data Transparency: The process of generating the Earth Day Report for the last two years has demonstrated the need for increasing clarity, auditability, and strategic use of data. Current data management processes are time consuming, with more manual data entry and spreadsheet calculation than we would like, or are based on infrequent modeling. **Sustainability performance data can be used more consistently and help improve operations**.

Organizational Culture: City staff work hard, but are often absorbed by immediate concerns, with **inadequate bandwidth and competing demands that can reduce time for long-term, reflective thinking**.

Enterprise-wide Engagement: The City's full potential will be achieved with **coordinated, interdepartmental cooperation**. While the Sustainability Board provides that mechanism formally, as in any organization, collaboration can be enhanced. As we make systemic improvements across City operations, organizational alignment under the common goal of reducing emissions and improving quality of life will accelerate.

Attachment E: Sustainability Policy & Organization Structure

Shown below is the City's Sustainability Policy approved by the Council in 2007.

POLICY AND PROCEDURES 5-01/MGR
First adopted in April, 2000
Revised June 18, 2007
CMR: 260:07

SUPPORT FOR SUSTAINABILITY

POLICY STATEMENT

It is the intent of the City of Palo Alto to be a sustainable community – one which meets its current needs without compromising the ability of future generations to meet their own needs. In adopting this policy, the City of Palo Alto accepts its responsibility, through its operations, programs and services to:

Economy: Maintain a healthy, thriving and well-balanced economy comprising a blend of large and small business, which encourages the development of independent businesses and is resilient to the economic changes common to California's economy

Social Equity: Continuously improve the quality of life for all Palo Alto community members without adversely affecting others

Environment: Enhance the quality of the air, water, land and other natural resources by minimizing human impacts on local, regional and global ecosystems through greater conservancy, reduced pollution, increased efficiency, and protection of native vegetation, fish, wildlife habitats and other ecosystems.

In working toward these goals, the City will, when appropriate, align and partner with community groups, businesses, non-profits, and neighboring communities.

NOTE: Questions and/or clarification of this policy should be directed to the City Manager's Office.

Organizational Structure to Facilitate Sustainability Actions and to Achieve Goals

City Manager determined that the City's many cross-departmental environmental sustainability activities requires a clear organizational structure to succeed. In preparation for the recruitment of the new position of Chief Sustainability Officer (CSO), roles and responsibilities for each part of the organization was established.

Sustainability Board: Comprising of Directors from key departments, will establish the vision and goals for the overall effort, approve the CSO's work plan, and identify and approve resources to complete the work plan tasks.

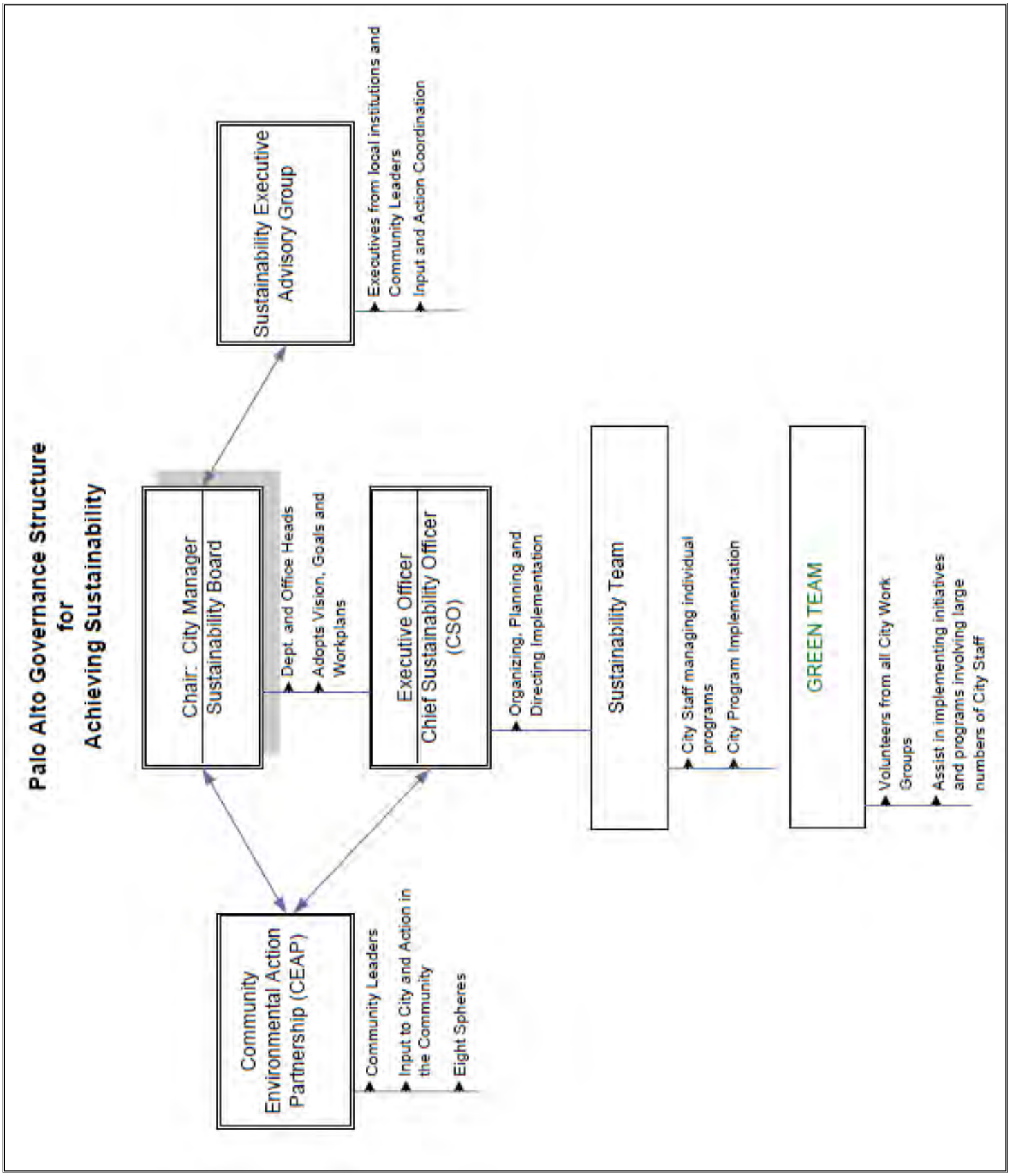
Sustainability Executive Advisory Group: To solicit input from outside the City, the City Manager will organize and lead such an ad hoc group, whose membership will include key executives from Palo Alto institutions, community leaders, and representatives from Stanford and large companies. The function of the group is to give advice and feedback to the City Manager, get input from the "real world", forge and leverage international relationships/partnerships, build excitement, and model and motivate behavioral changes.

Chief Sustainability Officer: The CSO will report to the City Manager and take direction from the Sustainability Board. A critical task of the CSO is to develop the long-term sustainability work plan and prioritize tasks for each fiscal year. The CSO will work with a larger group of individuals from many City departments to complete the tasks on the work plan. That larger group, the Sustainability Team, will organize itself into committees to implement the work plan as prioritized by the CSO. Participants in the Sustainability Team will be embedded in job descriptions and annual appraisals to ensure that team members understand that the sustainability work plan tasks are key City priorities. The CSO will also be responsible for community outreach on sustainability efforts and will act as the co-chair of community based Community Environmental Action Partnership (CEAP).

Green Team: This is a long standing individual employee initiative driven team with voluntary membership. The Green Team includes employees from many work groups and has historically been project-based with the goal to complete projects and a bias towards action. This group of engaged employees will be a valuable asset for the CSO to work with as they act as ambassadors to their own work groups and spread the word on sustainability throughout the City. Many Green Team members will also be on the Sustainability Team. The CSO will act as the liaison to the Green Team co-chairs and will convey information to and from the Sustainability Board.

One of the key tasks for the CSO and the Sustainability Board, the Sustainability Team and the Green Team is to update the 2007 Climate Protection Plan. In addition, measuring performance with respect to the goals of the plan must be done on an annual basis.

Attached is the line-diagram of the proposed governance structure.


Palo Alto Governance Structure
for
Achieving Sustainability
Sustainability Executive Advisory Group
Executives from local institutions and Community Leaders
Input and Action Coordination
Chair: City Manager
Sustainability Board
Dept. and Office Heads
Adopts Vision, Goals and Workplans
Executive Officer
Chief Sustainability Officer (CSO)
Organizing, Planning and Directing Implementation
Sustainability Team
City Staff managing individual programs
City Program Implementation
GREEN TEAM
Volunteers from all City Work Groups
Assist in implementing initiatives and programs involving large numbers of City Staff
Community Environmental Action Partnership (CEAP)
Community Leaders
Input to City and Action in the Community
Eight Spheres