



City of Palo Alto

City Council Staff Report

(ID # 8979)

Report Type: Study Session

Meeting Date: 4/16/2018

Summary Title: Earth Day Report 2018 (EDR18)

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From: City Manager

Lead Department: City Manager

Executive Summary

This report includes:

- Summary/Overview
- Background
- Discussion/Summary of 2017 initiatives and results, including:
 - Development and adoption of the Sustainability and Climate Action Plan (S/CAP) and acceptance of the 2018 – 2020 Sustainability Implementation Plan “Key Actions” as a work program for 2018-2020
 - Green House Gas (GHG) Emissions from City Operations, City and Community Activities, and from City of Palo Alto Utilities
 - Water Consumption and Considerations
 - Highlights and Accomplishments from City Departments
- Future Vision and Challenges

On April 2, 2001, Palo Alto City Council adopted a Sustainability Policy, affirming its intent to create a community where sustainability is a way of life — one which meets its current needs without compromising the ability of future generations to meet their own needs. Since 2001, the City has undertaken a wide range of initiatives to improve the sustainability performance of both government operations and the community at large, including: adoption of one of the first municipal Climate Action Plans in the US in 2007; adopting an ambitious goal of [reducing Greenhouse Gas \(GHGs\) emissions 80 percent below 1990 levels by 2030](#)¹; adopting the [Sustainability and Climate Action Plan Framework](#)², which will serve as the road map for achieving Palo Alto’s GHG reduction goal; and accepting the [2018-2020 Sustainability Implementation Plan “Key Actions” as a summary of the City’s work program](#)³, which will guide City actions in the coming years, subject to available resources.

¹ <https://www.cityofpaloalto.org/news/displaynews.asp?NewsID=3534&TargetID=268>

² <https://www.cityofpaloalto.org/civicax/filebank/documents/60858>

³ <https://www.cityofpaloalto.org/civicax/filebank/documents/63141>

Highlights of progress in 2017 include:

- Palo Alto reduced greenhouse gas (GHG) emissions an estimated 43 percent in 2017 from the 1990 baseline.
- Staff developed and Council unanimously accepted the 2018 – 2020 Sustainability Implementation Plan “Key Actions” as a summary of the City’s work program for 2018-2020.
- City of Palo Alto Utilities became the first utility in the world to provide both carbon neutral electricity and natural gas as a standard to all customers.
- Implemented two sustainability ordinances related to green building – the new Green Building Ordinance and the new Energy Reach Code.
- Began a one-year pilot of the Bay Area’s first all-electric refuse collection truck, which is also the first full-size, fully automated side loader collection truck in North America.
- Worked with the not-for-profit Empowerment Institute to engage 88 households in the CoolBlock beta program – adding 45 new households to this neighbor-to-neighbor collaborative program for GHG reduction.
- Produced 223 million gallons of recycled water at the Regional Water Quality Control Plant (RWQCP), a two percent increase from 2016.
- Continued to reduce the amount of material going into landfills, with a waste diversion rate of 82 percent, compared to 80 percent in 2016 (and 63 percent in 2015).

In addition to the uncertain Federal policy environment, the City will need to address additional concerns, changes and challenges in the coming years. We are well in motion on many, taking initial steps on others, and just beginning to formulate our perspective on some. There are many sustainability, climate and resilience-related issues we may want to address in the coming years. For example (not necessarily in order of priority), how will we:

- Consistently align City actions (with city buildings, fleets, purchasing, infrastructure development, land use decisions, investments and financial analysis) with sustainability policies, while managing competing budget and staffing constraints?
- Make better use of sustainability performance data, and improve the timeliness and efficiency of data collection and emissions reporting processes?
- Match City processes to the pace of technology, climate and policy change; Upgrade existing building stock (since only ~1-2% of buildings are affected annually by our green building codes and utility efficiency initiatives)?
- Continue to encourage water conservation even as the urgency Palo Altans feel toward conservation is alleviated as Palo Alto exits near-term drought conditions, and bring attention to potential long term climatic shifts even as we deal effectively with short term “drought”?
- Position CPAU to successfully (and economically) navigate the decline of natural gas and the acceleration of distributed energy and storage, electric vehicle adoption, controllable electric loads?
- Overcome the constraints presented by some of the tools we have available or are required to use to advance Palo Alto’s policy commitments?

- Address adaptation and resilience choices in the face of sea level rise and other dimensions of climate change?
- Understand and reduce “Scope 3” emissions?
- Maintain progress in the other six S/CAP areas, while focusing on the four included in the 2018-2020 SIP?
- Finance the future we want, including investing prudently in sustainability and climate action?
- Engage our neighbors in addressing the ultimately regional challenge of making it more convenient for people not to drive?
- Nurture a learning culture, and learn how to do fast experiments when traditional planning is difficult in the face of uncertainty?
- Maintain Palo Alto’s leadership while other cities continue to leap forward, and continue to share learnings and best practices with each other in collaborative competition?

Background

Demonstrating its leadership in climate and sustainability, Palo Alto adopted one of the first municipal climate action plans in the U.S. in 2007, partnering with our community to develop a vision for an innovative, carbon neutral city of the future—and quickly exceeded the 15 percent from 2005 levels by 2020 reduction goals set by Council in the 2007 Climate Protection Plan.

On April 18, 2016, Council unanimously approved the primary goal of the S/CAP - [achieving an 80 percent reduction in Greenhouse Gases \(GHGs\) below 1990 levels by 2030](#)⁴ - 20 years ahead of the State of California 80x50 target.

On November 28, 2016, Council adopted the [S/CAP Framework](#)⁵, including its Guiding Principles, Decision Criteria, Design Principles, and Key Goals and Strategies, as the road map for development of S/CAP Implementation Plans.

On December 5, 2016, Council unanimously approved Palo Alto’s “[Carbon Neutral Natural Gas Plan](#)”⁶, which provides a bridge to mitigate Palo Alto’s second largest source – after transportation – of greenhouse gas emissions.

As of July 1, 2017, Palo Alto has provided 100 percent carbon neutral natural gas — making the City of Palo Alto Utilities the first utility in the world to provide carbon neutral electricity and natural gas as a standard to all customers. Palo Alto’s municipally-owned utility has been providing 100 percent [carbon neutral](#) electricity since 2013, which has been a major stride in reducing GHG from energy use.

⁴ <http://www.cityofpaloalto.org/civicax/filebank/documents/51856>

⁵ <http://www.cityofpaloalto.org/civicax/filebank/documents/54865>

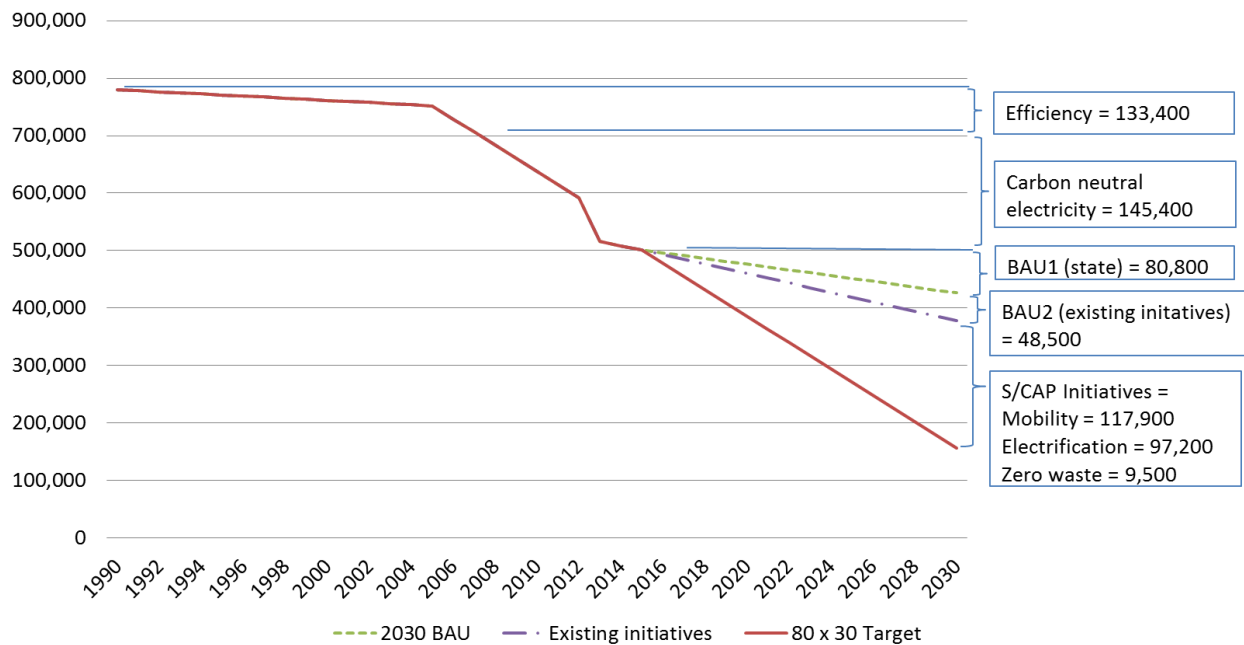
⁶ <https://www.cityofpaloalto.org/civicax/filebank/documents/55728>

On December 11, 2017, the Palo Alto City Council unanimously accepted the 2018 – 2020 Sustainability Implementation Plan (SIP), which details the work plans for the next phase of the City’s Sustainability and Climate Action Plan.

Also in 2017 we have witnessed the withdrawal of the United States from the historic Paris climate agreement, the rapid growth of renewable energy and electric vehicles globally, and the continued leadership of cities and states, in the US and around the world, in climate change mitigation and adaptation. While Palo Alto’s unique circumstances have in some cases conflicted with California’s energy policies, in 2017 we have made great progress with the California Energy Commission in reconciling our pursuit of different approaches to serving common goals.

To achieve an 80 percent reduction target by 2030, Palo Alto will need to meet a target “GHG reduction budget” of about 224,600 MT CO₂e⁷ (See Figure 1 below). The analyses in the 2016 S/CAP (conducted in 2014-2015) project that more than half of the needed additional reductions (117,900 MT CO₂e) can come from mobility related measures, just under half (97,200 MT CO₂e) from efficiency and fuel switching measures (largely in buildings), and about four percent (9,500 MT CO₂e) from continuation and extension of Palo Alto’s zero waste initiatives.

Figure 1: Overview of Palo Alto GHG Reduction Target relative to Business-as-Usual (MT CO₂e)

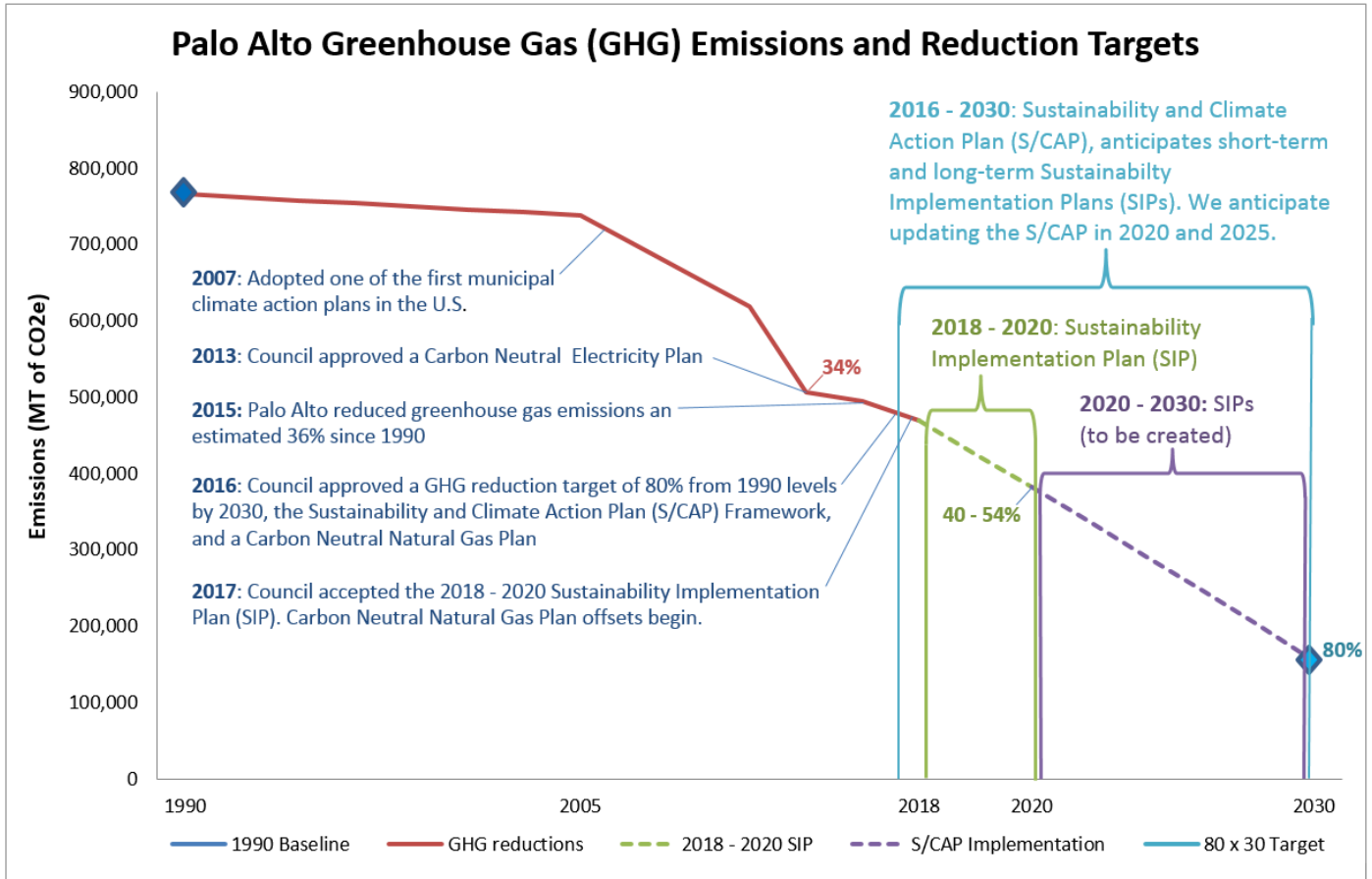


As summarized in Figure 2, Staff estimated that the Key Actions in the 2018-2020 SIP and other actions underway could enable Palo Alto to reduce GHG emissions to about 40 percent below

⁷ MT CO₂e = metric tons of CO₂ equivalent

the 1990 base year by 2020 as the SIP is implemented (depending of course on the pace of implementation), and by about 54 percent if we include the “bridging” contribution of natural gas offsets⁸. That will be a major step forward towards the S/CAP’s 2030 Goal of 80 percent GHG reduction, which far exceeds the state of California’s world-leading reduction goals of 40 percent by 2030 and 80 percent by 2050.

Figure 2: Summary of Palo Alto Greenhouse Gas Emissions and Reduction Targets



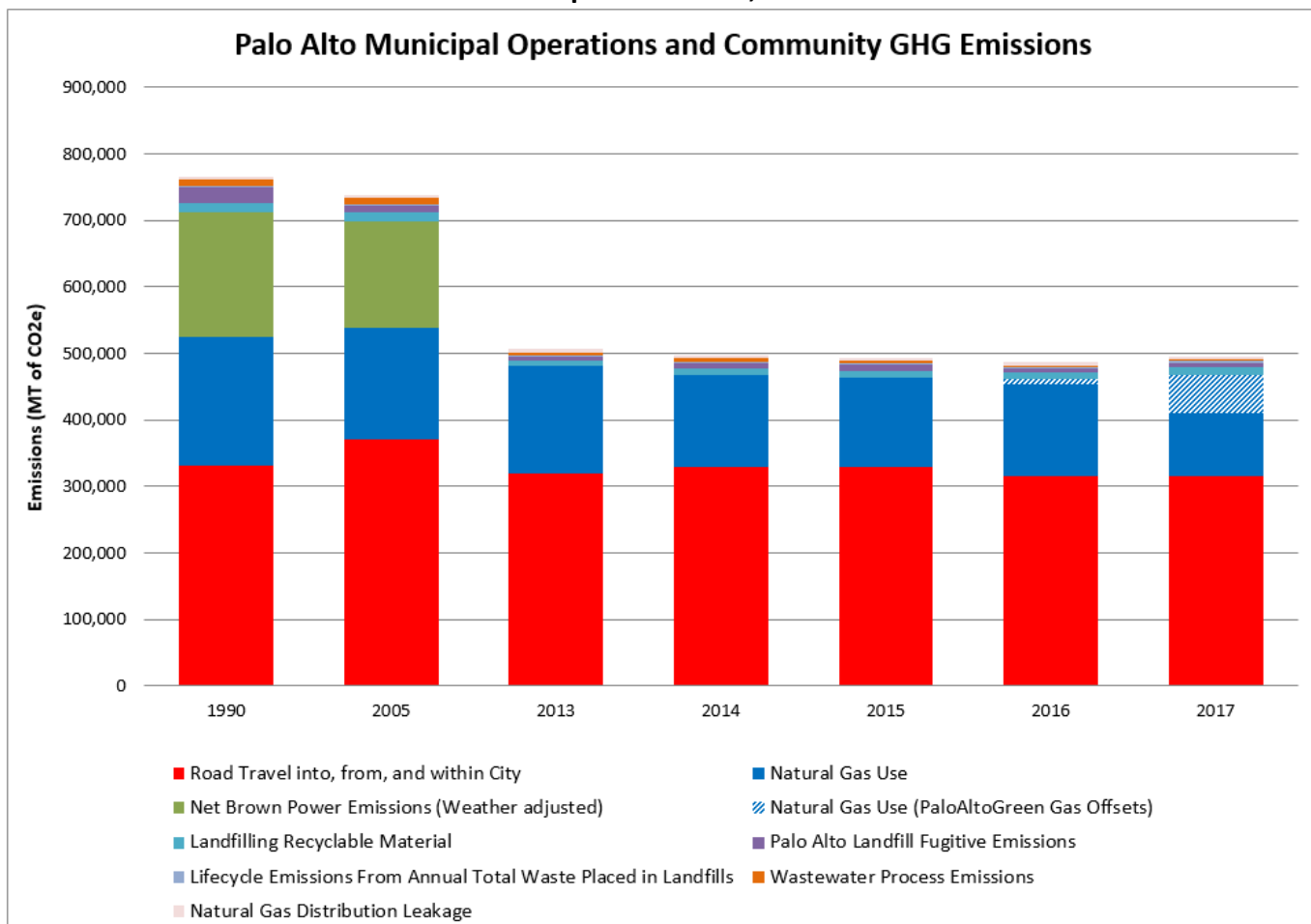
As shown in Figure 3, Palo Alto reduced greenhouse gas (GHG) emissions an estimated 43 percent since 1990⁹ in 2017 — six percent more than 2016 reductions, and well ahead of

⁸ Based on 1) SCAP projections and 2) Carbon Neutral Natural Gas. Staff estimates that Carbon Neutral Natural Gas will result in an additional 18% reduction in GHG emissions. Staff will report both actual emissions and emissions net of offsets, as required by CDP.

⁹ Palo Alto emissions in the 1990 baseline year are estimated at 765,920 MT CO₂e, a restatement of prior estimates of 780,119 MT CO₂e due to changes in “Lifecycle Emissions from Annual Total Waste placed in Landfills” and “Landfilling Recyclable Material” emissions, which have been updated based on the most recent EPA Waste Reduction Model (WARM) methodology. Most emissions noted in this report as called “estimates,” since only utility consumption (electricity, natural gas and water) are measured. Transportation emissions are modeled every few years using regionally compliant travel forecasting models and should not be considered precise. Staff is exploring alternate approaches to generate these estimates. Solid waste related emissions are calculated using established EPA protocols. Solid waste related emissions were not included in the CompPlan DEIR.

California’s 40 percent by 2030 goal. Most of this reduction has been accomplished since 2005 — largely a result of the leadership of Palo Alto Utilities and the City Council’s commitment to carbon neutral electricity and natural gas. Palo Alto’s largest remaining sources of greenhouse gas emissions are road transportation (approximately 72 percent) followed by natural gas use (approximately 21 percent).

Figure 3: Palo Alto Municipal Operations and Community GHG Emissions: 2013 – 2017 compared to 1990, 2005 baselines¹⁰



Source: City of Palo Alto Utilities

Discussion

Palo Alto’s continued leadership in advancing sustainability commitments has succeeded mainly because of the continued cooperation across City departments and diverse community

¹⁰ Total Emissions are weather adjusted, with biogenic emissions excluded. Purchases of carbon offsets for natural gas emissions through PaloAltoGreen Gas program, which began in July 2017, are included. Net Brown Power (fossil fuel-based) electricity emissions taper down and are not present starting in 2013 because CPAU began purchasing Renewable Energy Credits (RECs) to offset all the GHG emissions for this power source. Transportation emission estimates have not been revised since 2016.

stakeholders. Palo Alto has shown that despite uncertainty around climate policy on the federal level, cities around the world—including the 175-member Urban Sustainability Directors Network, the 75-member Mayors National Climate Agenda, the Compact of Mayors, and the Carbon Neutral Cities Alliance—remain in the forefront of sustainability and climate action.

At the local level, the Bay Area Air Quality Management District (BAAQMD) Board of Directors approved the [2017 Bay Area Clean Air Plan: Spare the Air, Cool the Climate](#) to achieve air quality improvements and greenhouse gas (GHG) reductions in the Bay Area, and provides a Bay Area regional strategy to protect public health and protect the climate. The Air District’s Clean Air Plan shares many of the same strategies outlined in Palo Alto’s Sustainability and Climate Action Plan (S/CAP) and 2018-2020 Sustainability Implementation Plan, but goes one step further by addressing the need for “Conscientious Consumption.” This refers to how Bay Area residents can develop a low-carbon lifestyle by reducing personal GHG consumption by driving electric vehicles, living in zero net energy homes, eating low-carbon foods, purchasing goods and services with low carbon content, and reducing waste. Many of the “Conscientious Consumption” recommendations fall under the category of Scope 3 emissions.

Current protocols¹¹ quantify some sources, such as transportation-related emissions, but not others, such as community purchases, which would require quantifying the life cycle emissions associated with goods and services. While not a required part of climate reporting protocols, Scope 3 emissions can be a significant part of a community’s GHG emissions—two-to-three times our “reportable” emissions—and will need to be shifted through cultural and behavioral changes, not only policy and regulation. Some Scope 3 emissions, such as employee commuting and waste disposal, are already being addressed by the S/CAP and the 2018-2020 Sustainability Implementation Plan.

But there are other Scope 3 emissions—especially the emissions “embedded” in City and community purchases—that need further examination. The next phase of the City’s climate and sustainability planning will need to take these impacts into account. In addition, the City will need to develop a more efficient and transparent way of collecting, analyzing, and reporting on Palo Alto’s sustainability performance data and outcomes to support more effective decision-making and project implementation.

Sustainability and Climate Action Plan (S/CAP)

The City launched its Sustainability and Climate Action Plan (S/CAP) initiative in August 2014 to chart a path to a more sustainable future, in ways that improve our quality of life, grow prosperity, and create a thriving and resilient community – all while dramatically reducing our carbon footprint. The S/CAP builds on Palo Alto’s historic leadership – and our successes exceeding the goals of our 2007 climate plan – to create an ambitious plan that also considers

¹¹ See for example, Global Protocol for Community-Scale Greenhouse Gas Emission Inventories: An Accounting and Reporting Standard for Cities, https://www.wri.org/sites/default/files/global_protocol_for_community_scale_greenhouse_gas_emissions_inventory_executive_summary.pdf

broader issues of sustainability, such as land use and biological resources. The S/CAP was shaped by substantive technical and economic analysis and substantial community participation;¹² many of the key initiatives that found their way into the S/CAP and the SIP were initially proposed or developed by that community participation.

On April 18, 2016¹³, Council adopted the S/CAP's "80x30" GHG reduction goal, "supported the draft S/CAP framework," and directed staff to return for further discussion of the S/CAP Guidelines as Design Principles, unanimously adopting those in turn November 28, 2016¹⁴.

2018-2020 Sustainability Implementation Plan

On December 11, 2017, the Palo Alto City Council unanimously accepted the 2018 – 2020 Sustainability Implementation Plan (SIP) "Key Actions" as a work program to guide City efforts in the 2018-2020 period.

The SIP focuses on two key concerns—CO2 emissions and Water—and four key areas of activity: Energy, Mobility, Electric Vehicles, and Water. The SIP identifies Strategic Moves and Key Actions in each of the four key areas that could enable Palo Alto to reduce GHG emissions to about 40 percent below the 1990 base year by 2020, and by about 54 percent if we include the "bridging" contribution of natural gas offsets.¹⁵

The remaining S/CAP chapters—Zero Waste and Circular Economy; Municipal Operations; Climate Adaption and Sea Level Rise; Regeneration and Natural Environment; Financing Strategies; and Community Behavior, Culture, and Innovation—will be included explicitly in future SIPs; note that many actions in support of these goals are already included in departmental work plans.

Figure 4 provides a snapshot of the 2018 SIP Projects and Key Performance Indicators (KPIs). As we move forward with the 2018-2020 SIP, progress towards the 80 X 30 goal will be evaluated by the 2018-2020 SIP KPIs, and the Earth Day Report will evolve to provide a "report card" of the 2018-2020 SIP.

A more complete summary of the Sustainability and Climate Action Plan and the 2018-2020 Sustainability Implementation Plan can be found in Attachment A: Summary of Sustainability and Climate Action Plan and 2018-2020 Sustainability Implementation Plan.

¹² S/CAP community engagement include a 20-person advisory board, 40-person design charrette, and 80-person ideas expo, a 300-person poll, and a 500-person community summit.

¹³ <http://www.cityofpaloalto.org/civicax/filebank/documents/52025>

¹⁴ <http://www.cityofpaloalto.org/civicax/filebank/documents/55242>

¹⁵ Staff estimates that Carbon Neutral Natural Gas will result in an additional 18% reduction in GHG emissions.

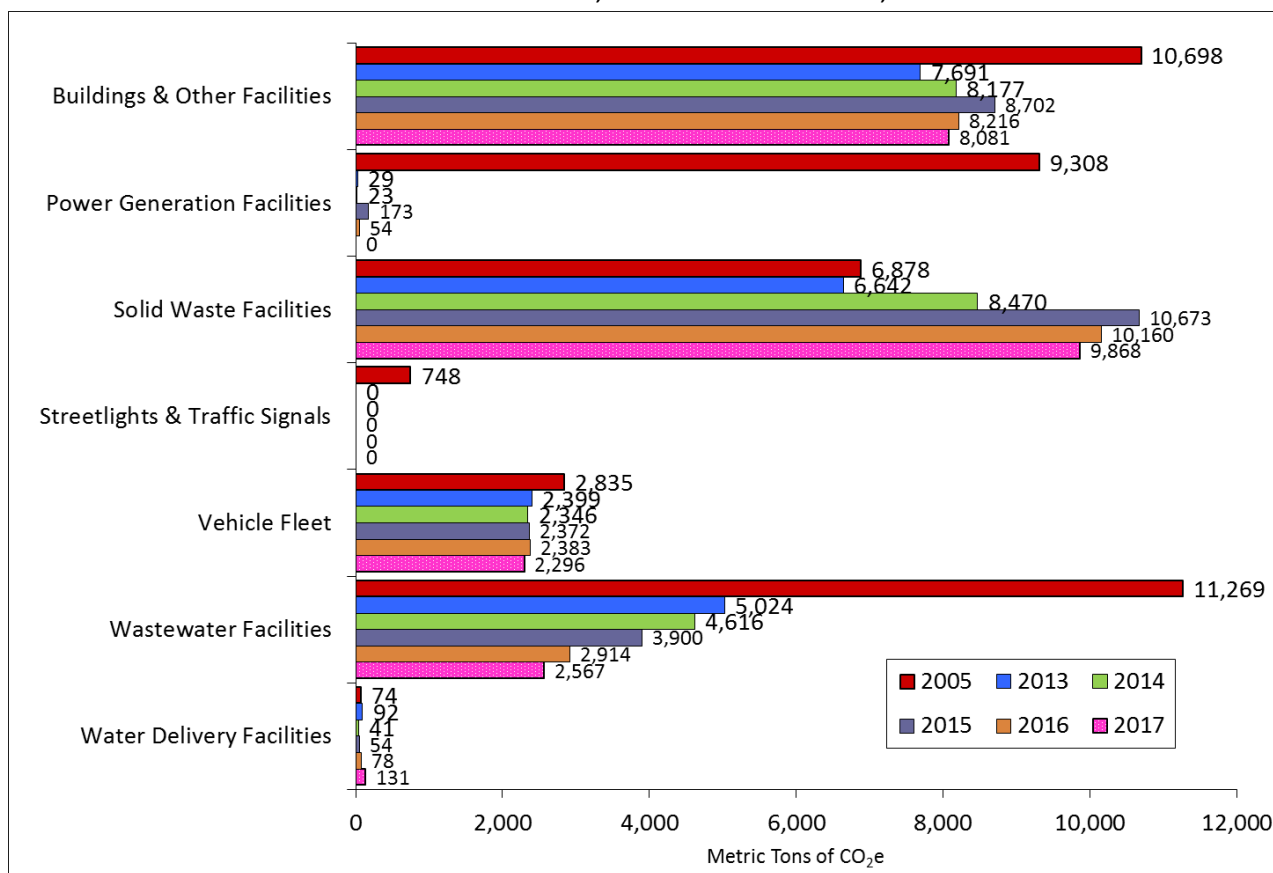
Figure 4: 2018-2020 Sustainability Implementation Plan: 2018 Snapshot

<p>ENERGY GOALS</p>  <ul style="list-style-type: none"> ➔ Drive building efficiency and electrification through voluntary and mandatory programs ➔ Mitigate the impacts of natural gas use through carbon offsets (short term) and electrification (mid-to long-term) <p>KPIs</p> <ul style="list-style-type: none"> ➔ Building Energy Efficiency (EE): Electric EE savings, 0.8% in FY17 ➔ Gas energy savings, 0.81% in FY 17 ➔ Electrification Percentage: Electric / Electric + Gas Energy Usage (kBtu), 58.5% (1st 6 months in FY 18) <p>2018 Projects Highlights</p> <ul style="list-style-type: none"> ➔ Develop a ZNE Roadmap ➔ Achieve carbon neutrality for the FY 2018 gas supply portfolio ➔ Evaluate new energy efficiency programs for all customer segments ➔ Promote building benchmarking among commercial customers (>50,000 sq ft) to comply with AB 802 ➔ Evaluate and update HPWH pilot based on customer feedback 	<p>WATER GOALS</p>  <ul style="list-style-type: none"> ➔ Reduce inefficient water consumption ➔ Ensure adequate water supply from sustainable sources ➔ Protect canopy, creeks, groundwater and the bay <p>KPIs</p> <ul style="list-style-type: none"> ➔ Per capita water use: Gal Per Capita / Day potable water, 134 in 2017 ➔ % recycled water use: RW Volume / RW Filter Capacity, 14% in 2017 <p>2018 Projects Highlights</p> <ul style="list-style-type: none"> ➔ Amend Title 8 of Municipal Code ➔ Green Building Ordinance 2020 ➔ Non-Potable Water Sources programs in Recycled Water Strategic Plan ➔ Complete Recycled Water Phase III expansion pipeline business plan ➔ Complete draft Green Stormwater Infrastructure Plan ➔ Identify funding for Advanced Water Purification Feasibility Plan
<p>MOBILITY GOALS</p>  <ul style="list-style-type: none"> ➔ Reduce Single Occupancy Vehicle (SOV) travel ➔ Make it more convenient not to drive <p>KPIs (pending working group discussion)</p> <ul style="list-style-type: none"> ➔ SOV commute mode share ➔ Transit ridership ➔ Commute Benefits participation <p>2018 Projects Highlights (pending working group discussion)</p> <ul style="list-style-type: none"> ➔ Begin FTA Fair Value Commuting Project ➔ Continue to track Review and refine Fleet CIP schedule ➔ Implement one-year bicycle share pilot program ➔ Participate in Caltrain Business Plan project ➔ Complete construction of 7.1 miles of bicycle boulevards 	<p>ELECTRIC VEHICLE GOALS</p>  <ul style="list-style-type: none"> ➔ Accelerate EV penetration ➔ Make "Going EV" more convenient and economical than using fossil fueled vehicles <p>KPIs (pending work grouping discussion)</p> <ul style="list-style-type: none"> ➔ GHG emissions ➔ EV penetration <p>2018 Projects Highlights (pending working group discussion)</p> <ul style="list-style-type: none"> ➔ Install 18 EV charging stations at public garages ➔ Develop EV charging station rebate program for multi-family and non-profit facilities using Low Carbon Fuel Standards ➔ Improve permit process and reduce review and approval time of applications for electrical panel upgrades. ➔ Add "loading order" for fleet electrification to fleet procurement policy ➔ Co-sponsor 2 educational_ride-and-drive_events_per_year

GHG Emissions from City Operations

Overall, the performance of City Operations showed a 45.1 percent reduction in Scope 1 and Scope 2 emissions from the 2005 baseline year¹⁶, and 2 percent beyond 2016 reductions (Figure 5). Emissions declined from buildings and other facilities due largely to carbon offsets purchased through PaloAltoGreen Gas (PAGG); from power generation facilities, which were reduced to zero; from solid waste facilities due in part to the completion of the landfill cap and upgrades to the landfill gas collection system; from vehicle fleet due to a slight reduction in consumption of compressed natural gas (CNG) fuels and gasoline; and from waste facilities due to use of landfill gas for incinerator, optimized use of gas from incinerator tuning, use of carbon neutral electricity, and purchasing additional carbon offsets through PAGG for the natural gas used in the incinerator. No emissions were reported for streetlights and traffic signals due to conversions to highly efficient LED streetlights and carbon neutral electricity supply. Emissions increased slightly from water delivery facilities due to fluctuating energy use for water pumping, with a decrease in activity for 2014 and 2015.

Figure 5: City Operations GHG Emissions: 2005 and 2013-2017 (Hydro and PAG-adjusted)
Total Emissions Reduced from 41,800 MT in 2005 to 22,942 MT in 2017



Source: City of Palo Alto Utilities

More detailed analysis can be found in Attachment B: City Municipal Operations Emissions

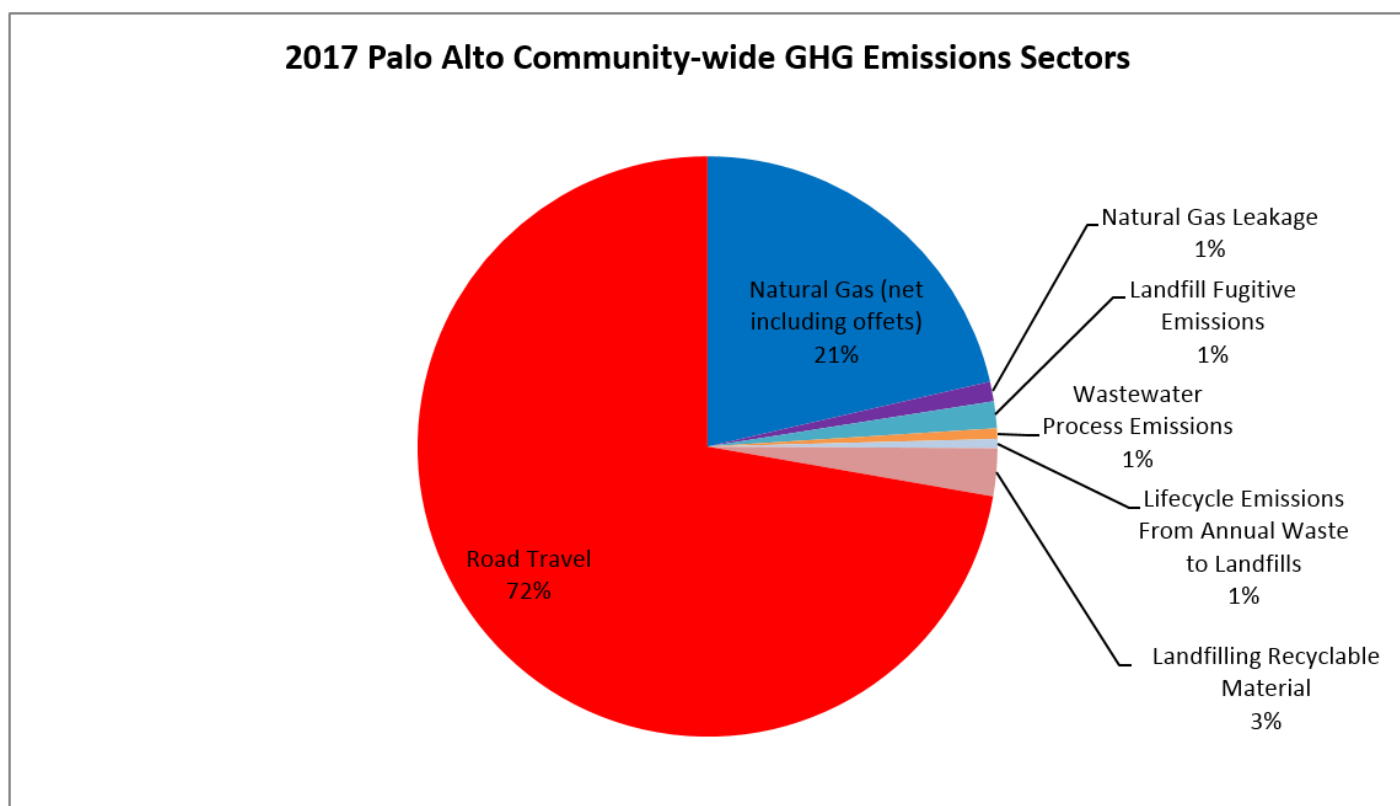
¹⁶ This include the effects of the purchase of PaloAltoGreen resources and the normalization of the vagaries of hydroelectric supply conditions.

GHG Emissions from City and Community Activities

Combined City Municipal Operations and Palo Alto community emissions continue to decline. In 2017, City and community climate and sustainability efforts resulted in reducing overall City and Palo Alto GHG emissions an estimated 43 percent from 1990 levels, 6 percent more than 2016 reductions, due mostly to reductions in natural gas emissions through the purchases of carbon offsets through PAGG¹⁷. As shown previously in Figure 3, estimated emissions from natural gas use declined 35 percent from 2016 reductions, due largely to carbon offsets purchased through PaloAltoGreen Gas (PAGG). However, natural gas consumption increased 5% from last year.

As illustrated in Figure 6 below, Palo Alto’s largest single source of greenhouse gas emissions is transportation into, around, and through the City (approximately 72 percent), followed by natural gas use (approximately 21 percent).

Figure 6: 2017 Palo Alto Community-wide GHG Emissions¹⁸ Sectors



¹⁷ Since natural gas is a non-renewable fossil fuel, its use will always produce greenhouse gas (GHG) emissions. As of July 1, 2017, the City of Palo Alto purchases carbon offsets to balance GHG emissions from our natural gas use. These high-quality carbon offsets support projects that reduce the amount of GHGs in the atmosphere, such as planting trees or capturing methane from dairy farms. The climate impact of our natural gas use is therefore carbon neutral. Purchasing carbon offsets is a good first step towards reducing carbon in the atmosphere, but our longer-term goal is to reduce our use of natural gas by maximizing efficiency and switching to high-efficiency electric appliances where possible.

¹⁸ Total Emissions are weather adjusted, with biogenic emissions excluded

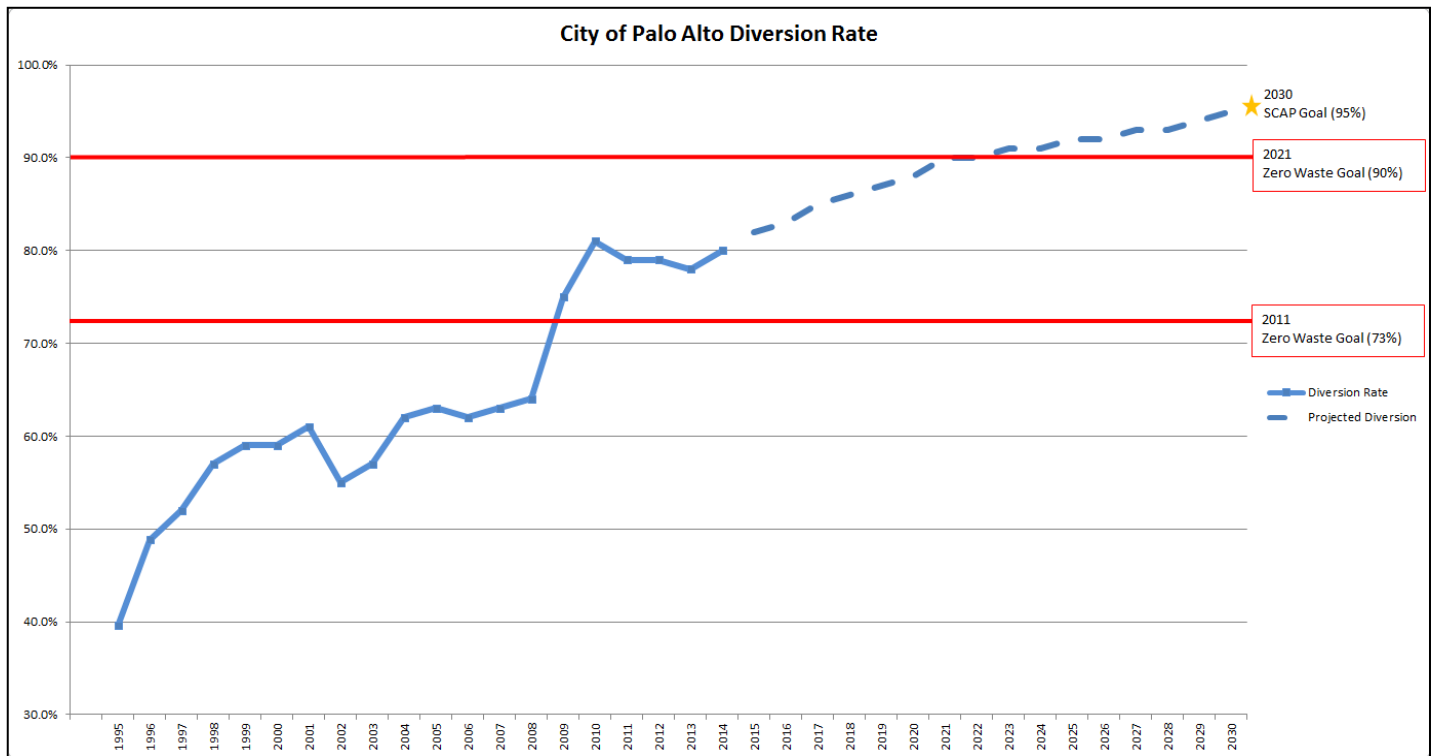
Source: City of Palo Alto Utilities

While City Fleet Services reports a steady reduction in fuel consumption and emissions over the past years, the majority of Palo Alto's reported transportation emissions are from people commuting to and from Palo Alto, and from residents' and workers' travel within Palo Alto. The City can't control the cars, but it can influence the driving environment. The S/CAP has set a target of 90 percent electric vehicle (EV) market share in Palo Alto by 2030, with half of all cars commuting into Palo Alto to be electric. While still aspirational, the pace and growth of EV adoption is well above even the most optimistic expectations. Palo Alto has one of the highest per-capita electric vehicle ownership rates in the country, with an estimated 3,100 residents owning a vehicle (4-5% penetration), and another 2,700 EV commuters coming into town each day. Palo Altans account for about one percent of the state's total EV ownership, which is estimated to be around 300,000 vehicles. The 2018-2020 SIP includes exploration of 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 that include making the switch to electric vehicles more convenient and economical than using fossil fueled vehicles. The Office of Sustainability (OOS) is working with its partners in the Planning Department, Development Services, Fleet Services, regional business and agencies and the community to envision, explore and assess a broad spectrum of approaches for transforming mobility within the City.

In 2017, Palo Alto's Cool Block Beta – a pilot program with the Cool City Challenge – brought together 88 households (in 24 teams) on 23 neighborhood blocks who worked together on 1,344 actions that eliminated 345 tons of CO2 emissions-- an average 6.6 tons of CO2 per household. Households also participated in water stewardship, energy resiliency, and disaster resiliency activities.

The City of Palo Alto adopted a Zero Waste policy in 2005. Since then, the City has dramatically reduced the amount of material going into landfills and now has a waste diversion rate of 82 percent, an increase from a 63 percent diversion rate in 2005, and a 2 percent increase from 2016. (Figure 7). Progress has flattened in recent years, however, and will need to accelerate to meet our targets of 90% diversion by 2021 and 95% by 2030.

Figure 7: Annual Diversion Rate, 1995-2016



Source: City of Palo Alto Department of Public Works

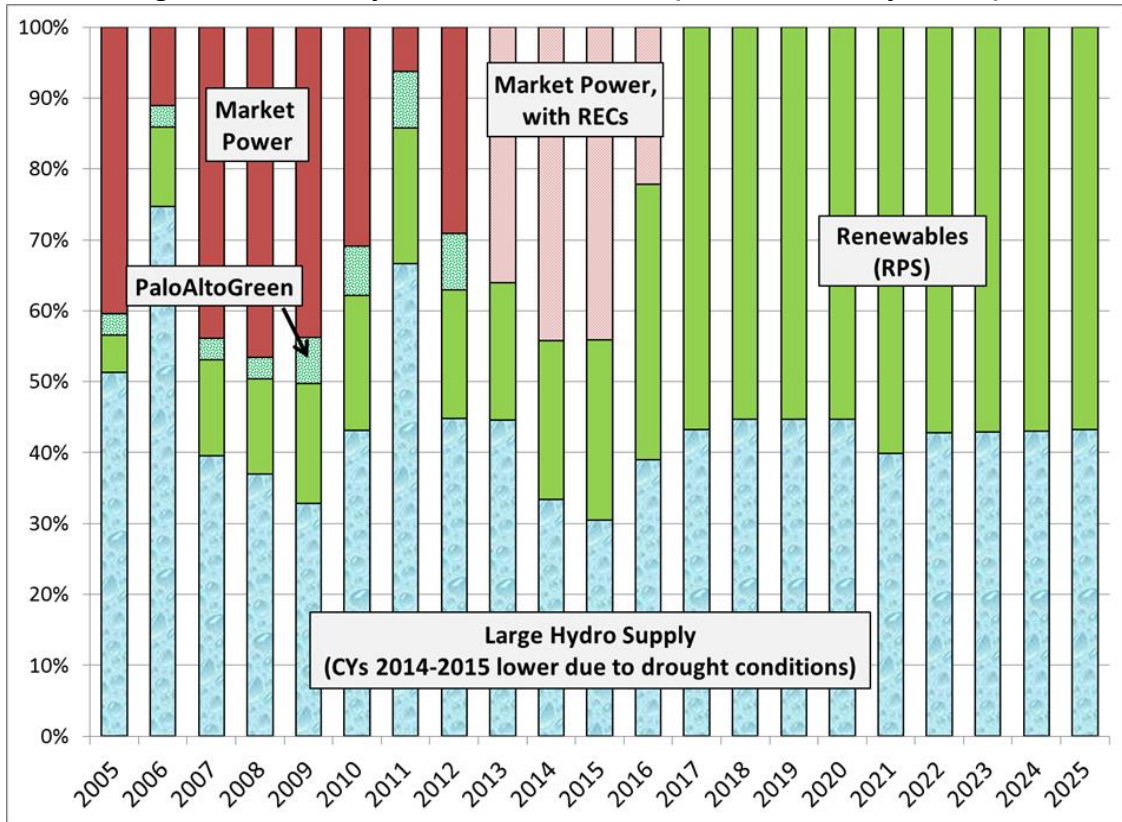
A breakdown of actual emissions numbers can be found in Attachment C: Palo Alto Community and City Municipal Operations GHG Emission

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).

The City’s electricity supply has been carbon neutral since 2013, when Council approved a Carbon Neutral Electric Resource Plan, committing Palo Alto to pursuing only carbon-neutral electric resources and effectively eliminating all GHG emissions from the City's electric portfolio (Figure 8).

Figure 8: Electricity Portfolio: 2005-2025 (Actuals and Projections)



Source: City of Palo Alto Utilities

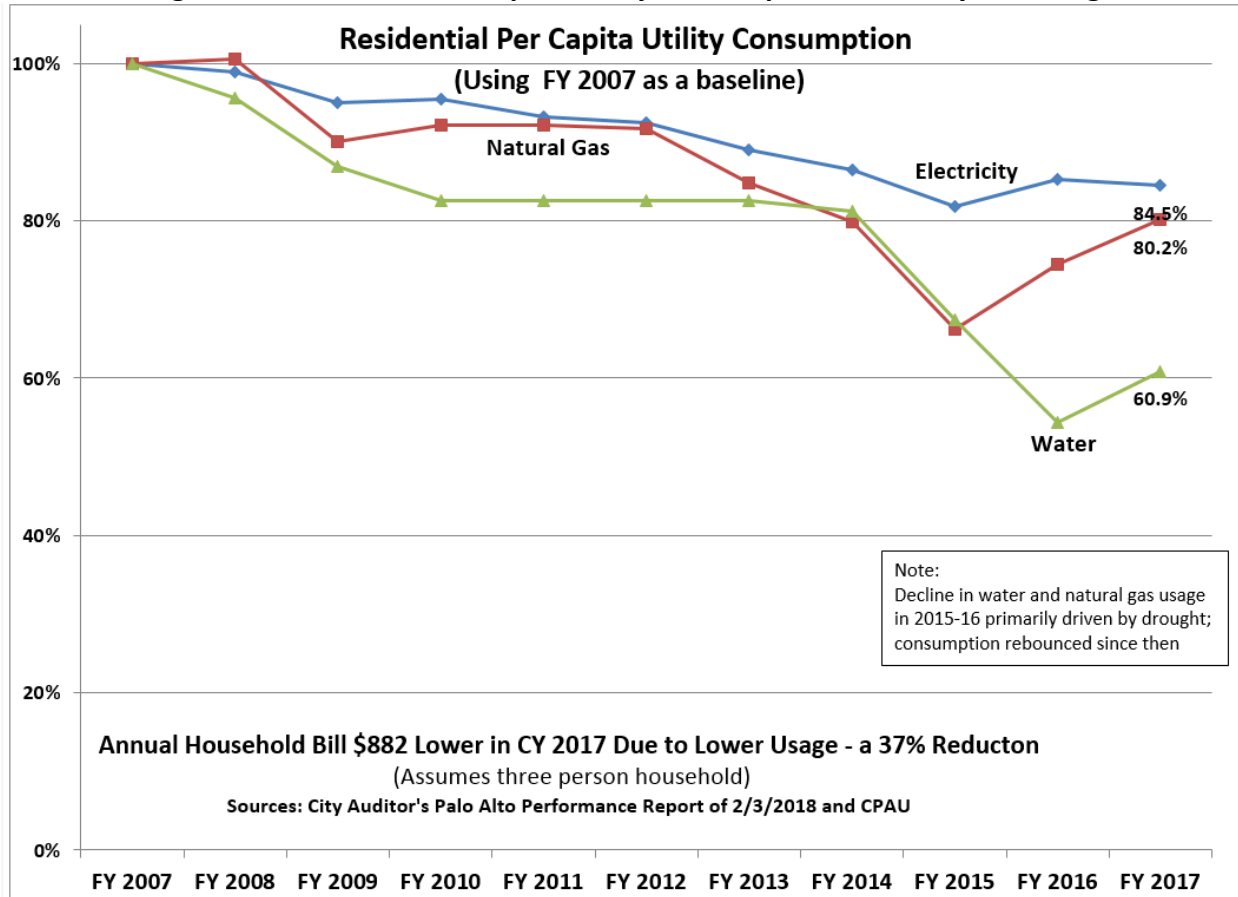
Council unanimously approved Palo Alto’s Carbon Neutral Natural Gas Plan on December 5, 2016, which was implemented on July 1, 2017. The Natural Gas Plan achieves carbon neutrality for the gas supply portfolio by 1) purchasing high-quality environmental offsets equivalent to our City and community natural gas emissions (~21% of our carbon footprint); 2) pursuing efficiency strategies to reduce natural gas use, and 3) seeking opportunities to fund *local* offsets that finance actual emissions reductions in Palo Alto and the surrounding region. Figure 3 shows the impact of a half year of offset purchases on total emissions.

Overall residential per capita utility consumption of resources from CPAU has been steadily declining since FY 2007 (Figure 9), contributing to overall GHG emissions reductions; but natural gas use ticked up last year, as did per capita water use – due in part to cold winters and the easing of state-mandated water use reductions.

The increase in natural gas use is related to a few factors, but the primary reason is the post-drought recovery to “normal” water consumption levels. Natural gas consumption tends to follow water consumption. More water usage means more hot water usage, which means more natural gas usage. Second, the increase could also be driven or abetted by colder than normal weather and the continued low natural gas commodity prices we’ve experienced the past several years. Despite the increase in natural gas consumption, the long-term trend is a

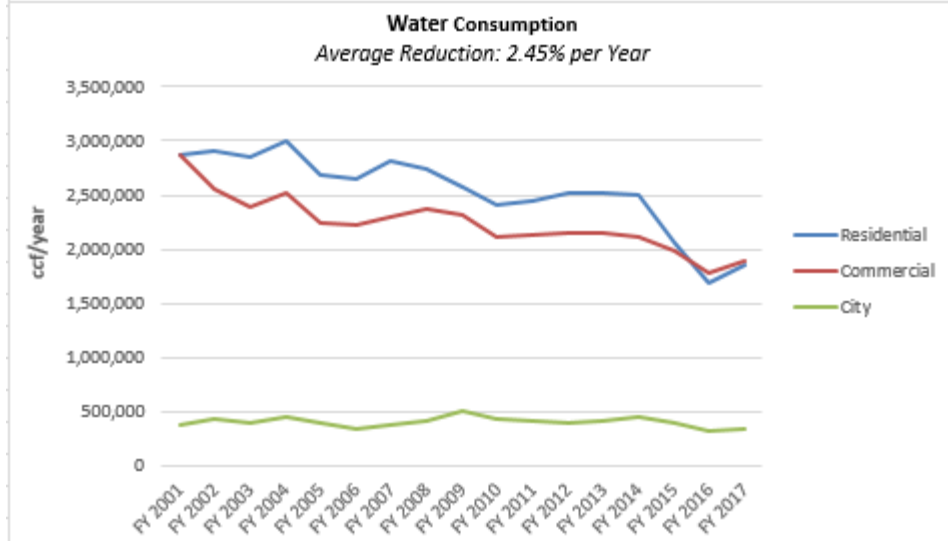
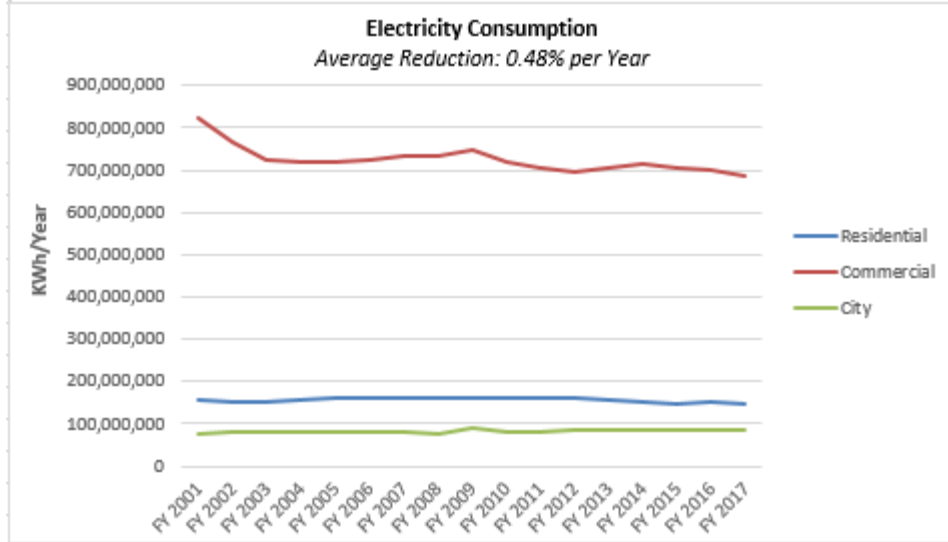
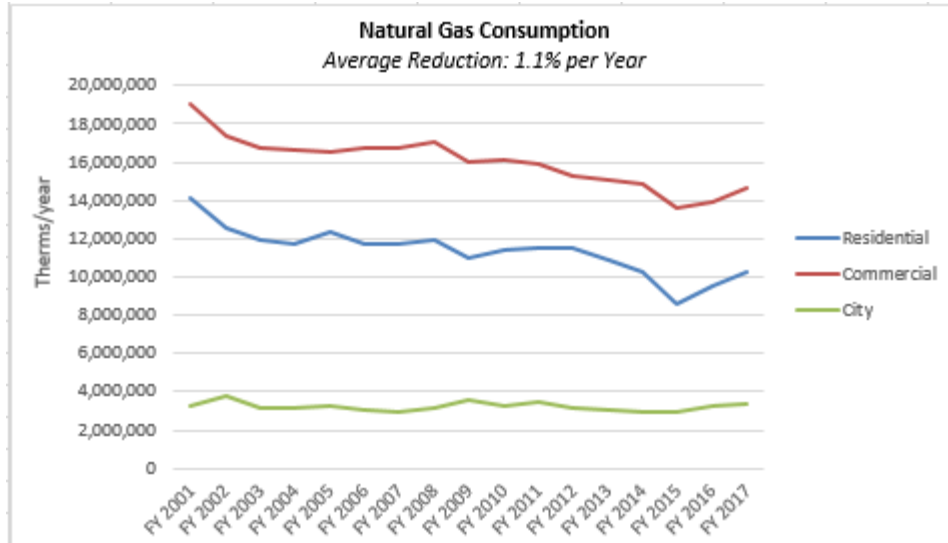
continued decline in natural gas usage, which is also the long-term trend for electricity and water usage (Figure 10).

Figure 9: Residential Per Capita Utility Consumption Generally Declining



Source: City of Palo Alto Utilities

Figure 10: CPAU Use Data Trends for Natural Gas, Electricity, and Water FY 2007 - 2017



Source: City of Palo Alto Utilities

Water Consumption and Considerations

As anticipated by City staff, both residential and commercial water consumption increased due to a post-drought rebound and continued increases in economic development and population. CPAU data shows that total residential water consumption increased 8 percent from FY 2016¹⁹, but overall has declined 32 percent since FY 2008. Total commercial, industrial research, and City Facilities water consumption increased 6 percent from FY 2016, but overall has declined 19% since FY 08. CPAU's goal is to reduce water use to 135 gallons per capita per day (40%) by 2040.

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.

City of Palo Alto Utilities (CPAU): CPAU continues to implement cost-effective energy efficiency and water conservation programs. The Carbon Neutral Natural Gas Plan was implemented on July 1, 2017. The City's Renewal Portfolio Standard was 26.0 percent in 2015, 40 percent in 2016, and 59 percent in 2017. The 2017 Solar group-buy discount program, Bay Area SunShares, resulted in 157 kW of new local solar. 82 CPAU customers installed a net metered PV system in 2017 for a total capacity of 1,496 kW. Rebate program for EV chargers using LCFS funds was launched in January 2017. Electric vehicle count in Palo Alto is estimated at around 3,100 residential and 2,700 commuters.

Community Services (CSD): Community Services Department maintains over 4,000 acres of parkland. Habitat restoration, which includes removing invasive vegetation, planting native vegetation and adapting vegetation to climate change helps renew, restore, and enhance resilience of our natural environment, and maximizes carbon sequestration and storage in the natural environment. CSD partnered with environmental organizations and volunteers to improve habitat by removing 16,295 pounds of invasive weeds and planting a total of 7,826 native plants. Through strategic reductions in irrigation in parks and open space, CSD reduced potable water use by approximately 25 percent. In addition, CSD provides standards-based science lessons and camps for young children (ages 3-12) and their adults through the Junior Museum and Zoo.

Development Services (DSD): 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 for living and working. On January 1, 2017, DSD implemented two sustainability ordinances related to green building - the new Green Building Ordinance and the new Energy Reach Code. In FY 2017, there were 1,622,943 ft² of Green Buildings, which saved 1,430,0352 kBtu/yr (ft²) of energy, and reduced 187,695,3932 gallons/year of water, resulting in a 38,247 metric ton reduction of CO₂ emissions.

¹⁹ FY 2017 Performance Report, <https://www.cityofpaloalto.org/civicax/filebank/documents/63205>, p. 53

Human Resources (HR): The City offers commuter benefits to benefit eligible employees as an effort to reduce the amount of single occupancy vehicles to and from work. Participation in the various commuter options has increased over time, but the number of participants is still low compared to the number of eligible employees. Go Pass participation has increased from nearly 100 employees to nearly 200 over the last few years. We hope to increase the total number of participants by 50 in 2018. Participation in the other commuter options varies from 3% to 6%, we hope to increase participation by 2% in all categories in 2018.

Information Technology (IT): The IT department manages and maintains a data center that houses 114 physical servers and occupies approximately 1500 sq. ft. of space. The DCROSE (Data Center Redesign and Office Space Expansion) program was envisioned in 2017 to reduce datacenter footprint by virtualizing or removing all physical servers other than those designated as exceptions. The objective of this program was to reduce physical servers by 58 percent and hence reduce cooling costs (electric energy) between 2017 and 2020. The annual power consumption at the beginning of the project was 274.6MWh²⁰. IT estimates that the annual power consumption at completion of the project will be 113.6MWh. To date, 31 servers have been removed or virtualized, which is a 27 percent total reduction in physical servers.

Library (PACL): The Library provides educational opportunities that provide the public with information and resources for reducing carbon footprint, waste and energy use, and for making improvements to home and habits that encourage a sustainable life. PACL hosted ten programs to all ages that passively or purposefully provided examples to demonstrate some aspect of sustainable practices. For example, nearly all crafts programs incorporate reuse of materials. In addition, Library buildings include information about energy use and conservation, model new thinking regarding public building design, and sustain materials collections that aid customer education about all aspects of sustainability and the environment.

Office of Emergency Services (OES): The City and others have made and plan to make substantial investments to reduce greenhouse gases. OES seeks to assist by providing input from a public safety perspective to facilitate a more complete understanding of the consequences and potential risks of certain strategies and to maximize the full value of such investments. OES is evaluating cost-effective and practical means to expand the use of renewables to reduce the risk of power disruption for certain facilities. OES has designed, developed, and now operates a variety of vehicles and portable equipment, most of which have solar generated power for auxiliary systems so as not to rely on automotive power. OES also maintains several small portable solar powered battery systems and is now exploring the development of a much larger Solar Portable Power Pod. In FY2018 OES acquired an all-electric All-Terrain Vehicle (ATV) for rescue operations and routine use which is the first of what may become many non-fossil-fueled public safety vehicles. Also in FY2018, OES piloted an electric bicycle program for the Police Department, that already uses a fleet of police bicycles, to evaluate how these assets could improve bike patrol operations.

²⁰ Electric Energy Savings are based on the assumption that all servers run 24 hours a day, 365 days a year. The average power consumption estimate is 275W/hour/server.



Palo Alto Police Officer Figueroa on a Magnum Peak Electric Bike, outfitted for patrol

Office of Sustainability (OOS): Continuing work on the S/CAP, OOS led other departments in development of the 2018-2020 Sustainability Implementation Plan (SIP), delineating the next steps in fulfilling the S/CAP’s 2030 goals. The 2018-2020 SIP was accepted unanimously by City Council on December 11, 2017. Interdepartmental working groups focused on Energy, Water, Mobility, and Electric Vehicles were formed and have created detailed workplans and performance metrics to guide implementation. OOS also worked with other City departments to incorporate sustainability commitments and programs into departmental work plans and the Comprehensive Plan where appropriate to align with the S/CAP. In 2017, OOS reestablished the Electric Vehicle (EV) Task Force and assisted development of pricing policies for EV charging stations and a zero-emissions fleet policy, and continued to develop implementation plans and vendor contracts for the \$1.085 million “mobility sandbox” grant awarded to the City by the Federal Transit Administration in 2016.

Planning and Community Environment (PCE): The Planning and Community Environment (PCE) Department is responsible for a range of planning and implementation actions aimed at preserving and enhancing the quality of life in Palo Alto, ensuring wise transportation investments, and facilitating land use and development decisions through consistent and transparent processes. PCE began implementation of sustainability related policies in the recently updated Comprehensive Plan by using them to inform discretionary decisions about development, land use, transportation, and capital projects. In addition, PCE developed transportation programs to address traffic congestion and parking demand generated by single occupant vehicles, including implementation of parking management programs (e.g. RPP), and creation and support of a Transportation Management Association (TMA).

Public Works (PWD) and Administrative Services (ASD) – Green Purchasing: The City’s award-winning green purchasing program has greened performance criteria for several goods and services including structural and landscaping pest control, custodial and office supplies, computers and the City fleet. The City has reduced the use of single-use plastics (bottled water, plastic bags, plastic packaging), reduced the toxicity and amount of pesticides used, and virtually eliminated products that contain mercury and dioxins. The City incrementally embeds green purchasing into its procurement procedures by revising forms, contract specifications, and contract Terms and Conditions, and by training staff in the application of these procedures; the City piloted “green procurement” software to simplify establishing product specs and managing the City’s Environmentally Preferably Purchasing policies. The new City Paper Reduction and policy (approved in January 2018) sets standards for a 25 percent reduction of paper use from 2017 average use, and sets higher standards for office and custodial paper recycled content.

Public Works – Engineering & Public Services:

The Public Works Department is committed to building, managing and operating City buildings and infrastructure in a sustainable manner. Through various Capital Improvement Projects, Public Works is working to use energy more efficiently and reduce water usage. Parks renovations include drought-tolerant landscaping and trees, and more efficient irrigation systems. Building projects are utilizing efficient LED lighting, more efficient HVAC systems, cool roofing materials, and water saving fixtures. Street resurfacing and related concrete work are utilizing recycled aggregates and other waste products, such as tire rubber and fly ash. Storm water capture and pollution control measures are being implemented in building, parks, and street projects. Public works completed installation of solar canopies on four City garages, as well as 18 Level 2 EV charger ports and electrical infrastructure for an additional 80 charger ports.

Public Works – Fleet: Achieved a 29.1% GHG emissions reduction from 2005 baseline year through 2017 (not including CNG consumption for non-city operations), as a result of decreased consumption across all fuel types. Vehicle miles traveled has decreased slightly, despite serving a larger service population. A new fleet procurement policy was drafted and approved in January 2018. Based on staff/department requirements fleet will select and offer cost-effective, fully manufacturer-supported vehicles in accordance with this prioritized “loading order”: 1. Electric, 2. Plug-in hybrid, 3. Hybrid, 4. CNG, 5. Other. The City fleet currently has 74 alternative fuel vehicles, with 35% of nonemergency vehicles using alternative fuels or technologies.

Public Works – Watershed Protection: The Public Works–Watershed Protection Division, in collaboration with the Regional Water Quality Control Plant (RWQCP), works to reduce pollutants entering the San Francisco Bay through award-winning pollution prevention, pretreatment, stormwater, water quality, and air quality management programs. Anthropogenic emissions have decreased ~70 percent since 1990 mainly due to the purchase of green natural gas beginning in 2015, purchase of 100 percent green power electricity since 2013, use of landfill gas as a replacement for natural gas in the incinerator afterburner since

2005, and decreased incinerator hearth natural gas usage due to regular incinerator tuning. RWQCP 2017 GHG emissions were approximately 16,000 metric tons of carbon dioxide equivalents (MT CO₂e) – a reduction of 1,000 MTCO₂e from 2016. Construction began for the Sludge Dewatering and Loadout Facility, which represents the next step needed to phase out the City’s sewage sludge incinerators as soon as possible. This is expected to further reduce RWQCP anthropogenic GHG emissions. In 2017, the RWQCP produced 223 million gallons of recycled water, a 2 percent increase from 2016. The Recycled Water Strategic Plan is underway, in partnership with the Santa Clara Valley Water District, including an updated evaluation of the expansion of Palo Alto’s recycled water distribution system to the Stanford Research Park.

Public Works – Zero Waste & Landfill: The City of Palo Alto adopted a Zero Waste policy in 2005. Since then, the City has dramatically reduced the amount of material going into landfills and now has a waste diversion rate of 82 percent, an increase from a 63 percent diversion rate in 2005 and 80 percent in 2016. For solid waste collection, from 2015 to 2016 the amount of garbage collected decreased by 9 percent or 2,943 tons. In addition, the amount of compostable materials collected increased by 25 percent or 5,889 tons. The reduction in garbage and increase in compostables collected is a result of the implementation of new compostable collection programs. The City’s zero waste strategy seeks to eliminate the generation of waste wherever possible, and then manage, through reuse and recycling, the discards that are created. Most 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 environmentally preferred purchasing policies. In April 2016, the City began implementing the Recycling and Composting Ordinance that required certain commercial customers to subscribe to compost services and sort their waste properly. By the end of 2017 all Phase I & II customers have subscribed to compost services. As a result, the City has been able to divert over 4,500 tons of compostables from the landfill with the material being processed into usable electricity and compost.

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

Recognition

Palo Alto continues to gain acknowledgement for its sustainability and climate action leadership. Some of the awards won in the last year include²¹:

Date	Organization Giving Award or Recognition	Person/Program Receiving Award or Recognition	Title and Description of Award or Recognition
2017	Institute for Local	City of Palo Alto	2017 Platinum Level Beacon Award

²¹ <http://www.cityofpaloalto.org/gov/depts/utl/about/awards.asp> & https://www.cityofpaloalto.org/services/sustainability/cityefforts/sustainability_actions_and_accomplishments.asp

	Government		(First ever awarded; Palo Alto was awarded five.)
2017	Smart Electric Power Alliance (SEPA)	City of Palo Alto Utilities	First place for Watts-per-Customer installed in 2016. Fourth time on Top Ten list of utilities integrating the most solar onto the grid.
2017	Green California	City of Palo Alto	Green California Summit Leadership Award for Sustainable Communities

Future Vision and Challenges

Cities around the world are playing an increasingly important role in facing the climate challenge—certainly in the US, where this issue is not a priority for the current administration, but also true around the world, even in Europe where national and European Union commitments are strong. In that context, Palo Alto’s leadership is important, and is respected internationally (which is one reason Palo Alto has been invited by the UN to be one of the pilot “SDG Cities”²²).

But S/CAP and SIP are snapshots in time—our very best *current* sense (based, admittedly, on three-year-old analyses in a very rapidly evolving field) of what might be possible, given what we know now. We recognize that, to be effective, they need to be living documents—modified as we learn, through their implementation, from our successes and failures. (In this way, the SIP process becomes a way to shape the next SIP, and the periodic updates and revisions of the S/CAP itself.²³)

Continued leadership will also require the City (including Council, staff and our constituencies alike) to cultivate a somewhat experimental attitude; staff will continue to plan rigorously and explicitly where we can and adopt more nimble and exploratory approach in areas that may lack certainty but still demand movement—since if we always wait for certainty we may miss opportunities to move effectively, and to lead.

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, or Palo Alto’s 80% by 2030 GHG goals. Most of the “low hanging fruit” efficiency gains may have been achieved, so deeper gains will require new approaches.

²² The Sustainable Development Goals (SDGs) are a collection of 17 global goals developed by the United Nations and adopted by 103 countries in 2003. The SDGs cover a broad range of social, environmental and economic development issues. https://en.wikipedia.org/wiki/Sustainable_Development_Goals

²³ OPR recommends that climate action plans be updated every five years; from date of Council adoption that would be 2021; from date of the core feasibility and financial analyses underlying the S/CAP, that would be 2020. In either case preparation for the next S/CAP needs to be considered throughout the SIP process, and potentially begun in 2019.

In addition, we face the challenge of “Scope 3” emissions—the result of our purchases of everything from food and clothing to electronics and air travel. These emissions, which are not currently required to be reported, are more than double the emissions we do report²⁴—so Palo Alto’s effective climate impact may be three times what we think it is. Reducing *these* emissions is not as much the realm of City policies as it is individual choices—about purchasing, behavior and lifestyle choices—for both residents and businesses. (The “Behavior Change” chapter in the S/CAP, while not prioritized in the 2018-2020 SIP, offers several potential starting points and pathways to addressing this issue, when we are ready.)

In addition to the uncertain Federal policy environment, the City will need to address additional concerns, changes and challenges in the coming years. We are well in motion on many, taking initial steps on others, and just beginning to formulate our perspective on some. There are many sustainability, climate and resilience-related issues we may want to address in the coming years. For example (not necessarily in order of priority), how will we:

- Consistently align City actions (with city buildings, fleets, purchasing, infrastructure development, land use decisions, investments and financial analysis) with sustainability policies, while managing competing budget and staffing constraints?²⁵
- Make better use of sustainability performance data, and improve the timeliness and efficiency of data collection and emissions reporting processes?²⁶
- Match City processes to the pace of technology, climate and policy change;²⁷ Upgrade existing building stock (since only ~1-2% of buildings are affected annually by our green building codes and utility efficiency initiatives)?
- Continue to encourage water conservation even as the urgency Palo Altans feel toward conservation is alleviated as Palo Alto exits near-term drought conditions, and bring attention to potential long term climatic shifts even as we deal effectively with short term “drought”?
- Position CPAU to successfully (and economically) navigate the decline of natural gas and the acceleration of distributed energy and storage, electric vehicle adoption, controllable electric loads?
- Overcome the constraints presented by some of the tools we have available or are required to use to advance Palo Alto’s policy commitments?²⁸

²⁴ <http://coolclimate.berkeley.edu/>

²⁵ For example, embed sustainability criteria into purchasing and CIP; ensure that City facilities match or exceed the efficiency gains for residential and commercial buildings; consider raising the bar for City buildings from LEED Silver to LEED Platinum or even the Living Building Challenge; more effectively address the transportation/housing nexus; incorporate a “carbon price” into all City financial analysis (as we have done with Fleet and will be exploring with the next Green Building Ordinance).

²⁶ Sustainability performance data is scattered across many different departments and systems, and generally must be collated manually and annually, rather than automatically and monthly. The City currently maintains seven different, but partially redundant, sustainability-related dashboards, and could arguably benefit from streamlining and rationalizing these processes.

²⁷ For example, the ahead-of-projections growth of EV uptake and decline of PV and battery prices.

²⁸ For example, the CEC’s current cost-effective analysis tools, which were not designed with a carbon-neutral utility in mind, and which effectively hinder intended moves toward electrification.

- Address adaptation and resilience choices in the face of sea level rise and other dimensions of climate change?
- Understand and reduce “Scope 3” emissions²⁹?
- Maintain progress in the other six S/CAP areas,³⁰ while focusing on the four included in the 2018-2020 SIP?
- Finance the future we want, including investing prudently in sustainability and climate action?³¹
- Engage our neighbors in addressing the ultimately regional challenge of making it more convenient for people not to drive?³²
- Nurture a learning culture, and learn how to do fast experiments when traditional planning is difficult in the face of uncertainty?³³
- Maintain Palo Alto’s leadership while other cities continue to leap forward, and continue to share learnings and best practices with each other in collaborative competition?

Palo Alto, like most cities, faces big challenges in coming years, including climate change and its local implications, the transportation/housing nexus, financial pressures and more. Each presents opportunities for innovation, and for the sort of leadership the City has demonstrated—repeatedly—in the past. And each will challenge our historic ways of working, since the City will have to make the best decisions it can in the face of an uncertain and rapidly changing future. But if we can be smart, agile and experimental—and resist the temptation to compromise our key goals of environmental quality, economic prosperity and better quality of life for all—we can advance all three goals, both for our community and the many others around the world who eagerly watch what we do.

FISCAL IMPACT

Initiatives are across departments and funds. Some are funded in current budgets, others will be submitted as part of the FY19 Proposed Budget, while some will need to be prioritized in light of competing priorities.

²⁹ “Scope 3 emissions” are indirect emissions, such as those engendered by purchased goods and services, production of purchased goods, emissions from the use of sold products, business travel, employee commuting, transportation and distribution of electricity, and waste disposal. Though we are not required to report these under current GHG protocols, Palo Alto’s climate impact including these Scope 3 emissions (according to UC Berkeley’s Cool Climate calculator, <https://coolclimate.berkeley.edu/calculator>), is approximately three times what we currently report.

³⁰ While the focus of the 2018-2020 SIP is on Energy, Water, EVs and Mobility, there are also continuing staff efforts underway addressing: Zero Waste and Circular Economy; Municipal Operations; Climate Adaptation; Regeneration and Natural Environment; Financing Strategies; Community Behavior, Culture and Innovation

³¹ Financing explorations could, for example, look beyond taxes and bonds to consider some of the 40 other measures identified in the *Financing Sustainable Cities Toolkit* staff developed with USDN:

https://www.usdn.org/uploads/cms/documents/usdn_if_project_-_financing_sustainable_cities.zip

³² For example, through the Managers’ Mobility Partnership, the Fair Value Commuting Project and other initiatives.

³³ See, for example, <https://www.digitalgov.gov/2014/07/11/lean-startup-changing-government-services-and-agencies-to-better-serve-the-citizens/>

ENVIRONMENTAL REVIEW

Acceptance and discussion of this Earth Day report from Council does not meet the definition of a “project” under the California Environmental Quality Act and therefore no environmental review is required.

Attachments:

- Attachment A: Summary of 2016 Sustainability and Climate Action Plan
- Attachment B: City Municipal Operations Emissions
- Attachment C: Palo Alto Community and City Municipal Operations GHG Emissions
- Attachment D: Highlights of Sustainability Initiatives by City Municipal Operations
- Attachment E: Sustainability Policy and Organizational Structure

**Attachment A: Summary of 2016 Sustainability and Climate Action Plan
and 2018 – 2020 Sustainability Implementation Plan**

Summary Description of the 2016 Sustainability and Climate Action Plan

On April 18, 2016, the Palo Alto City Council unanimously approved the primary goal of the S/CAP - achieving an 80% reduction in Greenhouse Gases (GHGs) below 1990 levels by 2030¹.

On November 28, 2016, Council adopted the Sustainability and Climate Action Plan (S/CAP) Framework, including its Guiding Principles, Decision Criteria, Design Principles, and key Goals and Strategies, as the road map for development of subsequent S/CAP Implementation Plans².

As of the end of 2016 Palo Alto reduced GHG emissions an estimated 37% since 1990³. (See Figure 1) Palo Alto's largest remaining sources of greenhouse gas emissions are road transportation (approximately 66%) followed by natural gas use (approximately 29%). Figure 2 illustrates the current sources breakdown more clearly. Figure 3 provides another view of the relative size of Palo Alto's emissions sources.

Over the next 14 years, a variety of external drivers, including Federal and state policy (such as building efficiency and vehicle efficiency standards) and demographic changes, are expected to reduce Palo Alto emissions to an estimated 45% below 1990 emissions by 2030⁴—in line with the State of California's recently approved 2030 reduction target of 40%. Initiatives that the City has already approved or set in motion (such as existing City of Palo Alto Utilities (CPAU) efficiency incentive programs, Palo Alto's existing Green Building Ordinance and Reach Code, and the Bicycle and Pedestrian Plan), will bring emissions down to an estimated 52% of 1990 levels by 2030. These trajectories are shown in Figure 3.

The additional GHG reduction between those already “in-the-pipeline” reductions and the 80% reduction target for 2030 is about 224,600 metric tons (MT) CO₂e⁵, and is Palo Alto's target “GHG reduction budget.” The S/CAP projects that 117,900 MT CO₂e, or more than half of the needed additional reductions, can come from mobility related measures, 97,200 MT CO₂e, or just under half from efficiency and fuel switching measures (largely in buildings), and 9,500 MT

¹ Staff Report 6754: Sustainability/Climate Action Plan and Annual Earth Day Report, <http://www.cityofpaloalto.org/civicax/filebank/documents/51856>

² Staff Report 7304: Discuss and Approve S/CAP Framework, Principles & Guidelines, <http://www.cityofpaloalto.org/civicax/filebank/documents/54865>

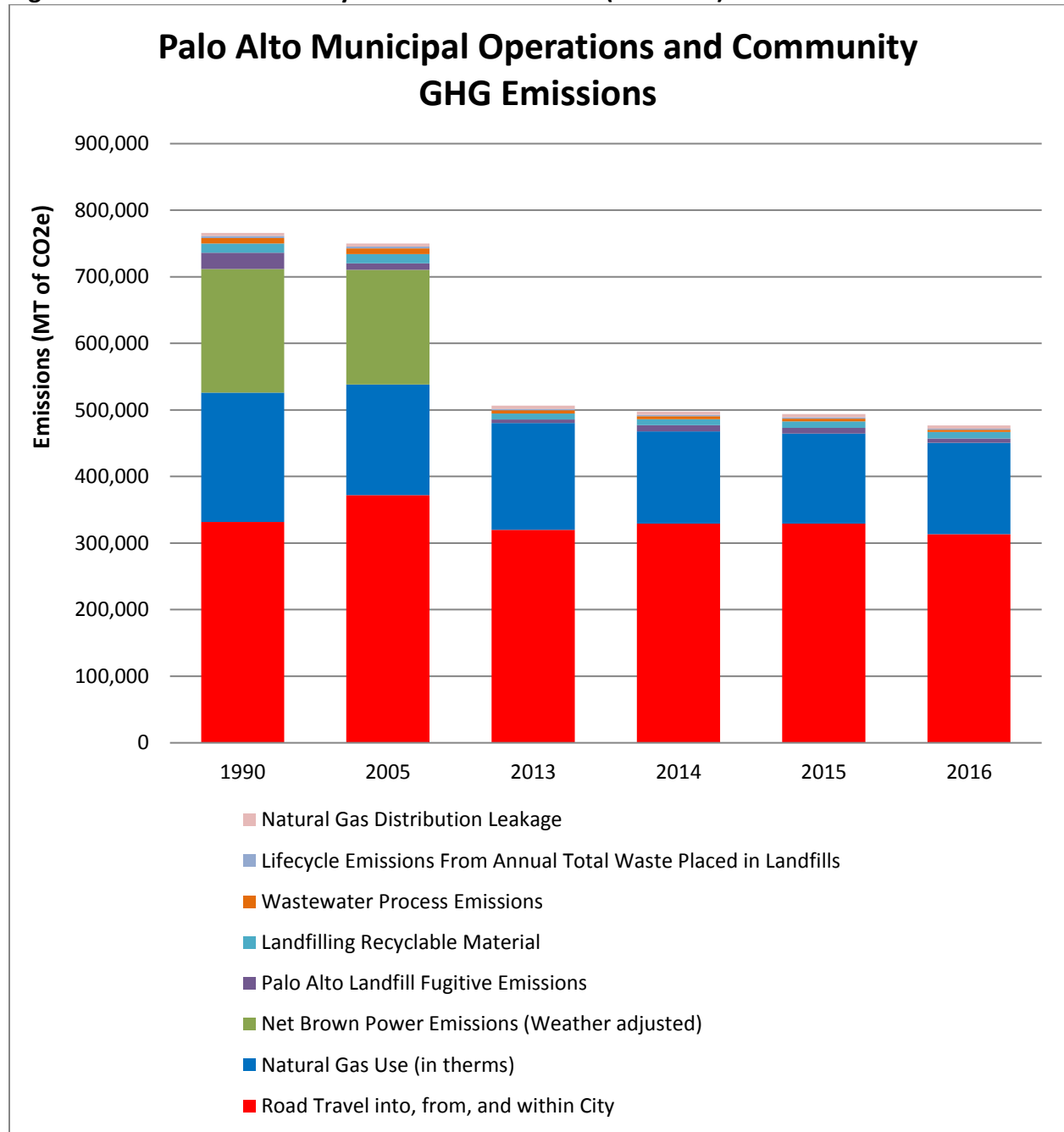
³ Palo Alto emissions in the 1990 baseline year are estimated at 780,119 MT CO₂e, a restatement of prior estimates based on revised analyses using updated emissions models. Most emissions noted in this report as called “estimates,” since only utility consumption (electricity, natural gas and water) are actually measured. Transportation emissions are modeled every few years; solid waste related emissions are calculated using established EPA protocols, and lag by one year. Solid waste related emissions were not included in the CompPlan DEIR.

⁴ Based on the “business as usual” analysis conducted for the CompPlan DEIR.

⁵ MT CO₂e = metric tons of CO₂ equivalent

CO₂e, or 4% from continuation and extension of Palo Alto’s zero waste initiatives. These emission reduction budgets are shown in Figure 4.

Figure 1. Palo Alto Community-wide GHG Emissions⁶ (MT CO₂e)⁷

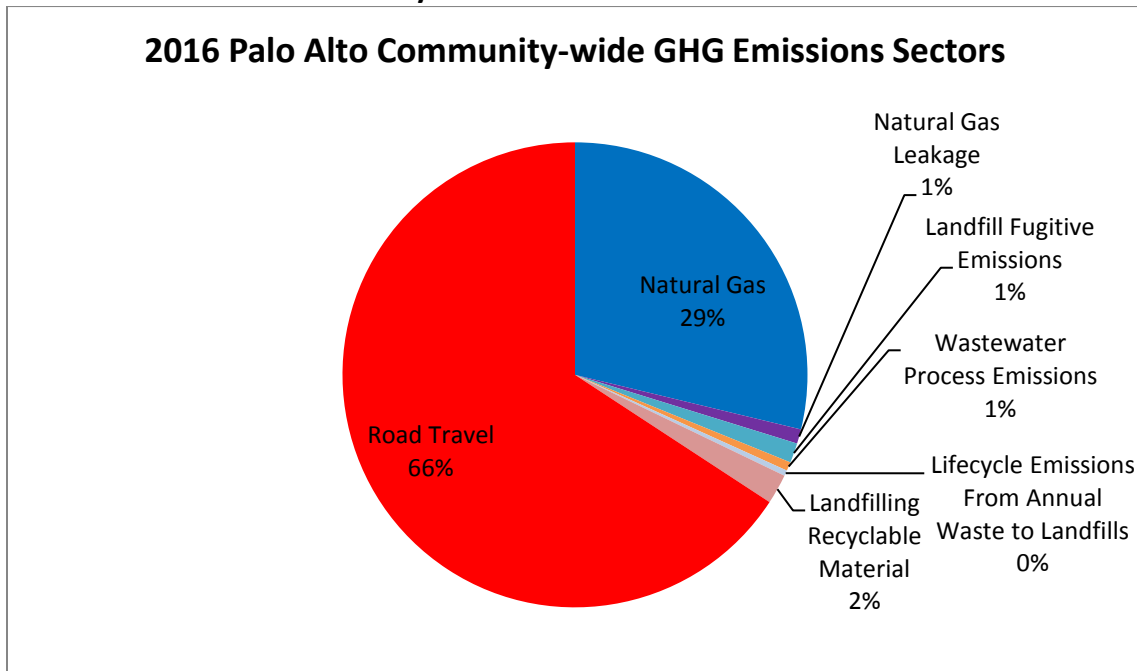


Source: City of Palo Alto Utilities

⁶ Total Emissions are weather adjusted, with biogenic emissions excluded

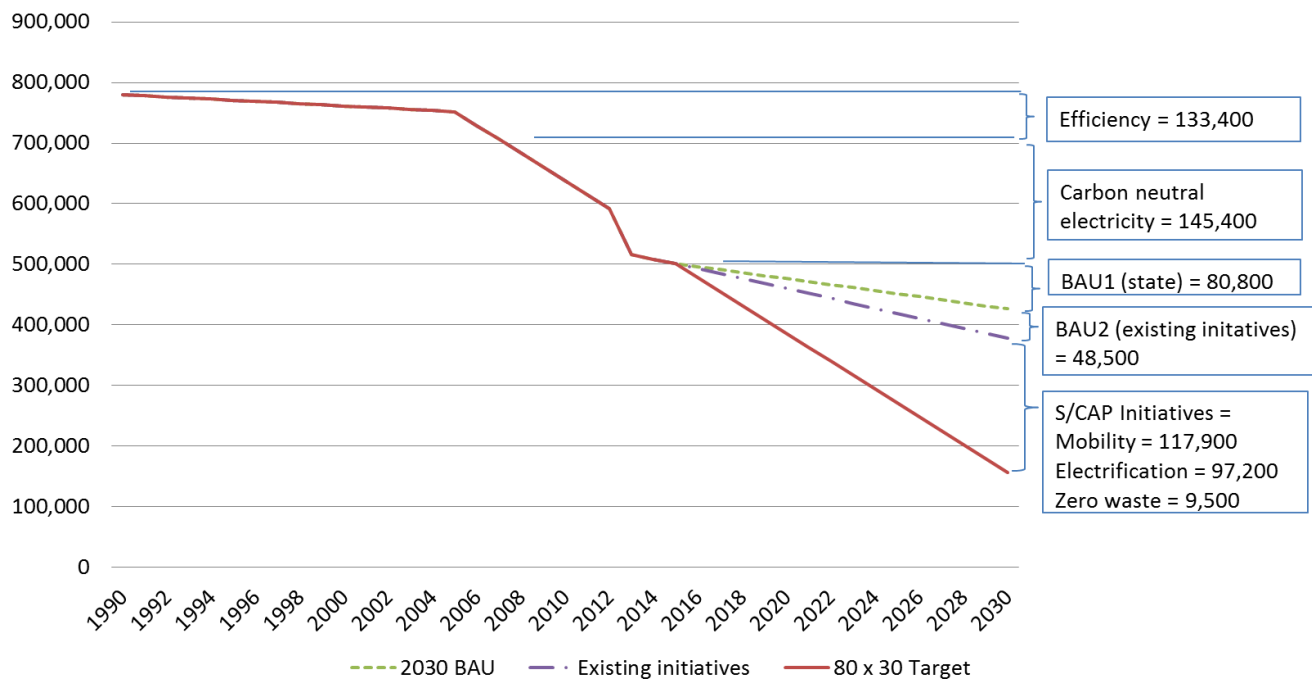
⁷ Net Brown Power (fossil fuel-based) electricity emissions taper down and are not present starting in 2013 because CPAU began purchasing Renewable Energy Credits (RECs) to offset all the GHG emissions for this power source, and replacing brown power with increasing purchases of renewable energy.

Figure 2. 2016 Palo Alto Community-wide GHG Emissions⁸ Sectors



Source: City of Palo Alto Utilities

Figure 3. Overview of Palo Alto GHG Reduction Target relative to Business-as-Usual (MT CO₂e)

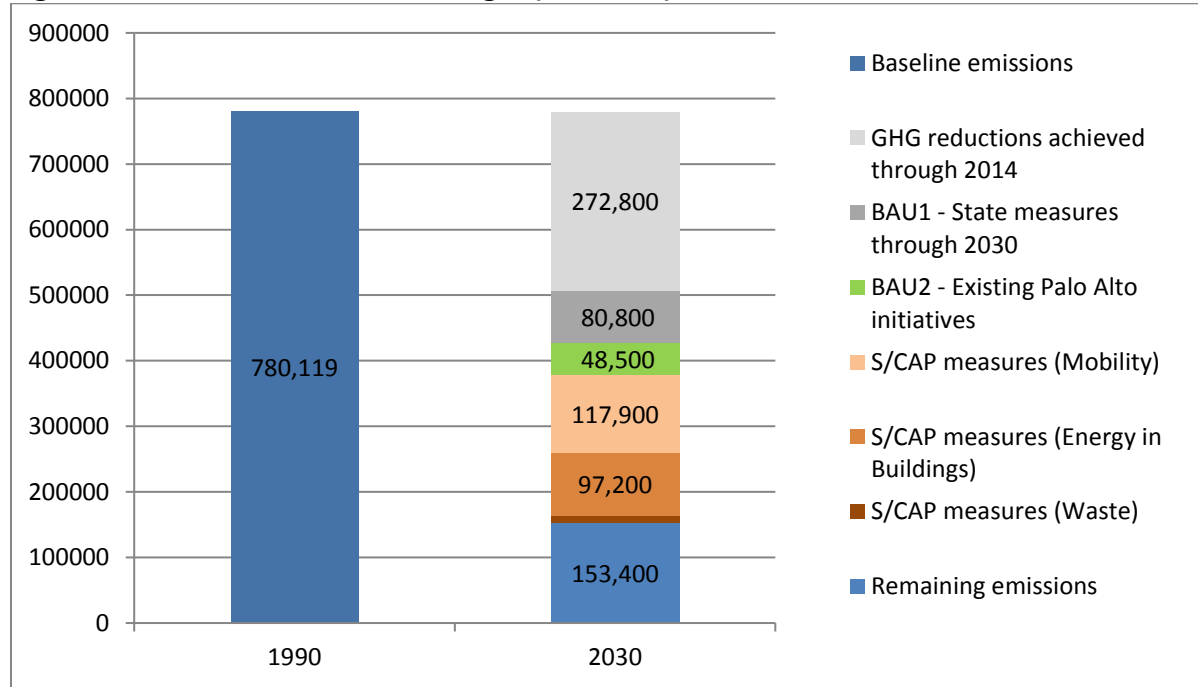


The S/CAP focuses on pathways to a low-carbon future, and initiatives addressing mobility, energy, city operations, water, green infrastructure, adaptation and regeneration as part of a holistic framework for sustainability. Specifically, it contains Goals and Strategies for reducing

⁸ Total Emissions are weather adjusted, with biogenic emissions excluded

Palo Alto's GHG emissions from the current level of 38% below 1990 levels to 80% below 1990 levels by 2030 ("80x30"), 20 years ahead of the State of California 80x50 target. This represents a GHG reduction "budget" of approximated 224,600 MT CO₂e (as shown in Figure 4 below).

Figure 4: 80x30 GHG Reduction Budget (MT CO₂e)



The S/CAP is organized around ten sustainability chapters, including some without direct quantifiable impacts on greenhouse gas emissions, but which are central to a holistic approach for sustainability in Palo Alto that protects and enhances our natural resources for generations to come. The Goals and Strategies for GHG reduction are summarized below:

- **Mobility:**
 - ***Make it more convenient not to drive*** by developing responsive, multimodal, service-focused transportation services
 - ***Shift subsidies*** from free parking to support non-SOV travel
 - ***Encourage land use*** patterns that reduce both congestion and climate impacts.
 - ***Support policy changes that promote EV charging infrastructure in public and private development and that encourage EV use by residents and commuters***
- **Building Energy Efficiency & Electrification:**
 - ***Pursue large gains in energy, and materials efficiency*** in buildings and operations
 - ***Pursue the adoption of an Energy Reach Code that drives energy efficiency through our building codes***
 - Emphasize ***integrative design*** and ***streamlined policy*** approaches
 - Explore ***building stock upgrades*** to Zero Net Energy or Net Positive through design, efficiency, renewables and bundled services packages

- **Encourage all-electric** new construction (if technically and legally feasible, cost effective and directed by City Council)
- **Rapidly upgrade existing building stock** resource efficiency (residential and commercial)
- Support a systematic **shift from natural gas to all-electric systems⁹ and/or renewable natural gas** (if technically and legally feasible, cost-effective and directed by City Council)
- **Zero Waste and the Circular Economy**
 - **Divert 95% of Waste** from Landfills by 2030, and ultimately achieve Zero waste
 - **Minimize Energy and Pollution** from waste collection, transportation and processing
- **Water Management:**
 - **Reduce** Water Use
 - Utilize **the right water** quality for the right use
 - Ensure **sufficient water** quality and quantity
 - **Protect** the Bay, other Surface Waters, and Groundwater
 - **Lead** in Sustainable Water Management
- **Sea Level Rise Response:**
 - **Plan** for the Coming Changes in our Climate and Environment
 - **Protect** the City from Climate Change-Induced Hazards
 - **Adapt** to Current and Projected Environmental Conditions
 - **Empower** the Local Community and Foster Regional Collaboration
- **Municipal Operations – Leading the Way**
 - Create Energy and Water **Efficient City Buildings**
 - Minimize **City Fleet** Emissions and Maximize its Efficiency
 - **“Default to Green”** purchasing for products and services
 - **Embed sustainability** in city procurement, operations and management
 - **Set targets and tracking performance metrics** for City sustainability performance
 - **“Walk the talk”** by ensuring the City goes first on any sustainability actions requested or required of the community
- **Natural Environment Protection:**
 - **Renew, Restore, and Enhance resilience** of our natural *environment*
 - **Align Planning** for Management of our Natural Environment with the S/CAP and other key City Plans
 - **Maximize Carbon Sequestration and Storage** in the Natural Environment
- **Utility of the Future:**
 - **Adapt CPAU** offerings and business model to potentially disruptive challenges facing the utility industry, including distributed generation & storage, and “grid defection”
 - **Explore micro-grids, nano-grids** and other resilience strategies
- **Community Behavior and Culture Change**

⁹ See analysis of electrification strategies, Staff Report 5971, August 2015

- Challenge community to ***consider the impact on future generations*** of choices in lifestyle, purchases and investment.
- Engage and support community through ***neighborhood initiatives***, interactive tools, etc.
- **Information systems:**
 - ***Advance “smart city” platforms*** for transportation, utilities, buildings, operations, finance, etc.
 - Provide ***transparent reporting and open data*** to track performance, build knowledge and fuel innovation
- **Financing Strategies:**
 - ***Finance cost-effective initiative*** through multi-channel, non-general fund, local and external investment in support of these goals, to the extent permitted by existing legal and regulatory framework applicable to the City.

Council approved (November 28, 2016) a set of guiding principles, design principles and decision criteria to guide decision-making. In both evaluating the S/CAP, and in developing and evaluating future programs guided by it, the City is guided by the guiding principles and design principles below. In selecting specific programs and policies to pursue, and in allocating public resources to support them, the City will be guided by the decision criteria below:

Guiding Principles

The Vision Statement for the 1998 Comprehensive Plan Governance Element declares that:

“Palo Alto will maintain a positive civic image and be a leader in the regional, state, and national policy discussions affecting the community. The City will work with neighboring communities to address common concerns and pursue common interests. The public will be actively and effectively involved in City affairs, both at the Citywide and neighborhood levels.”¹⁰

S/CAP builds on that vision with these guiding principles as a basis for effective and sustainable decision-making:

- Consider “sustainability” in its broadest dimensions, including quality of life, the natural environment and resilience, not just climate change and greenhouse gas emissions reductions.
- Address the sustainability issues most important to the community and select most cost-effective programs and policies—recognizing that this will entail moral and political, as well as economic, decision factors.
- Seek to improve quality of life as well as environmental quality, economic health and social equity.
- Foster a prosperous, robust and inclusive economy.
- Build resilience—both physical and cultural—throughout the community.

¹⁰ <http://www.paloaltocomplan.org/plan-contents/governance-element/>

- Include diverse perspectives from all community stakeholders, residents, and businesses.
- Recognize Palo Alto's role as a leader and linkages with regional, national and global community.

Design Principles

- Focus on what's feasible—recognizing that technology and costs are shifting rapidly.
- Prioritize actions that are in the City's control – recognizing that we can urge others to join us, but leading by example is most effective
- Be specific about the actions and costs to achieve near-term goals, while accepting that longer-term goals can be more aspirational
- Use ambient resources: Maximize the efficient capture and use of the energy and water that fall on Palo Alto.
- Full cost accounting: Use total (life cycle) cost of ownership and consideration of externalities to guide financial decisions, while focusing on emission reductions that achievable at a point in time (i.e. not on life cycle emissions).
- Align incentives: Ensure that subsidies, if any, and other investment of public resources encourage what we want and discourage what we don't want.
- Flexible platforms: Take practical near term steps that expand rather than restrict capacity for future actions and pivots.

Decision Criteria

- Greenhouse gas impact
- Quality of life impact
- Mitigation cost
- Return on investment (ROI)
- Ecosystem health
- Resilience
- Impact on future generations

Council directed Staff to create a Sustainability Implementation Plan (SIP) specifying actions needed to build City capacity to achieve the "80x30" GHG reduction goal. Staff used proposed S/CAP actions to construct a near-term SIP. Staff formed inter-departmental teams to develop a 2017 – 2020 Sustainability Implementation Plan to cover key S/CAP sections: Mobility, Efficiency and Electrification, Water Management, Zero Waste & Circular Economy, Municipal Operations, Climate Adaptation & Resilience, Regeneration & Natural Environment, and Financing Strategies. Other S/CAP sections - Community Behavior, Culture, and Innovation; and Utility of the Future - will be developed in future work phases.

Summary Description of the 2018 - 2020 Sustainability Implementation Plan

On December 11, 2017, the Palo Alto City Council unanimously accepted the 2018 – 2020 Sustainability Implementation Plan (SIP), which is the next phase of the City’s Sustainability and Climate Action Plan.

The SIP focuses on two key concerns—CO2 emissions and Water—and four key areas of activity: Energy, Mobility, Electric Vehicles, and Water. The SIP identifies Strategic Moves and Key Actions in each of the four key areas that could enable Palo Alto to reduce GHG emissions to about 40 percent below the 1990 base year by 2020, and by about 54 percent if we include the “bridging” contribution of natural gas offsets¹¹.

The remaining S/CAP areas—Zero Waste and Circular Economy; Municipal Operations; Climate Adaption and Sea Level Rise; Regeneration and Natural Environment; Financing Strategies; and Community Behavior, Culture, and Innovation—will be included in future plans.

The Goals, Strategic Moves, and Key Actions of the 2018-2020 SIP are summarized below:



ENERGY GOALS

- ➔ Drive building efficiency and electrification through voluntary and mandatory programs
- ➔ Mitigate the impacts of natural gas use through carbon offsets (in the short term) and electrification (in the mid-to long-term)

STRATEGIC MOVES

- ➔ Identify utility projects needed to support S/CAP decarbonization goals through utility planning processes such as the Utilities Strategic Plan, Smart Grid Implementation Plan, Distributed Energy Resources Plan, distribution planning processes and Electric Integrated Resources Plan.
- ➔ Develop a ZNE Roadmap and benchmarking energy study to identify opportunities to increase efficiency of new and existing building stock from construction through operation.

KEY ACTIONS

- EGY1** - Continue to purchase carbon offsets to match natural gas emissions as a transitional measure. Evaluate potential local offset purchases.
- EGY2** - Achieve cumulative energy efficiency savings of 2-5% by 2020 through voluntary and mandatory energy efficiency measures in buildings.
- EGY3** - Encourage voluntary electrification (and mandates as appropriate) of natural gas appliances through actions such as pilot programs, process streamlining, evaluating barriers (rates/fees, financing), and contractor/supplier engagement.

¹¹ Staff estimates that Carbon Neutral Natural Gas will result in an additional 18% reduction in GHG emissions.

- EGY4** - Complete construction of a replacement facility for sludge incinerators, the City facility with the largest energy use.
- EGY5** - Develop programs that will result in even greater efficiency savings and decarbonization from 2020 to 2030. Potential evaluations include higher efficiency standards for new and existing buildings.
- EGY6** - Develop building benchmarking requirements, and commissioning / retro-commissioning programs to ensure efficient post-occupancy building operation.



MOBILITY GOALS

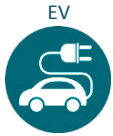
- Reduce Single Occupancy Vehicle (SOV) travel
- Make it more convenient not to drive

STRATEGIC MOVES

- Implement solutions and incentives to reduce SOV travel
- Advocate for regional transportation solutions that reduce emissions and congestion

KEY ACTIONS

- MOB1** - Fund the TMA with the goal of reducing SOV commute-trips downtown by 30%.
- MOB2** - Ensure that Palo Alto's transportation policies and investments support integrated mobility services.
- MOB3** - Develop "commuter wallet" mobility app(s) to make it easier for people to use and pay for transit, rideshare, bike share, and mobility services, and take other steps to ensure supportive infrastructure and services.
- MOB4** - Increase bicycle boulevard mileage by 13.1 miles, and redesign streets to support active and non-SOV modes of travel.
- MOB5** - Use parking management strategies, including dynamic pricing, to support transportation and sustainability goals and better align the cost of commuting by car with the cost of commuting by transit.
- MOB6** - Explore options for aligning City fleet management with the "three revolutions" of electric, shared and connected; evaluate using City vehicles as "ride share" vehicles and/or contracting with a 3rd party for pool management.
- MOB7** - Explore housing strategies (such as transit oriented development, trip caps, parking maximums and unbundling parking) that reduce auto trips.
- MOB8** - Explore re-establishing and expanding access to citywide bike share program, integrated with regional transit, perhaps in collaboration with neighboring cities.
- MOB9** - Advocate for policies that enable provision of universal transit passes to residents in transit served areas.
- MOB10** - Explore providing flexible/responsive first-and-last-mile solutions.



ELECTRIC VEHICLES GOALS

- ➔ Accelerate EV penetration for both PA-based & inbound vehicles
- ➔ Make “Going EV” more convenient and economical than using fossil fueled vehicles

STRATEGIC MOVES

- ➔ Build out public and private infrastructure to support rising EV penetration, including anticipated local ownership of 4-6,000 EVs by 2020
- ➔ Evaluate incentives, outreach, policies, and financing options to stimulate charging infrastructure and EV ownership/use

KEY ACTIONS

- EV1** - Publicize streamlined permitting and CPAU-funded transformer upgrades.
- EV2** - Consider requiring EV Readiness and charger installation in existing buildings.
- EV3** - Evaluate programs to expand EV charger deployment on private property, including rebates and financing options (e.g. on-bill financing, etc.).
- EV4** - Develop a plan for expanding EV charging infrastructure in the public right-of-way and on publicly-owned property.
- EV5** - Expand EV deployment in City fleet.
- EV6** - Support regional EV group-buy programs.
- EV7** - Build public awareness of EV options through communications, RideAndDrive events, etc.



WATER GOALS

- ➔ Reduce water consumption
- ➔ Ensure adequate water supply from sustainable sources
- ➔ Protect canopy, creeks, groundwater and the bay

STRATEGIC MOVES

- ➔ Explore incorporating an evaluation of the costs and benefits of non-potable water sources to supplement potable sources, as well as a high-level “water balance” chart, into a single strategic planning document (such as the Water Integrated Resources Plan).

KEY ACTIONS

- WAT1** - Develop programs and ordinances to maximize water efficiency.
- WAT2** - Develop programs and ordinances to facilitate the use of non-traditional, non-potable water sources (e.g. graywater, storm water, black water, etc.).
- WAT3** - Develop Recycled Water Strategic Plan and explore the most effective uses of recycled water, both inside and outside Palo Alto.
- WAT4** - Develop a Green Storm Water Infrastructure Plan to better capture and infiltrate storm water back into the hydrologic cycle.
- WAT5** - Reduce salinity of Palo Alto’s recycled water to increase desirability of use.

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 and 2013-2017 (in MT of CO₂ equivalent)

– Biogenic and Anthropogenic, not normalized for hydro conditions or PAG purchases –

	2005			2013			2014			2015			2016			2017		
	Scope 1	Bio-genic	Scope 2	Scope 1	Bio-genic	Scope 2	Scope 1	Bio-genic	Scope 2	Scope 1	Bio-genic	Scope 2	Scope 1	Bio-genic	Scope 2	Scope 1	Bio-genic	Scope 2
Buildings and Other Facilities	8,723	0	1,819	7,691	0	0	8,177	0	0	8,702	0	0	8,216	0	0	8,081	0	0
Streetlights and Traffic Signals	0	0	689	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Delivery Facilities	2	0	67	92	0	0	41	0	0	54	0	0	78	0	0	131	0	0
Wastewater Facilities ¹	8,504	16,689	2,546	5,024	11,183	0	4,616	11,385	0	3,900	11,054	0	2,914	11,342	0	2,567	10,587	0
Vehicle Fleet	2,835	1	0	2,399	0	0	2,346	0	0	2,372	0	0	2,383	0	0	2,296	0	0
Power Generation Facilities	0	0	8,570	29	0	0	23	0	0	173	0	0	54	0	0	0	0	0
Solid Waste Facilities	6,846	5,853	29	6,642	5,789	0	8,470	5,789	0	10,673	6,948	0	10,160	6,120	0	9,868	6,445	0
Other Processes & Fugitive Emissions	3	0	0	4	0	0	4	0	0	6	0	0	4	0	0	2	0	0
TOTAL	26,912	22,543	13,720	21,881	16,972	0	23,676	17,174	0	25,881	18,002	0	23,809	17,462	0	22,944	17,032	0

Scope 1 and Scope 2 emissions are non-biogenic emissions that are 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 starting in 2013 by the purchase of Renewable Energy Credits (RECs) under the Carbon Neutral Plan. Table B2 below shows the transformation of the data in Table B1 above by excluding biogenic emissions, and shows a 43.5% reduction in Scope 1 and Scope 2 emissions from the 2005 baseline.

¹ Wastewater biogenic emissions numbers for 2015 and 2016 were incorrectly recorded. They referenced total City biogenic emissions, including landfill. The numbers have been corrected and are significantly lower. 2015 was 5,840 MT of CO₂e for Scope 1 emissions, and 2016 was 5,892 MT of CO₂e for Scope 1 emissions.

Table B2: City Operations GHG Emission in 2005 and 2013-2017 (in MT of CO₂ equivalent)

Excludes Biogenic, not normalized for hydro conditions or PAG purchases

GHG Emissions (Scope 1 & 2)	2005	2013	2014	2015	2016	2017
Water Delivery Facilities	69	92	41	54	78	131
Wastewater Facilities	11,049	5,024	4,616	3,900	2,914	2,567
Vehicle Fleet	2,835	2,399	2,346	2,372	2,383	2,296
Streetlights & Traffic Signals	689	0	0	0	0	0
Solid Waste Facilities	6,876	6,642	8,470	10,673	10,160	9,868
Power Generation Facilities	8,570	29	23	173	54	0
Buildings & Other Facilities	10,542	7,691	8,177	8,702	8,216	8,081
TOTAL	40,629	21,877	23,672	25,875	23,805	22,942
Reduction from 2005 Baseline		46.2%	41.7%	36.3%	41.4%	43.5%

Table B2 does not include the effects of the purchase of PaloAltoGreen resources and the normalization of the vagaries of hydroelectric supply conditions. Table B3 below *does* adjust for these two effects and shows a 45.1% reduction in emissions from the 2005 baseline year.

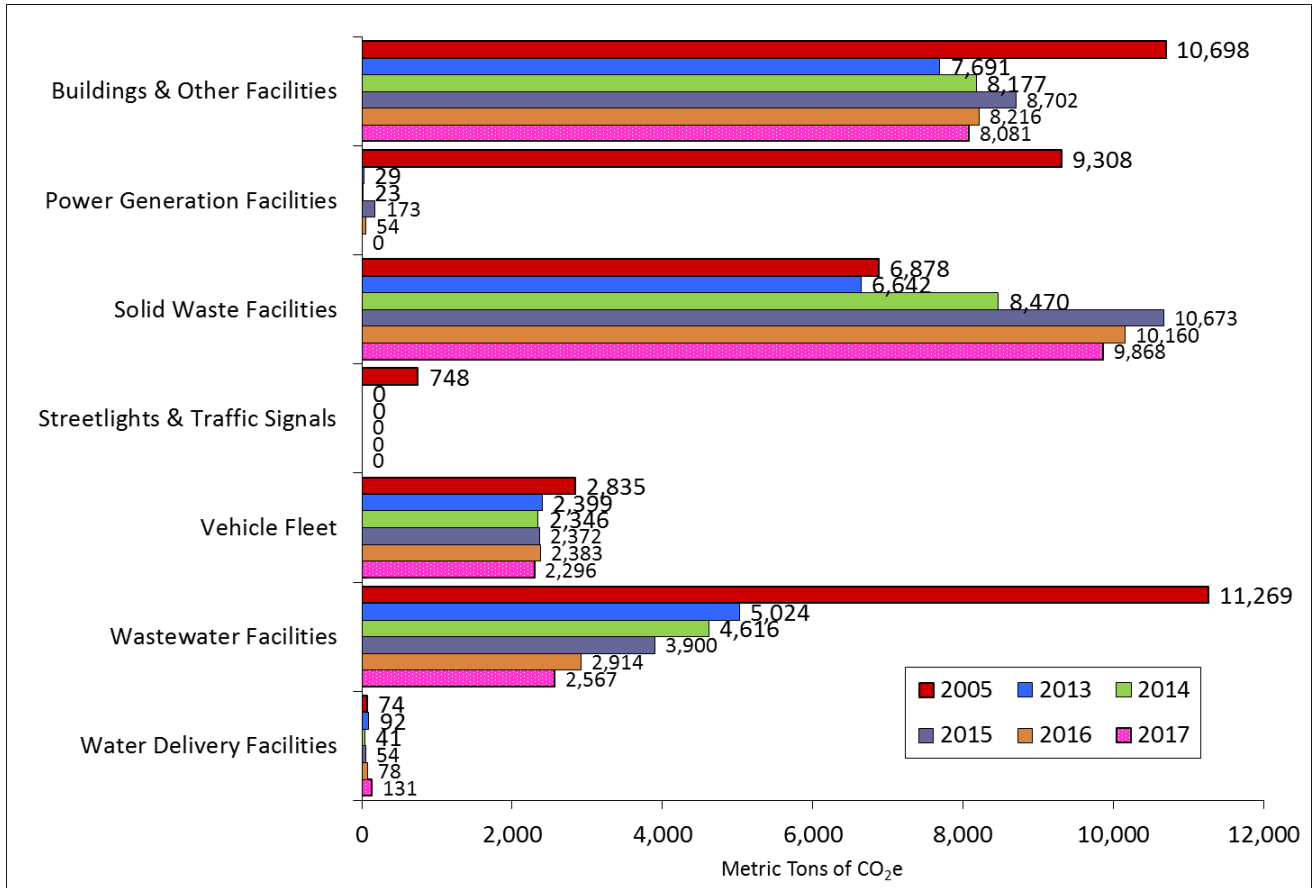
Table B3: City Operations GHG Emission in 2005 and 2013-2017 (in MT of CO₂ equivalent)

Excludes Biogenic, normalized for hydro conditions and PAG purchases

GHG Emissions (Scope 1 & 2)	2005	2013	2014	2015	2016	2017
Water Delivery Facilities	74	92	41	54	78	131
Wastewater Facilities	11,269	5,024	4,616	3,900	2,914	2,567
Vehicle Fleet	2,835	2,399	2,346	2,372	2,383	2,296
Streetlights & Traffic Signals	748	0	0	0	0	0
Solid Waste Facilities	6,878	6,642	8,470	10,673	10,160	9,868
Power Generation Facilities	9,308	29	23	173	54	0
Buildings & Other Facilities	10,698	7,691	8,177	8,702	8,216	8,081
TOTAL	41,811	21,877	23,672	25,875	23,805	22,942
Reduction from 2005 Baseline		47.7%	43.4%	38.1%	43.1%	45.1%

Figure 1 below graphically illustrates Table B3 and is a reproduction of Figure 5 from the body of the report.

Figure 1: City Operations GHG Emissions: 2005 and 2013-2017 (Hydro and PAG-adjusted)
 Total Emissions Reduced from 41,800 MT in 2005 to 22,942 MT in 2017



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. The City also purchased carbon offsets through PaloAltoGreen Gas (PAGG) to cover 100% of the emissions from natural gas consumption for all of 2017.
- **Power Generation Facilities** – This category accounts for transmission and distribution system losses. The City divested its ownership of the COTP transmission line in 2009, resulting in a 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 since 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 compressed natural gas (CNG) fuels and gasoline in 2017.
- Wastewater Facilities – 74% 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 12% decrease from 2016 was due to purchasing additional carbon offsets through PaloAltoGreen Gas (PAGG) for the natural gas used in the incinerator.
- Water Delivery Facilities – There has been fluctuating energy use for water pumping, with a decrease in activity for 2014 and 2015.

**Attachment C: Palo Alto Community & City Municipal Operations GHG Emission:
Reduction of 41% since 2005, 43% since 1990**

	1990****		2005		2013		2014		2015		2016		2017		Notes
	Quantity	Emissions (MT of CO2e)	Quantity	Emissions (MT of CO2e)	Quantity	Emissions (MT of CO2e)	Quantity	Emissions (MT of CO2e)	Quantity	Emissions (MT of CO2e)	Quantity	Emissions (MT of CO2e)	Quantity	Emissions (MT of CO2e)	
Scope 1 Emissions															
Natural Gas Use (therms)	36,589,986	194,000	31,374,970	166,350	30,336,076	160,842	26,103,713	138,402	25,491,698	135,153	25,846,328	144,978	28,696,589	152,264	1
PaloAltoGreen Gas Offsets												(7,832)	(58,652)		1
Natural Gas Distribution Leakage		4,718		4,718		4,718		4,781		4,781		4,781		4,781	2
Palo Alto Landfill Fugitive Emissions		24,325		9,900		5,110		9,427		8,617		6,527		6,538	3
Palo Alto Landfill Gas Flaring (biogenic)		11,993		2,994		2,919		6,436		5,941		5,463		6,445	3
Wastewater Process Emissions		8,504		8,504		5,024		4,616		3,900		2,914		2,567	4
City of Palo Alto Vehicle Fleet		2,835		2,835		2,399		2,523		2,372		2,383		2,296	5
Scope 2 Emissions -- Actual															
Total Electric Load (MWh)			996,091		986,241		978,561		963,254		945,744		946,525		
Hydro Supply (MWh)*****			548,760		406,570		266,026		256,570		406,975		782,556		
Renewables Supply (MWh)			49,980		188,086		180,735		235,491		365,016		533,256		
Brown Power Supply (MWh)		186,000	397,352	158,427	391,585	0	531,744	0	471,193	0	177,753	0	(369,287)	0	6a
Palo Alto Green Purchases (MWh)			30,601	-12,201		N/A		N/A		N/A		N/A		N/A	7
Scope 2 Emissions -- Weather Adjusted***															
Total Electric Load			996,091		986,241		978,561		963,254		945,744		946,525		
Hydro Supply (MWh)			514,073		508,660		508,660		531,011		531,011		531,011		
Renewables Supply (MWh)			49,980		188,086		180,735		235,491		365,016		533,256		
Brown Power Supply (MWh)		186,000	432,038	172,257	289,495	115,424	289,166	115,293	196,752	78,447	49,718	19,823	(117,742)	0	6b
Palo Alto Green Purchases (MWh)			30,601	-12,201	0	0	0	0	0	0					7
Scope 3 Emissions															
Commute into, from, and within City		329,005		369,035		317,321		326,773		326,923		314,004		314,004	8
Lifecycle Emissions From Annual Total Waste Placed in Landfills		2,883	9,900	2,883	5,110	1,931	9,427	1,919	8,617	1,986	6,527	1,850	6,538	2,213	9
Landfilling Recyclable Material		13,650		13,650		8,934		8,892		9,910		9,905		11,623	9
Total Emissions (weather adjusted, biogenic excluded)		765,920		737,931		506,279		497,333		493,643		479,031		437,241	
Emissions Reduction since 2005						31.4%		32.6%		33.1%		35.1%		40.7%	
Emissions Reduction since 1990						33.9%		35.1%		35.5%		37.5%		42.9%	

Notes:

1	<i>Total Community supply of natural gas use/delivery. Adjusted for purchases of carbon offsets through PaloAltoGreen Gas program.</i>
2	<i>Leakage from the natural gas distribution system- modeled result, unchanged over the period.</i>
3	<i>Now using 40CFR Part HH methodology, per AB32. Estimates provided in prior estimates have been revised to reflect current methodology.</i>
4	<i>Represents N2O emissions from biological treatment process and release of nitrogen.</i>
5	<i>City of Palo Alto Vehicle Fleet emissions are Scope 1 emissions. For more accuracy in reporting, they are separated out from the Scope 3 "Commute into, from, and within City" emissions.</i>
6	<i>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.</i>
	<i>b. Weather normalized (for hydroelectric generation) quantity of brown power. No GHG emissions in 2017.</i>
7	<i>Emissions saved due to purchase of PaloAltoGreen (PAG) related Renewable Energy Credits (RECs). PAG related RECs not included beyond 2012 due to Carbon Neutral Plan.</i>
8	<i>Road travel estimates are based on emissions modeling, not on actual measurements. The 2016 estimate is from Placeworks On-Road Transportation Greenhouse Gas Emissions Inventory Technical Memorandum from February 28, 2017. 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, bicycle use, etc. 2012 - 2013 estimates were from a subsequent 2016 Fehr and Peer analysis.</i>
9	<i>Based on most recent EPA WARM methodology, based on characteristics and tons of material landfilled; prior year emissions have been updated using new WARM methodology. Landfilled amount in 2016 down 34% compared to 2005.</i>
*	<i>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.</i>
**	<i>Table excludes biogenic emissions related to: Landfill gas flaring and WQCP sludge incineration.</i>
***	<i>Normalized to account for the vagaries of weather on hydroelectric supplies. No GHG impact starting in 2013 due to Carbon Neutral Plan. Because of the timing of the Earth Day Report, the meter data from renewable power counterparties is not prepared yet, so invoice data is used for some months. The 2015 estimates have been with updated with the most accurate data.</i>
****	<i>1990 emissions data, where unavailable, were assumed to be equal to 2005 values.</i>
*****	<i>The hydro supply number changed for 2015 because the percentage received of Western Area Power Administration (WAPA) base resource hydro power changed on Jan 1, 2015, and was not accurately reflected in last year's Earth Day Report Attachment C.</i>

Attachment D: Highlights of Sustainability Initiatives by City Municipal Operations

Department: City of Palo Alto Utilities (CPAU)

Background: The mission of CPAU is to provide safe, reliable, environmentally sustainable and cost effective 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 from local solar resources by 2023 (this strategy will be reviewed and updated in 2018)
- Facilitate adoption of electric vehicles (EVs) in Palo Alto by providing rebates for EV chargers installed at multi-family, mixed-use facilities, public schools, and non-profit organizations
- Maintain the time-of-use (TOU) electric rate option for EV customers in the pilot TOU program
- Implement pilot programs to encourage electrification of natural gas appliances, specifically for water heating and space heating, in new and existing buildings
- Make the City’s entire natural gas supply portfolio carbon neutral by procuring certified carbon offsets (California and local offsets preferred)
- Seek and test emerging technologies that have the potential to enable CPAU to provide more effective utility services
- Consistent with cost of service requirements, provide customer rates that do not inhibit efficiency, conservation, greater EV adoption and electrification of natural gas appliances
- Implement advanced metering infrastructure (AMI) by 2022
- Develop a Recycled Water Strategic Plan
- Develop a 2018 Utilities Strategic Plan

Goals:

1. Reduce electric energy use by at least 5.7% between 2018 and 2027¹ (no GHG impact since electric supply portfolio is carbon neutral).
2. Reduce natural gas use by at least 5.1% between 2018 and 2027 (7,800 metric tons per year of GHG reduction by 2027).
3. Reduce water use to 135 gallons per capita per day by 2040 (40% by 2040).
4. Increase the use of recycled water and other non-traditional water sources such as grey water and storm water.
5. Maintain the City’s 100% carbon-neutral electric supply with hydro and renewable energy supply
6. Generate 4% of electrical energy from local solar by 2023² (no GHG impact).
7. Continue to procure long-term carbon neutral electric supplies (no GHG impact).
8. Maintain a 100% carbon-neutral gas portfolio.
9. Target installation of 200 heat pump water heaters and 20 heat pump space heaters by 2020.

¹ For updated 10-year electric energy efficiency goals, see: <http://www.cityofpaloalto.org/civicax/filebank/documents/56087>

For updated 10-year gas energy efficiency goals, see: <https://www.cityofpaloalto.org/civicax/filebank/documents/56113>

² For Local Solar Plan, see: <https://www.cityofpaloalto.org/civicax/filebank/documents/39981>

Initiatives and Activities:

Top Sustainability Initiatives in 2017

Sustainability Initiative	Objective	Outcome
Electricity and Natural Gas Efficiency and Conservation Programs	Promote resource efficiency to commercial and residential customers for cost savings, lowered consumption, and avoided greenhouse gas emissions.	Electric and natural gas efficiency programs achieved savings of 5,986 MWh and 228,207 therms, exceeding the annual efficiency goals for FY17 by 8% and 25% respectively.
Renewable Portfolio Standard (RPS) eligible electric supplies	Increase renewable energy in CPAU's electric portfolio.	The City's RPS share has increased over the years: 26% (2015), 40% (2016), and 59% (2017). In CY 2017 the remaining 41% of supplies came from hydroelectric resources.

Attachment D: Highlights of Sustainability Initiatives by City Municipal Operations

Sustainability Initiative	Objective	Outcome
Local Solar Program	Increase local solar generation from 0.7% of total load to 4.0% by 2023.	<p>The 2017 Solar group-buy discount program, Bay Area SunShares, resulted in 157 kW of new local solar, which was 129 kW more than 2016. 82 CPAU customers installed a net metered PV system in 2017 for a total capacity of 1496 kW. Currently, 1.8% of the City’s electricity energy needs are met by local solar with cumulative 10,000 kW of solar capacity installed by over 1,000 customers. The City’s Renewable Portfolio Standard (RPS) as increased steadily over the years, from 26% in 2015 to 40% in 2016 and 59% in 2017. For comparison, in 2015 California adopted one of the most aggressive RPS policies in the country, requiring that all utilities in the state supply 50 percent of their retail electric sales from eligible renewable energy resources by the year 2030.</p> <p>The CLEAN Program participation to date includes four city garages totaling 1.36 MW and two commercial facilities totaling 1.55 MW. Currently 0.85 MW of capacity is still available at the 16.5 cents/kWh purchase price. The annual purchase cost for all 3 MW of program capacity is ~\$20M over a 25-year period.</p>
Carbon Neutral Gas Plan	Design and implement a carbon neutral gas plan.	The carbon neutral gas plan using carbon offsets was implemented July 2017, making the entire natural gas supply portfolio carbon neutral.
Water conservation programs	Promote water conservation to commercial and residential customers for cost savings and lower consumption.	Water efficiency programs achieved 57,154 ccf of water savings in FY17 (equivalent to 1.4% of total supply).

Sustainability Initiative	Objective	Outcome
Recycled Water Strategic Plan	Evaluate alternatives for increasing recycled water use in the City and in the region.	In partnership with the Santa Clara Valley Water District, the Recycled Water Strategic Plan is underway, including an updated evaluation of the expansion of Palo Alto's recycled water distribution system to the Stanford Research Park.
Electrification	Facilitate adoption of high-efficiency electric heat pump appliances and electric vehicles.	<p>Pilot program to promote heat pump water heaters (HPWH) launched in May 2016, with 13 HPWH rebates processed by end of 2017.</p> <p>Rebate program for EV chargers using LCFS funds was launched in January 2017 and 2 rebates applications totaling \$30,000 were provided in 2017. EV count in Palo Alto is estimated at around 5,800 at the end of 2017 (with 3,100 residential and 2,700 commuter EVs).</p>

Summary of Utility Customer Program Goals and Achievements in FY 2017

Resource	FY 2017 Savings Goals (% of load)	FY 2017 Savings Achieved (% of load)	FY 2017 Savings Achieved
Electricity	0.60%	0.65%	5,986 MWh
Gas	0.55%	0.81%	228,707 therms
Water	0.91%	1.40%	57,154 CCF
Customer side Renewable	Program Goal	FY 2017 Achievement	Cumulative Achievement through FY 2017
Solar Electric (PV)	6,500 kW, by 2017	917 kW	7,946 kW since 2008
Solar Water Heating	30 systems/year	1 system	64 systems since 2008

Notes: See impact of energy efficiency programs on utility loads in Figures D-2 and D-3. Solar Water Heating systems are not cost effective, but state law mandates a program offering.

Challenges:

1. For existing homes, switching from natural gas appliances (for space heating and water heating) to electric appliances requires a high upfront investment and is not cost effective at this time, especially if the home's electrical panel needs to be upgraded. Also, most water heaters are replaced in an emergency scenario. It is difficult to

complete a same-day replacement of a gas water heater with a heat pump water heater (HPWH) since most contractors do not stock HPWH units.

2. Future State water regulations that will impact available water supply are unknown.
3. Hydroelectric power as well as potable water supplies could be at risk in potentially disruptive climate change scenarios.
4. The current Title 24 building standards discourage the replacement of gas space heating with electric heat pump space heating; this bias will be removed in the next Title 24 code cycle beginning January 2020. Palo Alto is currently working with the California Energy Commission (CEC) to determine the necessary changes in the local ordinance order to remove this barrier in the current code cycle. The current code barrier to electric heat pump water heating has been largely addressed.
5. High penetration of local PV generation, distributed energy storage, electric vehicles, and net zero energy buildings will substantially impact the characteristics of load served by CPAU.
6. Cost of service based retail rate making process required by State law may limit the options available to encourage electrification through retail rate structures, unless a ballot measure is approved by Palo Alto voters.
7. 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, or Palo Alto's 80% by 2030 GHG goals. "Low hanging fruit" efficiency gains have been achieved, so deeper gains will require new approaches.
8. If electrification of natural gas appliances achieves high market penetration in the coming decades, it will increase electricity demand and reduce natural gas loads and revenues.

Supplemental Graphs:

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

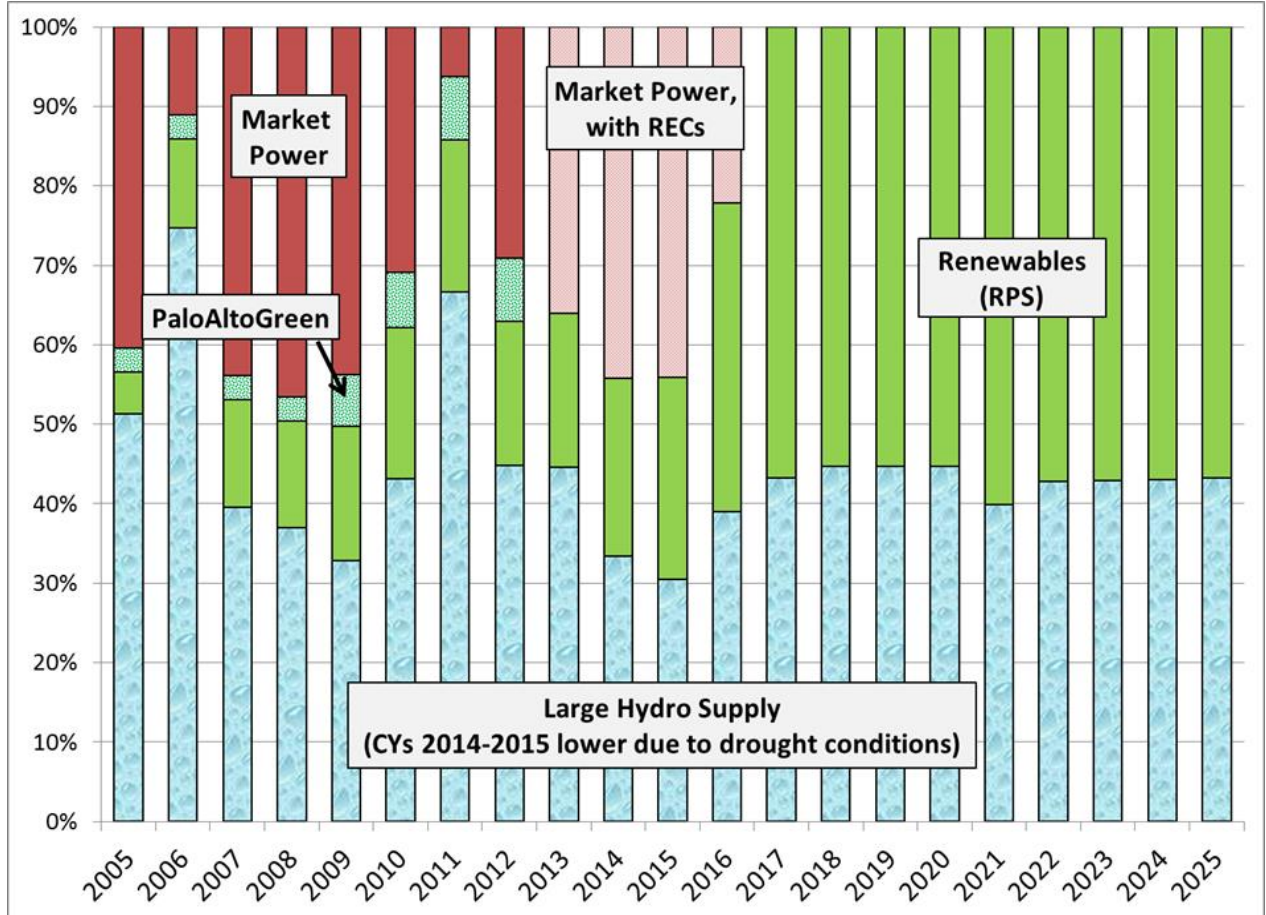


Figure D-2: Impact of Energy Efficiency Programs on Electric Sales³

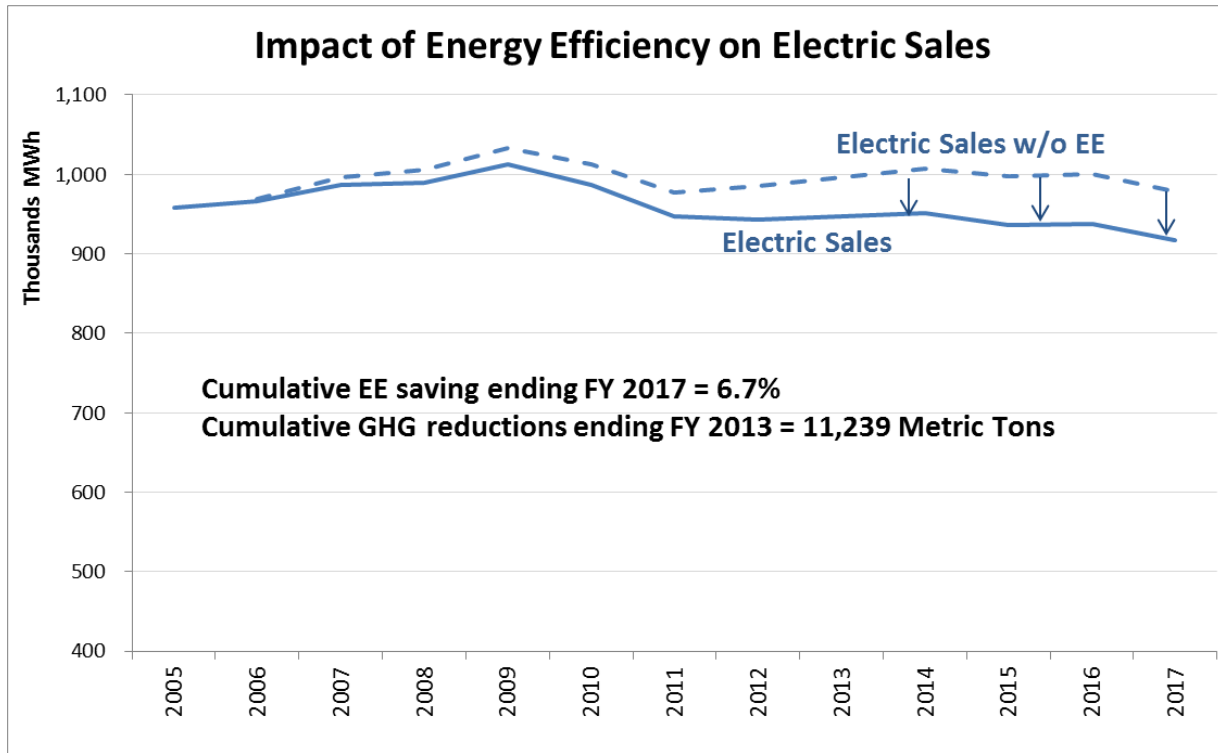
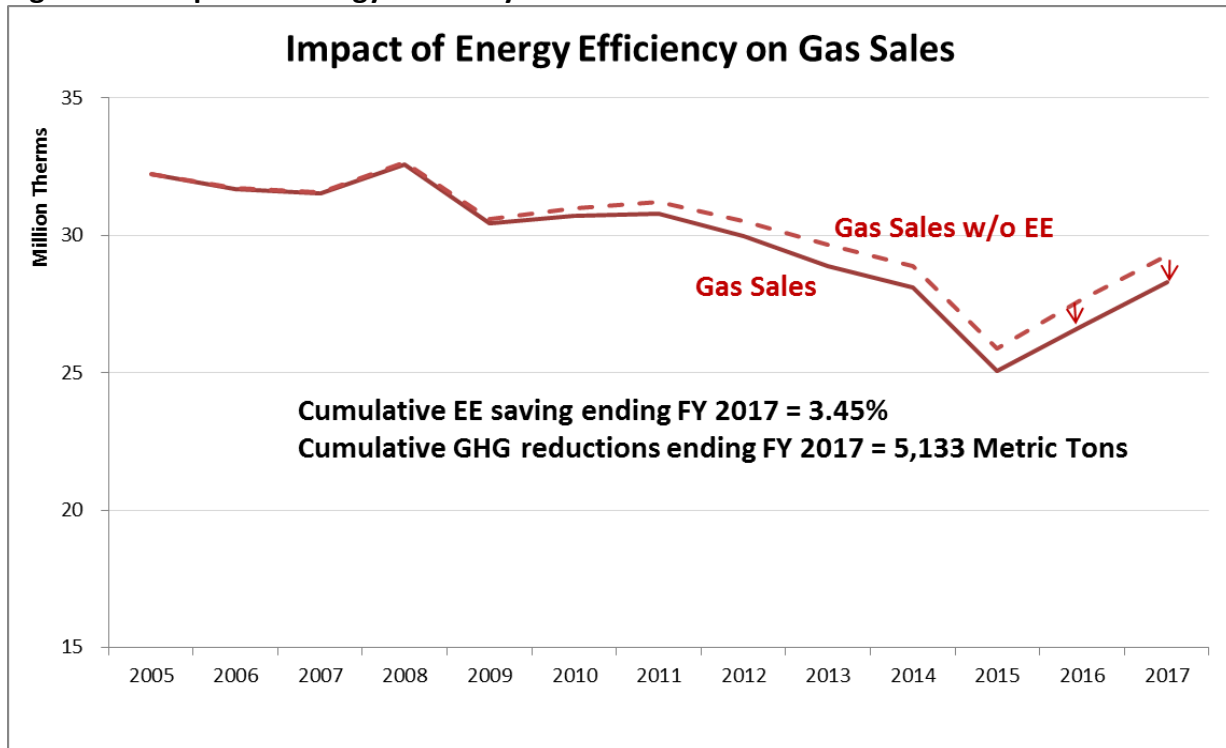
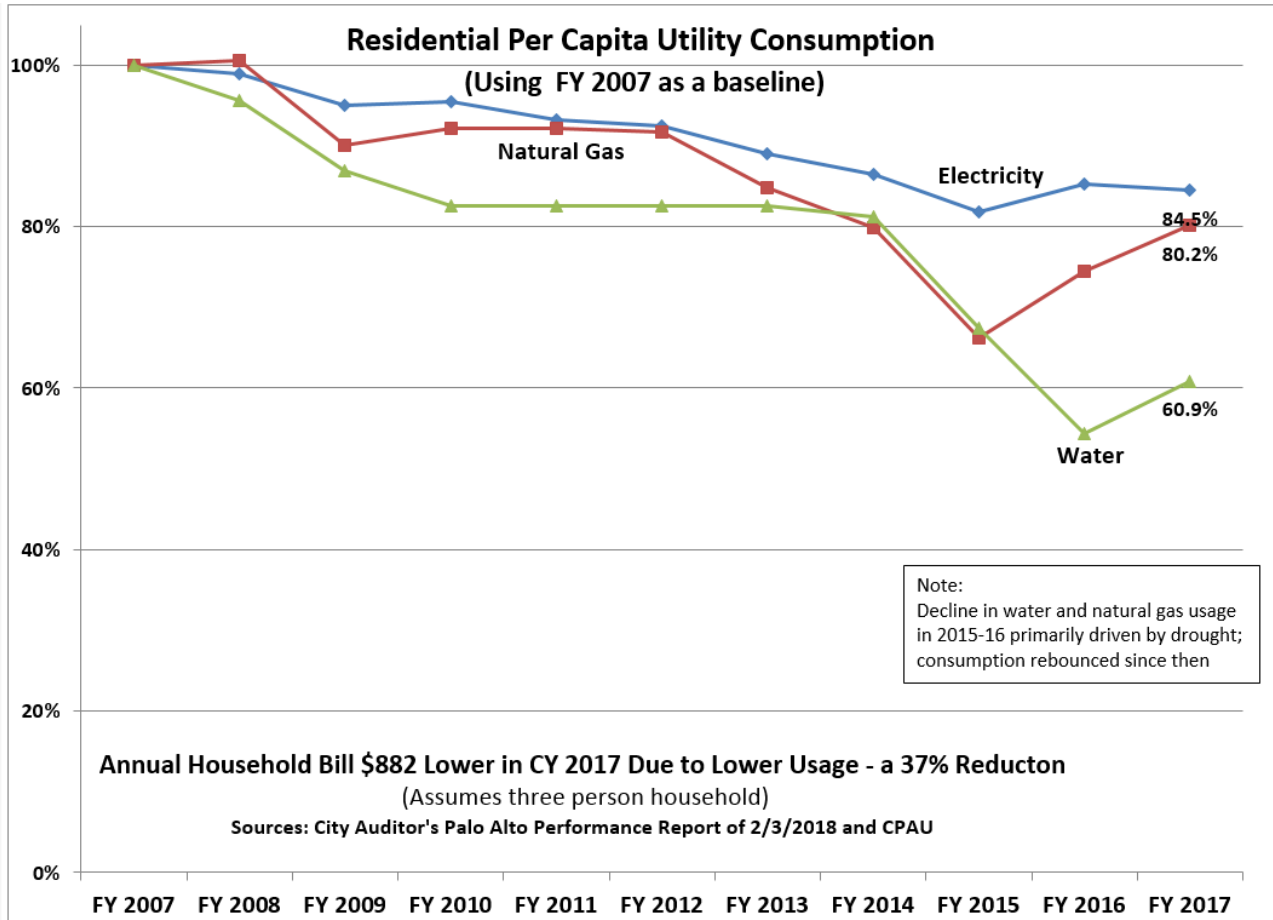


Figure D-3: Impact of Energy Efficiency on Gas Sales



³ There are no GHG reductions from electric energy efficiency after 2013 since electric supplies are carbon neutral.

Figure D-4: Residential Per Capita Utility Consumption Declining



Department Name: Community Services Department - Open Space, Parks, and Golf

Background: Community Services Department (CSD) maintains over 4,000 acres of parkland. The key sustainability issues are irrigation, water management and habitat restoration. Habitat restoration, which includes removing invasive vegetation, planting native vegetation and adapting vegetation to climate change helps renew, restore, and enhance resilience of our natural environment, and maximizes carbon sequestration and storage in the natural environment.

Through the Junior Museum and Zoo (JMZ), CSD provides standards-based science lessons and camps for young children (ages 3-12) and their adults. While these programs cover a wide range of topics in the life, physical and earth sciences, with some addressing ecology and conservation directly, the impact of all our science programs represents a substantial contribution to the goal of maintaining a healthy and sustainable environment. JMZ science programs support the cultivation of scientifically literate children who grow into scientifically literate adults with the skills to think critically, understand the relationship between natural phenomena and human events, problem solve, and take action.

Goals and Strategy:

- Sustain the reduction of potable water use for irrigation in Open Space, Parks, and Golf by 20% (based on 2013 base year). This will be achieved through: converting aesthetic turf to low-water use native plants, frequent and thorough inspection and analysis of the irrigation systems; and experimenting with the use of bio-char to save water.
- Plant 10,000 native plants in Palo Alto Open Space areas and parks annually. This will be achieved through staff and volunteer restoration efforts.
- Aggressively remove invasive non-native plants from Palo Alto open space areas and parks. This will be achieved through staff and volunteer restoration efforts.
- Reduce herbicide use by 10% (based on 2013 base year) by investing in new weed control equipment (weed steamers), and through strategic use of locally sourced mulch to suppress weeds.
- Facilitate science lessons and camps for approximately 19,000 children—ages 3 to 13— at the JMZ's temporary location at Cubberley Community Center, in local schools, and in local open spaces (including the Baylands and Arastradero preserves, and Foothills Park).

Initiatives and Activities:

Top Three Sustainability Initiatives in 2017

Sustainability Initiative	Objective	Outcome(s)
WATER MANAGEMENT- Protect creeks, bay, & groundwater	Complete hydrology study for Buckeye Creek and develop recommendations to resolve erosion and flooding issues.	The Study is complete, and has been reviewed and received by the Parks and Recreation Commission. Council will review it in the Spring.
REGENERATION & NATURAL ENVIRONMENT- Renew, restore, and enhance environmental resilience	Partner with environmental organizations and volunteers to improve habitat by removing invasive weeds and planting native plants.	16,295 pounds of invasive weeds were removed, and 7,826 native plants were planted in Palo Alto Open Space.
WATER MANAGEMENT- Reduce consumption & lead by example	Conserve potable water through strategic reductions in irrigation in Parks and Open Space.	Reduced potable water use by approximately 25%.

Top Three Sustainability Initiatives for 2018

Sustainability Initiative	Objective	Anticipated Outcome(s)
REGENERATION & NATURAL ENVIRONMENT- Renew, restore, and enhance environmental resilience	Partner with environmental organizations and volunteers to improve habitat by removing invasive weeds and planting native plants.	Remove approximately 17,000 pounds of invasive weeds, and plant 10,000 native plants in Palo Alto Open Space.
REGENERATION & NATURAL ENVIRONMENT- Renew, restore, and enhance environmental resilience	Reduce herbicide use by 10% (based on 2013 base year) by investing in new weed control equipment (weed steamers), and through strategic use of locally sourced mulch to suppress weeds.	Reduce herbicide use by 10% based on 2013 base year.
WATER MANAGEMENT- Reduce consumption & lead by example	Sustain the reduction of potable water use for irrigation in Open Space, Parks, and Golf by 25% (based on 2013 base year).	Reduce potable water use by approximately 25%.

Challenges:

- Limited budget will make the purchase of alternative new weed control equipment challenging.

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 for living and working.

Strategy: Development Services will continue to provide leadership in green building and energy programs and enforcement protocol. We will develop green building policy for new and existing building stock that lead within the State by 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: Our calendar year goal is to improve annual water use reduction, annual energy use reduction, and metric tons of CO2 avoided by 10% over the FY 2016 data. This goal applies to permitted building projects within the Development Services Center that trigger the green building and energy reach ordinances. Our target equals a total energy use reduction amount of 4.73M kBTu/year, 11.55M gallons/year of water, and 108.9 metric tons of CO2 (compared to 2016 performance data reported below). The percent savings represent the total savings from the green building and energy reach codes compared to the minimum building codes. Also, we have a target to reduce energy use of buildings while promoting local generation to offset what is left to achieve Zero Net Energy consumption (or potential Zero Net Carbon emissions—a potential more relevant metric for Palo Alto) over the course of a year. We have created an online survey for project teams to complete as part of their building permit application to better track these green building metrics.

Initiatives and Activities: Deliver interdepartmental trainings enabling all development review staff and community members to apply green building requirements to project applications. Continue a quarterly Green Building Staff Task Force with an assigned Green Building Liaison for each department. Continue providing public trainings quarterly for all Palo Alto stakeholders. Continue enforcement of two previously approved municipal ordinances, the green building ordinance and the energy reach code ordinance. Continue to meet with Green Building Advisory Group for development of criteria for future code cycles and to resolve issues from previous review cycles. Publish updates to the website promoting design clarity in green building policy and enforcement expectations.

Top Three Sustainability Initiatives in 2017

Sustainability Initiative	Objective	Outcome(s)
New Green Building Ordinance	Begin enforcement of the expanded and updated green building ordinance with new criteria that reflects current building technologies.	Implemented the new Green Building Ordinance on January 1, 2017.

Attachment D: Highlights of Sustainability Initiatives by City Municipal Operations

New Energy Reach Code	Begin enforcement of adopted new Energy Reach Code.	Implemented the new Energy Reach Code on January 1, 2017.
Training and Outreach	Solicit input on future building code amendments, enforce existing codes, and support awareness and compliance with existing codes.	Successful outcomes include improved code compliance and increased capacity from our community partners.

Data: Fiscal Year 2017

Green Building

Performance Measure	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	Forecast FY2018 ⁴	Forecast FY2019 ⁴	Forecast FY2020 ⁴
Green Building - revenue \$	\$127,186	\$89,911	\$304,625	\$108,255	\$102,007 ¹	\$112,207	\$123,427	\$135,769
Green Building valuations with mandatory regulations \$	\$569,451,035	\$349,128,085	\$537,328,177	\$399,013,812	\$263,481,442 ²	\$289,829,586	\$318,812,545	\$350,693,800
Green Building square feet with mandatory regulations	2,441,575	3,432,025	3,982,319	2,349,870	1,622,943	1,785,237	1,963,761	2,160,137
Energy savings (kBtu/yr) (sf)	1,922,532	3,141,510	3,958,192	3,677,853	1,430,035 ^{2,3}	1,573,039	1,730,343	1,903,377
Water reduction (gallons/yr)	5,580,485	7,730,840	31,285,192	8,200,989	187,695,393 ^{2,5}	206,464,932	227,111,425	249,822,568
CO2 emissions reduction (metric tons)	19,269	72,168	103,270	63,331	38,247	42,072	46,279	50,907

¹ Based on new building permit applications received during the reporting period.

² Based on existing building permits closed out during this reporting period.

³ Reduction related to a decrease in building permit activity during the reporting period compared to previous periods.

⁴ Forecasts based on a 10% annual increase of savings based on building permits finalized. Fluctuation in building permit activity creates challenges for forecasts.

⁵ Metric based on significant increase in water-efficient landscape projects closed out during this reporting period.

Top Three Sustainability Initiatives for 2018

Sustainability Initiative	Objective	Anticipated Outcome(s)
Zero Net Energy Road Map	Set the groundwork for achieving the City's S/CAP goals, by providing an overview of Palo Alto's building stock, energy use characteristics, and key	<ul style="list-style-type: none"> • Create a long-term strategy for zero net energy as it pertains to the local Energy Reach Code. • Incorporate cost-effective and feasible Zero Net Energy

	opportunities for voluntary and mandatory measures for achieving the City’s ambitious zero net energy and zero net carbon building targets.	measures into the Energy Reach Code Ordinance for the 2019 California Building Code triennial cycle.
Green Building Ordinance and Energy Reach Code Ordinance	<ul style="list-style-type: none"> • Explore technical criteria to incorporate into the local amendments to the 2019 California Green Building and Energy Codes, specifically related to the following sustainability initiatives: Energy Efficiency and Zero Net Energy, Water Efficiency, CO2 Emissions, Indoor Air Quality, and Construction Debris & Demolition/Salvage. • Contract with outside consultant to perform the Cost-Effectiveness study in compliance with the California Energy Code. 	<ul style="list-style-type: none"> • Host the 2018 Green Building Summit to engage with the Palo Alto community and stakeholders to explore possible local amendment to the green building and energy codes for the 2019 California Building Code cycle update. The ordinances are targeted to be effective January 1, 2020. • Establish Technical Advisory Committee to refine the suggestions defined during the 2018 Green Building Summit. • Develop the Energy Reach Code ordinance and present to city council for adoption. • Once adopted, begin state filling proceedings with the California Energy Commission.
Fulfill on all Sustainability Implementation Plan (SIP) related to Energy, Electric Vehicles and Water.	Complete all required outcomes established within the Sustainability Implementation Plan in collaboration with the Office of Sustainability, City of Palo Alto Utilities, and Public Works.	Attend all Sustainability Implementation Plan coordination meetings, complete reporting requirements, perform technical research, and support other California Building Code amendment activities.

Challenges:

- Development Services faces continuous change in state, local, and federal policy—particularly policies that don’t align with Palo Alto’s specific circumstances needs. Development Services publishes news releases and technical guidance to community members and staff to provide education on these ongoing changes. Local amendments

to the California Building Code are created each code cycle to best align with the needs of Palo Alto.

- California Energy Commission regulates how aggressive agencies can be in their pursuit above minimum code. To affect significant change and meet our GHG reduction goals, new legislation is needed. DSD Is working with CPAU, CEC, and other parties to explore these changes and the most appropriate method for implementation.
- Maintaining an educated community of city staff, local architects, and contractors is a concern that impacts our green building and energy policy. Development Services continues to roll out a comprehensive green building training protocol to address this challenges amongst staff and the community.
- Cost effectiveness analysis that accounts for environmental costs needs to be performed to support reach codes. To address this requirement, Development Services has contracted with an outside firm to perform a cost-effectiveness study in compliance with California Energy Commission requirements.
- All energy, water and carbon savings are based on building permits that have received a final inspection during the reporting fiscal year. The quantity of permits, the size of structures and building use types typically fluctuate which can result in reduced savings compared to previous years; as a result, generating accurate forecasts is challenging.

Figure 1: [Zero Net Energy YouTube Video](https://www.youtube.com/watch?v=P3hpxMYWuFA)
<https://www.youtube.com/watch?v=P3hpxMYWuFA>

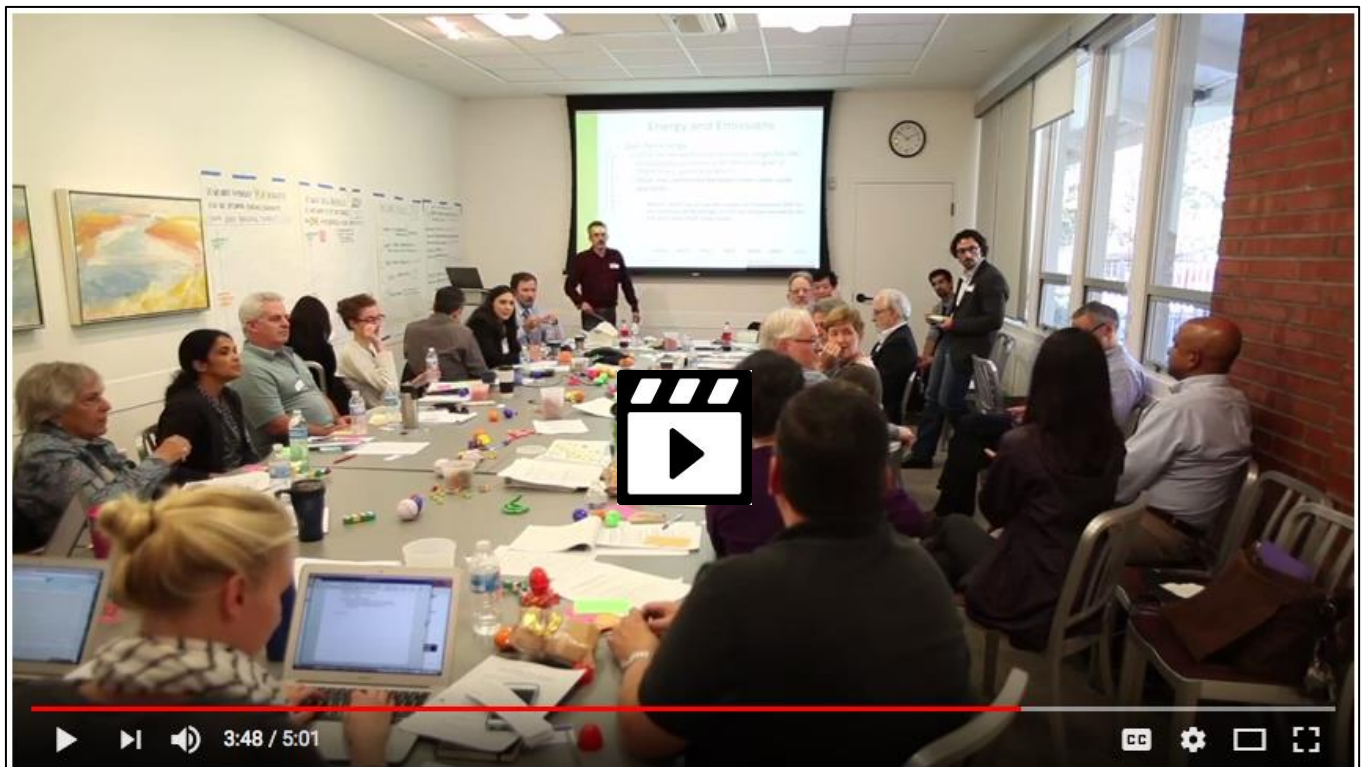
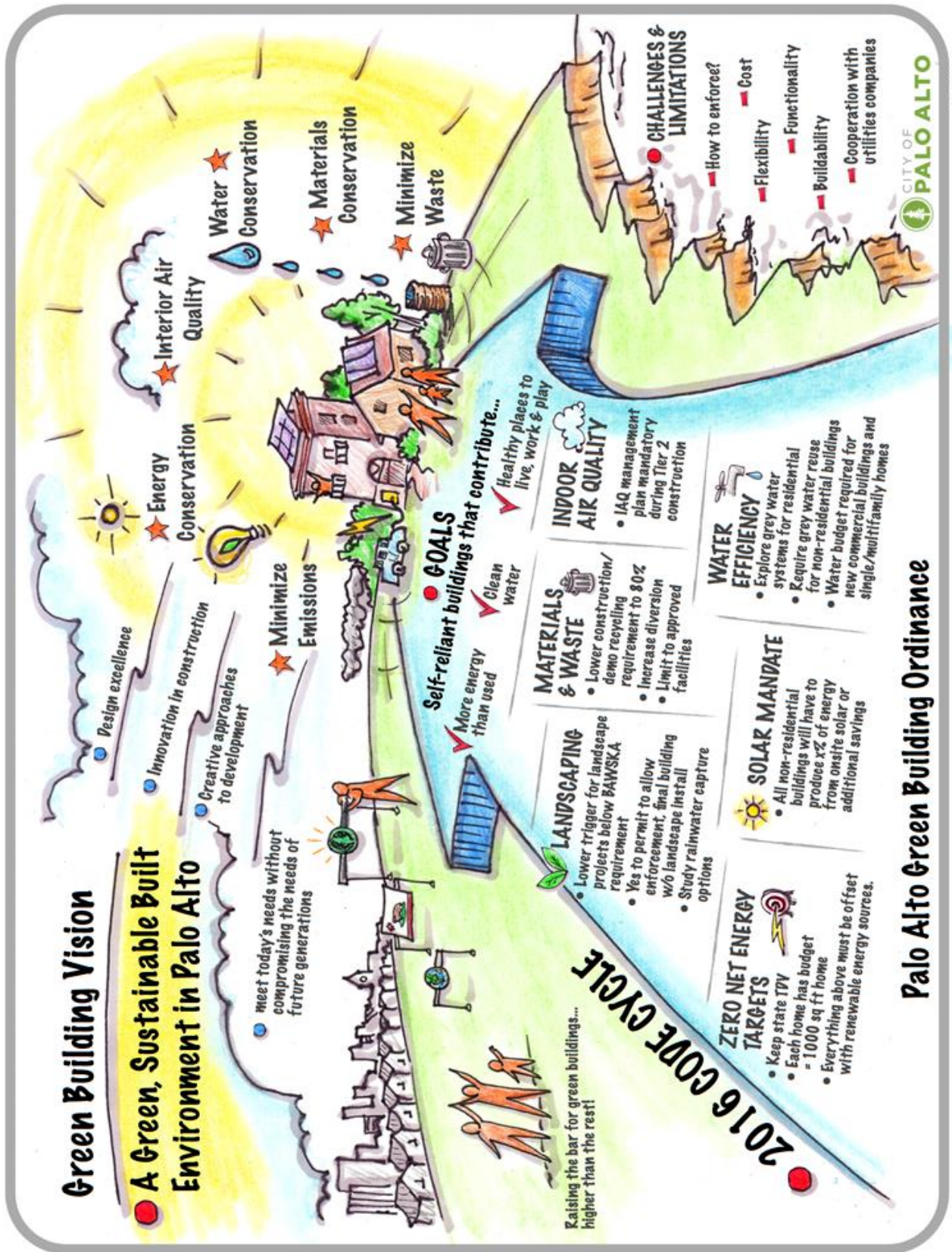


Figure 2: The Zero Net Energy Roadmap



Figure 3: The Green Building Vision



Department Name: Human Resources Department

Background: The City offers commuter benefits to benefit eligible employees as an effort to reduce the amount of single occupancy vehicles to and from work. The benefits include Go Pass stickers to employees located at one of the three downtown locations, subsidized pre-tax benefits for transit and biking commuters and a taxable benefit for employees that carpool or walk to work.

Strategy: The Human Resources department has sent all City staff regular emails over the past couple of years with commuter benefit information to continue to increase the number of employees utilizing these benefits. Commuter benefits are also mentioned during the benefits presentation at the City's New Employee Orientation. Furthermore, commuter benefits are mentioned in the updated conditional offer letters when extending job offers to new full-time staff. The department will continue these efforts and will try to increase the benefit amounts to attract more participants.

Goals: Participation in the various commuter options has increased over time, but the number of participants is still low compared to the number of eligible employees. Go Pass participation has increased from nearly 100 employees to nearly 200 over the last few years. We hope to increase the total number of participants by 50 in 2018. Participation in the other commuter options varies from 3% to 6%, we hope to increase participation by 2% in all categories in 2018.

Initiatives and Activities:*Top Three Sustainability Initiatives in 2017*

Sustainability Initiative	Objective	Outcome(s)
Employee Outreach	Attract new participants	A more informed employee population

Data: Human Resources took over commuter benefit administration from the Transportation division in the Planning Department a couple years ago. We do not have five years' worth of data. The increased numbers of participation we hope to achieve will be our indicators.

Top Three Sustainability Initiatives for 2018

Sustainability Initiative	Objective	Anticipated Outcome(s)
Employee outreach	Attract new participants	Increased participation; a well-informed employee population
Increase benefit amounts	Attract new participants	Increased participation
Switch to a more user-friendly commuter administration platform	Streamline the process for both participants and administrators	Less confusion on how to register, who is eligible and what options we offer.

Challenges: Some of the challenges we face are the IRS regulations around commuter benefits. The regulations restrict the maximum amount we can offer as a monetary commuter benefit. Also, employees come from various areas in northern California, and while they want to find alternate forms of commuting, it is often inconvenient or more costly to do so. We have also received requests from part-time staff wanting to take advantage of the City's commuter benefits. Commuter benefits are considered City benefits, and our part-time staff is considered 'non-benefited', therefore not eligible to participate in the commuter programs. In the near future, we can explore extending these benefits to part-time staff in an effort to continue to reduce single occupancy vehicles.

Department Name: Information technology (IT)

Background: The IT department manages and maintains a data center that houses 114 physical servers and occupies approximately 1500 sq. ft. of space. The DCROSE (Data Center Redesign and Office Space Expansion) program was envisioned in 2017 to reduce datacenter footprint by virtualizing or removing all physical servers other than those designated as exceptions. The objective of this program was to reduce physical servers by 58% and hence reduce cooling costs (electric energy) between 2017 and 2020.

Strategy: DCROSE project will

- Archive or remove data on legacy databases built on out of support hardware
- Improve environmental impact by reducing power needs in the datacenter
- Improve efficiency of disaster recovery and business continuity for newly virtualized systems
- Preparation for removal of unused racks for office space consolidation

Data:

<i>Servers</i>	Beginning State	Current State	End Goal
Physical Servers	114	78	47
Virtual Servers	124	105	123
% of Physical Servers	47.90%	42.62%	27.65%
% of Virtual Servers	52.10%	57.38%	72.35%

Electricity Energy Savings *:

Annual power consumption at the beginning of the project: 274.6MWh
(Power consumption estimate of 275W/hour/server)

Estimated annual power consumption at completion of the project: 113.6MWh

Initiatives and Activities:

Top Sustainability Initiatives in 2017

Sustainability Initiative	Objective	Outcome(s)
DCROSE program	Consolidate servers into City of Palo Alto’s VPC and retire legacy hardware (including stand-alone desktop machines in the data center)	Out of the total 114 servers, 67 servers were identified for reduction. To date, 31 servers have been removed or virtualized. i.e. 27% total reduction in physical servers
City’s Green Purchasing Policy (IT component)	Support City of Palo Alto’s Green Purchasing plan	Established specific guidelines for purchasing EPEAT Gold Rated desktops, laptops, and monitors

		to promote the purchase of more sustainable products. Established guidelines for requesting bulk packaging in an effort to reduce the use of expanded plastic packaging (e.g., foam blocks made from polystyrene, polypropylene, polyethylene).
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Top Sustainability Initiatives for 2018

Sustainability Initiative	Objective	Anticipated Outcome(s)
DCROSE Program	Consolidate servers into City of Palo Alto’s VPC and retire legacy hardware (including stand-alone desktop machines in the data center)	Continue phased removal of physical servers to attain the goal of 58% reduction.
City’s Green Purchasing Policy (IT component)	Continue supporting City of Palo Alto’s Green Purchasing plan	Continue the efforts on robust IT process for hardware purchase by building on the guidelines below: <ul style="list-style-type: none"> • Prior to creating a Purchase Requisition (PR) for equipment, the person requisitioning must go to the EPEAT website at: www.epeat.net to determine the rating of the equipment. • If the equipment is Gold Rated, the PR can be processed • If the equipment is not Gold Rated, an alternative Gold Rated piece of equipment is to be identified. • If there is no suitable Gold Rated alternative, Silver or Bronze rated piece of equipment is to be identified. • If there is no suitable Silver or Bronze rated equipment, the vendor should be notified as

		<p>well as the Green Purchasing Team Coordinated through Public Works/Environmental Compliance.</p> <ul style="list-style-type: none">• Within the PR Item Text, it should read: No expanded plastic packaging material including, but not limited to, polystyrene and polypropylene unless previous authorization with IT Manager.• A Part Number should be determined with the vendor for Bulk Packaging on large orders.
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* Electric Energy Savings are based on the assumption that all servers run 24 hours a day, 365 days a year. The average power consumption estimate is 275Wh / server

Department Name: Library

Background: The Library (PACL) provides educational opportunities that provide the public with information and resources for reducing carbon footprint, waste and energy use, and for making improvements to home and habits that encourage a sustainable life.

Strategy: Library buildings include information about energy use and conservation, model new thinking regarding public building design, and sustain materials collections that aid customer education about all aspects of sustainability and the environment. For example:

- Mitchell Park Library: building design as an example of sustainable building practices; architect-developed system of “ecoglyphs” (symbols to lead to discovery of conservation/sustainable systems), and other educational signage to teach while observing/experiencing the environment; LEED™ Platinum rating.
- Children’s Library: heating/cooling guide on screen
- Rinconada Library: building improvements from renovation to HVAC system and incorporation of improved furnishings
- eLibrary: Our online Library provides 24/7 access to digital resources, including books, movies, music and magazines

Initiatives and Activities: PACL continues to host events and provide programs to all ages that passively or purposefully provide examples to demonstrate some aspect of sustainable practices. For example, nearly all crafts programs incorporate reuse of materials. The Library provided the following programs for 2017:

- Bike PALS Service: Our bike outreach program attended around 15 community fairs, City events, schools and senior facilities to promote the Library's services. These included The May Fete Parade, the Chili Cook Off and the Earth Day Festival at the Baylands.
- February-November 2017: Monthly Master Gardeners program
- February-December 2017: Climate Change Book Club
- April - April 22: Earth Day Festival at the Baylands event. Bike PALS had attended the event as a community partner.
- June 18: Walk and Roll Library Tour, encouraging library customers of all ages to visit as many branches as they wanted using the Bike and Roll maps. The event culminated at Rinconada Library with a raffle and prizes for participants.
- Spring/Summer 2016: Sustainable Living programs on canning, raising chickens, home organization and decluttering.
- July 23: Build a Terrarium program where teens created their own mason jar terrariums using succulents, air plants, moss, flowers, fairies and butterflies.
- October 12: Author and illustrator Katherine Roy came to talk about her new book, which deals with conservation of African elephants.
- December 2017: Craft Drive, soliciting gently used craft items to be reused for January-June 2018 crafting night programs for teens and adults.

- STEAM & Kids Craft Programs: A variety of these programs solicited items to be reused, such as boxes and glass jars for these program projects.

Top Three Sustainability Initiatives for 2018

Sustainability Initiative	Objective	Outcome(s)
(Re)Maker Fair (06/23/18)	<ul style="list-style-type: none"> • Generate interest and engagement in environmental preservation and sustainable living • Create opportunities for the public to engage in environmental technology 	Attendees have more knowledge of sustainable practices, technology and life-skills.
Sustainability Programming	Continue with seasonal programming	Attendees have more knowledge of sustainable practices, technology and life-skills.

Challenges:

The Library’s books are still being shipped from other systems and within the Library’s system, relying on vans that depend on fossil fuel. The Library, while using energy efficient equipment, nevertheless relies on automation which requires high energy usage. Additional open hours of service to the public also increase the hours of energy use.

Department Name: Office of Emergency Services (OES)

Background: The mission of the Office of Emergency Services is to prevent, prepare for and mitigate, respond to, and recover from all hazards. The Office of Emergency Services (OES) works with all City departments as well as the community to promote resilience to threats and risks of all types.

Strategy: Hazards are now codified in the Threat and Hazard Identification and Risk Assessment (THIRA) report (www.cityofpaloalto.org/thira). The THIRA lists hazards that could either directly (criminal sabotage or cyber-attack) or indirectly (storm that knocks out power) endanger critical utilities and fuel supplies. The FEMA THIRA best practice structure also encompasses the “technological or accidental” type of incident, such as occurred in February 2010 when a small aircraft collided with the City’s connection to the power grid.

Multiple City plans and related documents bear on this topic. The Continuity of Operations Plan (COOP) is a multi-departmental effort that addresses means of keeping the City’s government in operation in the event of disruption of City facilities, including utility-related scenarios. OES has also drafted an Energy Assurance Plan (EAP) with the *pro bono* assistance of consultant Arrietta Chakos.

Palo Alto’s most recent Local Hazard Mitigation Plan (LHMP), with State and FEMA approval, and Council adoption in September 2017, provides recommended mitigation actions for the range of natural hazards that could impact the Palo Alto community. The LHMP process naturally interfaces with the S/CAP and the City’s Comprehensive Plan.

Goals: OES is working with the Chief Sustainability Officer, the Public Works Department, Utilities, and other staff to:

OES Sustainability Goals	Linkage to S/CAP Framework
1) Bolster resilience for key facilities	Supporting: Goals 5.1, 5.4
2) Develop systems (primarily vehicles and communications) that are resilient and adaptable to energy disruption, supply chain problems, and other emergencies	Primary: Goal 5.2 Supporting: Goal: 5.4
3) Community engagement and public safety education	Supporting: Goal 6.4, 9.1
4) Explore strategies to leverage existing sustainability initiatives to realize emergency preparedness functions of mitigation, preparedness, response, and recovery	Primary: Goals 1.4, 6.2, 7.2 Supporting: Goals 2.1, 2.3, 8.1

Primary: Directly Involved
Supporting: Indirectly Involved

Initiatives and Activities:

Critical Facilities:

OES is evaluating cost-effective and practical means to expand the use of renewables to reduce the risk of power disruption for certain facilities. For the 2018 budget, OES prepared a CIP project to implement a micro-grid (solar battery backup system) for the Cubberley Community Center. For this effort, we retained an outside expert who evaluated the existing photovoltaic (PV) grid-tied panel system and proposed a design to add a battery back-up capability. The purpose was to make certain locations and systems at Cubberley operational even in a grid-down scenario.

OES is also highly involved in the current planning for the construction of the new Public Safety building. The City has the opportunity to design this facility, from the start, to not only meet important sustainability goals, but also to be highly resilient as well⁴. Funding shortfalls may limit what is achievable, although it may be possible to meet these design goals without significant additional expense; we will continue to push for a facility that models efficiency and safety.

Vehicles and Portable Renewable Generation:

OES has designed, developed, and now operates a number of vehicles and portable equipment, most of which have solar generated power for auxiliary systems so as not to rely on automotive power. OES also maintains several small portable solar powered battery systems and is now exploring the development of a much larger Solar Portable Power Pod. In FY2018 OES acquired an all-electric All-Terrain Vehicle (ATV) for rescue operations and routine use which is the first of what may become many non-fossil-fueled public safety vehicles. Also in FY2018, OES piloted an electric bicycle program for the Police Department (which already uses a fleet of police bicycles), to evaluate how these assets could improve bike patrol operations.

Survivable Communications Network:

As the City continues to explore the integration of Fiber into the community, OES has partnered with the Utilities Department in expanding current systems to include a public safety Wi-Fi network powered by a photovoltaic backbone. Such a system would enhance emergency communications during a widespread disaster or temporary failure of the grid tied electrical system, and moreover could be shared with key community stakeholders who may be assisting our emergency response and recovery efforts (Emergency Services Volunteers, Business Neighborhoods, Faith Based Organizations, etc.). This effort may transition to a Public-Private partnership in the coming years with the focus on a small-scale system deployment, ahead of a broader system rollout.

⁴ The PSB may 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.

Community Engagement and Public Safety Education:

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.

Leverage Environmental Initiatives and Maximize Value for Community Risk Reduction and Emergency Preparedness:

The City and others have made and plan to make substantial investments to reduce greenhouse gases, etc. OES seeks to assist by providing input from a public safety perspective to facilitate a more complete understanding of the consequences and potential risks of certain strategies and to maximize the full value of such investments.

The push to increase electric home appliances, for example, has several nuances. Those residences with gas appliances (stoves, hot water heaters⁵) can still use them even during a power outage. Increasing electric vehicles (EV) can create hazards (electrical problems when charging; risks to first responders dealing with EVs in accidents) that will need to be considered and addressed.

This is certainly not to say such strategies should not be explored, but rather that the full spectrum of pros and cons should be evaluated. In many cases, there could be creative work-arounds. For example, a resident could install a new electric water heater in parallel to the legacy gas water heater, idling the gas water heater unless/until electricity fails. (The value of a shower during a crisis should not be ignored, in other words.)

There may be some genuine opportunities for “big thinking” in terms of resilience. Palo Alto is unique in having its Utilities, dating back over a century to a time, originally, when the City also controlled electrical generation. Imagine the benefits to residents, businesses, and others were the City to again own (all or a large part) of its electrical generation capability locally, mitigating the risk of grid failures, future pricing and commodities uncertainty, and so forth.

Put another way, what is the comparative economic and resilience value of investing in a second point connection to the power grid vs. expanding local electrical power generation?

⁵ Old-school tank hot water heaters have an additional advantage after an earthquake or other disaster where the water supply to a residence is impaired: It can be used as an emergency water source.

Top Sustainability Initiatives for 2018

Sustainability Initiative	Objective	Anticipated Outcome(s)	S/CAP Strategy⁶
Electric ATV	Public Safety Electric Vehicle demo	Prove feasibility of certain EVs in Public Safety fleet	5.2.1: Continue to electrify City fleet vehicles wherever possible
Portable Power Pod	Renewable Energy and Battery Portable Set-Up to Power MEOC and other Key Systems	Reduce fuel supply risk	5.4.1: Infuse sustainability throughout City operations
Public Safety Wi-Fi	Collaborate with CMU-SV to initiate conceptual design of a Public Safety Wi-Fi	Develop a small scale proto-type wifi node that can be scaled to meet the project goals.	8.1: Advance smart grid strategies; 9.1.2: Facilitate personal and neighborhood action
Public Safety Building Design	Complete the design of the Public Safety Building	LEED Platinum standard; energy, water, threat resiliency	5.1: Create energy and water efficient City buildings; 8.1 Advance smart grid strategies

Challenges: The Office of Emergency Services should be viewed a source of expertise, creative ideas, and operational experience. Improved interdepartmental cooperation is needed to advance sustainable programs that also maximize resiliency and enhance public safety. This can only be done with a deliberate interconnect across City Operations.

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Supplemental Materials:

Please refer to www.cityofpaloalto.org/preparedness

⁶ The S/CAP strategies are found in the City of Palo Alto Sustainability and Climate Action Plan, November 2016. <https://www.cityofpaloalto.org/civicax/filebank/documents/60783>

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

Background: The Office of Sustainability (OOS), established in December 2013, works 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: In the Office of Sustainability’s (OOS) fourth full year of operation, our priorities were to:

- Develop and adopt a world class sustainability and climate action plan (S/CAP), integrating the community’s highest aspirations and the many initiatives across city departments into coordinated one plan;
- Develop and adopt sustainability implementation plan (SIP), that builds SCAP initiatives into departmental work plans;
- Further embed the City’s sustainability commitments, programs and practices into City operations & Community actions, including management systems, procurement, finance and training.
- Develop innovative new strategies, particularly regarding mobility services and non-general fund options for financing the City’s sustainability initiatives; expand community engagement; and
- Collaborate with other cities, non-profits, and foundations, to bring in resources, raise awareness and build our capacity to reduce emissions in the two most impactful sectors: transportation and buildings.
- Develop a city/community wide sustainability performance dashboard, to streamline and improve access to sustainability performance data through the year.
- Foster experimentation, alliances & big leaps, such as electrification, “mobility as a service,” “Zero Net” and “Net Positive” Energy building initiatives and smart city.

Initiatives and Activities: OOS has coordinated and partnered with other City departments to advance the City’s overall sustainability goals, including active participation in electrification, green building, smart city and transportation work streams.

Building on the S/CAP, OOS led other departments in development of the 2018 - 2020 Sustainability Implementation Plan (SIP), delineating the next steps in fulfilling the S/CAP’s 2030 goals, and building organizational capacity to carry out key strategies and actions which will enable Palo Alto to reduce GHG emissions 50% by 2020. Interdepartmental working groups focused on Energy, Water, Mobility, and Electric Vehicles were formed and have created detailed workplans and performance metrics to guide implementation. The 2018-2020 SIP was approved by City Council on December 11, 2017.

OOS worked with ASD and other departments to respond to City Auditor recommendations for improving the City’s Environmentally Preferable Purchasing programs.

OOS worked with Public Works to develop a Fleet procurement policy that establishes a zero-carbon “loading order” that prioritizes EVs where feasible, and that incorporates a carbon price in cost/benefit analyses.

OOS also worked with Planning and Community Environment to incorporate sustainability commitments and programs into the Comprehensive Plan where appropriate and align with the S/CAP.

OOS worked with the Federal Transit Administration (FTA), local partners and proposed contractors to prepare for implementation of the Fair Value Commuting project.

OOS represented the City in the Compact of Mayors and the U.S. Mayors’ National Climate Action Agenda (MNCAA), which authored a letter opposing Federal actions to roll back critically important U.S. climate policies.

OOS continued to engage and inform City staff and Palo Alto residents about the City’s sustainability efforts through the annual Earth Day Report, new employee orientation (NEO) briefings & Green Team meetings, Sustainability web pages, and a periodic Sustainability e-Newsletter⁷.

In 2017, Palo Alto’s Cool Block Beta – a pilot program with the Cool City Challenge – brought together 88 households (in 24 teams) within 23 neighborhood blocks who worked together on 1,344 actions that eliminated 345 tons of CO₂ emissions-- an average 6.6 tons of CO₂ per household. Households also participated in water stewardship, energy resiliency, and disaster resiliency activities.

In addition, OOS staff responded to multiple community requests for information about sustainability and City programs, and presented the City’s sustainability work at multiple conferences and workshops.

The progress that City Departments have made in advancing sustainability initiatives has not gone unnoticed. Palo Alto was recognized as the first city in California to achieve a Platinum Level Beacon Award – the highest level possible – for its efforts and leadership in addressing climate. In addition, Palo Alto received the Green California Summit Leadership Award for Sustainable Communities.

⁷ http://www.cityofpaloalto.org/services/sustainability/sustainability_newsletters_and_reports_.asp

Top Three Sustainability Initiatives in 2017

Sustainability Initiative	Objective	Outcome(s)
Strategy	Implement the S/CAP	<ul style="list-style-type: none"> • 2018 – 2020 Sustainability Implementation Plan (SIP) adopted 8-0 December 2017 • Formed four inter-departmental working groups in Energy, Water, Mobility, and Electric Vehicles to shape and guide SIP implementation.
Operations	Embed Sustainability in City operations	<ul style="list-style-type: none"> • Reestablished the Electric Vehicle (EV) Task Force and assisted with work on draft polices for EV charging stations such as potential pricing options. • Secured Bay Area Air Quality Management District grant to fund additional EV chargers at City garages and parking lots. • OOS worked with ASD departments to respond to Auditor recommendations regarding City’s Environmentally Preferable Purchasing programs. • Worked with PWD to develop zero emissions fleet strategy and City facilities master plan • Introduced EV charging and parking fees in August 2017 - with a total of 27 charging stations with 48 charging ports - generating \$32,400 revenue from fees. • Managed City and community GHG emissions reporting to the Climate Registry and the Carbon Disclosure Project.

<p>Innovation</p>	<p>Foster experimentation, alliances and big leaps</p>	<ul style="list-style-type: none"> • Secured \$1m Federal Transit Administration grant for the “Fair Value Commuting” project to pilot “new mobility” strategies with regional partners. • Participated in national 'shared used mobility' study and development of database of initiatives. • Added 45 households to the Cool Block Beta Project
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Top Three Sustainability Initiatives for 2018

<p>Sustainability Initiative</p>	<p>Objective</p>	<p>Anticipated Outcome(s)</p>
<p>Strategy and Planning</p>	<p>Establish bold, coherent and grounded direction, goals and plans.</p>	<ul style="list-style-type: none"> • Complete and adopt full Sustainability and Climate Action Plan (S/CAP). Ensure that the S/CAP includes the concept of where practical and cost effective. • Further embed S/CAP goals and SIP actions into department work plans, program goals, objectives and operations. • Work with City Departments to develop and implement specific S/CAP implementation strategies and plans. • Assess and refine policies to ensure alignment with City sustainability commitments.
<p>Operations</p>	<p>Integrate sustainability policies, programs and practices into City operations and community actions.</p>	<ul style="list-style-type: none"> • Coordinate with Administrative Services Department to develop internal carbon pricing strategy and protocols, improve effectiveness of City's Environmentally Preferred Purchasing

		<p>program and explore divestment of City portfolios from fossil fuels.</p> <ul style="list-style-type: none"> • Review and ensure effective implementation of City’s “total cost of operations” (TCO) and externality policies in CIP and operating budgets. • Partner with Human Resources Department and the Transportation Division to develop and expand commute alternative pilots for city staff, and possibly for local businesses and citizens.
<p>Innovation</p>	<p>Foster experimentation, alliances and big leaps</p>	<ul style="list-style-type: none"> • Begin implementation of the “Fair Value Commuting” project; develop, pilot and evaluate local and regional MaaS initiatives. • Deploy a sustainability dashboard to provide better reporting of sustainability data and increased transparency to drive stronger community engagement • Develop and enhance electrification/fuel switching strategies. • Continue Cool Block program.

Challenges:

- OOS is a very small office with a very large mission (in both absolute terms and compared to other cities), and is challenged to fulfill that mission without permanent staff or stable budget.
- OOS relies on coordination with other departments whose resources are also limited and not always available for collaborative activities; we’re working to design more effective ways to coordinate sustainability activities across departments.
- The emerging nature of OOS’s work requires timely responsiveness (for example in relation to funding and collaboration opportunities and invitations to participate in multi-city platforms and positions) that the City is not always able to provide; as a result, OOS has been unable to pursue and capture some relevant funding opportunities.

Department Name: Planning and Community Environment

Background:

The Planning and Community Environment (PCE) Department is responsible for a range of planning and implementation actions aimed at preserving and enhancing the quality of life in Palo Alto, ensuring wise transportation investments, and facilitating land use and development decisions through consistent and transparent processes. The department is responsible for:

- Updating, maintaining, and overseeing compliance with the City’s Comprehensive Plan
- Monitoring and enhancing the City’s transportation infrastructure
- Implementing a variety of transportation programs aimed at reducing reliance on the private automobile and improving safety for all modes of travel
- Gathering and analyzing data in support of land-use and transportation policy
- Reviewing commercial and residential applications for planning entitlements for compliance with the City’s zoning ordinance and applicable guidelines
- Reviewing projects for potential environmental impacts on the City and its residents
- Administration of the City’s Community Development Block Grant (CDBG) programs
- Management and implementation of the City’s Housing Programs
- Oversight and implementation of the City’s Historic Preservation Ordinance
- Investigating and abating code violations

Strategy: Implement the recently adopted Comprehensive Plan 2030 for Palo Alto, addressing issues related to sustainability in land use and community design, transportation, climate change and sustainability, safety, noise, natural environment, community services and facilities, business and economics, governance, and housing. The updated Comprehensive Plan was developed with a greater emphasis on sustainability, as reflected in the Introductory Chapter’s vision statement where it states: “We envision a City with diverse housing opportunities and a sustainable transportation network, where the natural environment is protected, where excellent services are provided and where citizens have say in government.” These concepts, including reduction of traffic congestion and GHG, addressing risks from climate change and sea-level rise, are threaded throughout the Land Use, Transportation and Natural Environment elements. Goal L-2 of the Land Use Element states: “An enhanced sense of ‘community’ with development designed to foster public life, meet citywide needs and embrace the principles of sustainability.” The following steps will be implementing programs to support the adopted goals and policies.

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

- Comprehensive Plan: Implement sustainability related policies in the recently updated Comprehensive Plan by using them to inform discretionary decisions about development, land use, transportation, and capital projects.
- Housing Work Plan: Develop zoning initiatives to increase the production of housing. Increasing production of housing in key areas would not only help with housing challenges, but also reduce traffic congestion by making more housing available near jobs and services.

- North Ventura Coordinated Area Plan: Initiate the preparation of a coordinated area plan for the North Ventura Area, consistent with the Comp Plan. The North Ventura area presents an opportunity to locate housing near jobs, the California Avenue commercial area, and transit services, which will help to reduce traffic congestion.
- Transportation Initiatives: Implement transportation programs to address traffic congestion and parking demand generated by single occupant vehicles, including implementation of parking management programs (e.g. RPP), and creation and support of a Transportation Management Association (TMA).

Initiatives and Activities:

Top Three Sustainability Initiatives for 2017

Sustainability Initiative	Objective	Anticipated Outcome(s)
Comprehensive Plan Update	Align the Comp Plan Update with the adopted S/CAP goals	Adoption of Comprehensive Plan that supports implementation of S/CAP goals
Expanded Free Shuttle Service	Identify ways to increase ridership by improving and/or expanding shuttle service in Palo Alto	Identify preferred strategies to increase trip frequency and ridership, and reduce emissions
Transportation Management Association support	Support activities of the new TMA to reduce SOV trips to/from downtown	Identify a future, secure funding source and support the maturation of the non-profit organization

Top Three Sustainability Initiatives for 2018

Sustainability Initiative	Objective	Anticipated Outcome(s)
Comprehensive Plan sustainability related goals and policies	Implement Comprehensive Plans policies that align with the S/CAP	Adoption of ordinance to stimulate housing, especially near jobs, services, and transit, and initiate the North Ventura Coordinated Area Plan process
Reduce Single Occupancy Vehicle (SOV) travel	Implement solutions and incentives to reduce SOV travel	Develop, support and fund programs such as the TMA to reduce reliance on SOVs. Seek external funding for expanded shuttle services.
Make it more convenient not to drive	Explore land use and transportation strategies, especially for housing and transit-oriented development, and provision of services, such as universal transit passes, that reduce auto trips.	Continued investments in pedestrian, bicycle and transit improvements to make it easier for people to use alternatives to private automobiles.

Challenges:

- PCE has many competing priorities and key staff positions are currently vacant.
- Planning and transportation initiatives are often controversial and take investments of time and resources to engage the community early in the process and reach a successful outcome(s). PCE recognizes the importance of its sustainability-related initiatives, and has been challenged to hire the staff needed to implement these programs.
- PCE recognizes the importance of using meaningful metrics to track performance and existing conditions traffic data. While quite a bit of data was collected during the Comprehensive Plan Update process, it will be a challenge to continue to collect and supplement this data given limited resources. As time permits, PCE is developing (especially for mobility issues like transit, mode shift to cycling or walking, and parking) a data management system to provide quantifiable evidence for program effectiveness and outcomes.

Department Name: Public Works (PWD) and Administrative Services Department (ASD) - Green Purchasing

Background: PWD and CMO initiated development of the City’s Green Purchasing Policy following adoption of the 2007 Climate Protection Plan and the City’s 2008 [Environmentally Preferable Purchasing \(EPP\) Policy](#). PWD coordinates with ASD and other City departments to incorporate green purchasing priorities into contract language and purchasing operations as resources and program priorities allow. PWD leads the Green Purchasing effort partnering with ASD, Utilities and IT.

Strategy: In 2015, the City Manager established a “default to green” strategy that makes the greener product the norm rather than the exception. The approach is to:

- Prioritize products and services to green based on City policies, regulatory drivers and “low hanging fruit”;
- Incorporate green purchasing into the City’s policies and purchasing procedures.

Goals:

- Goal 1: “Default to green” procurement as the standard and align purchasing procedures with the City’s environmental policies, regulatory requirements and Council directives;
- Goal 2: Purchase goods and services that value product performance, human health, and environmental health as outlined in the [City’s Green Purchasing Policy](#);
- Goal 3: Provide dedicated staff and budget to implement green purchasing.

Initiatives and Activities: The City’s award-winning green purchasing program has greened performance criteria for several goods and services including structural and landscaping pest control, custodial and office supplies, computers and the City fleet⁸. The City has reduced the use of single-use plastics (bottled water, plastic bags, plastic packaging), reduced the toxicity and amount of pesticides used, and virtually eliminated products that contain mercury and dioxins. The City incrementally embeds green purchasing into its procurement procedures by revising forms, contract specifications, and contract Terms and Conditions, and by training staff in the application of these procedures; the City piloted “green procurement” software to simplify establishing product specs and managing the City’s Environmentally Preferably Purchasing policies.

Top Three Sustainability Initiatives in 2017

In 2017, the City Auditor’s Office completed its [Audit of Green Purchasing Practices](#). The Auditor’s report included eight general recommendations with multiple tasks that staff has been working through. Several of these recommendations were existing tasks of the existing Green Purchasing workplan. The primary initiative in 2017 was implementing the City Auditor recommended tasks. Three of these tasks are listed as objectives in the table below which shows how they relate to the Green Purchasing Sustainability Initiatives listed above. A

⁸ Fleet procurement policies are discussed in more detail under Public Works– Fleet Division on page 45.

complete report on the status of all audit tasks will be provided to the Auditor’s Office in spring 2018.

Sustainability Initiative	Objective	Outcome
<p>The City’s “default to green” procurement policy is the standard for aligning Purchasing procedures with the City’s environmental policies, regulatory requirements and Council directives (Goal 1).</p>	<p>a) Establish a process to document the suitability of battery electric and plug-in hybrid vehicles during capital replacements planning;</p> <p>b) Conduct an evaluation of the cost effectiveness of battery electric and plug-in hybrid vehicles in coordination with the budget office and the Chief Sustainability Officer. This will include life cycle costs and environmental impacts.</p>	<p>a) A new fleet procurement policy was drafted and approved in January 2018. Based on staff/department requirements fleet will select and offer cost-effective, fully manufacturer-supported vehicles in accordance with this prioritized “loading order”:</p> <ol style="list-style-type: none"> 1. Electric 2. Plug-in hybrid 3. Hybrid 4. CNG 5. Other <p>b) Fleet will now assess cost-effectiveness based on total cost of operation (TCO) over the service life of the vehicle, US Department of Energy Alternative Fuels Data Center Vehicle Cost data. Fleet will apply the federal "social cost of carbon," to ensure accurate comparison of true costs. Data is sourced from the US Environmental Protection Agency (EPA) “Social Cost of Carbon.”</p>
<p>The City purchases goods and services that value product performance, human health, and environmental health as outlined in the City’s Green Purchasing Policy and subsequent guidelines (Goal 2)</p>	<p>Revise City’s existing Recycled Paper Policy and procedures and develop an integrated City-wide paper reduction and recycled-content paper procurement plan.</p>	<p>The new City Paper Reduction and policy was approved in January 2018. The new policy sets standards for a 25% reduction of paper use from 2017 average use, and sets higher standards for office and custodial paper recycled content. 100% recycled content paper is now used for all copy paper and custodial papers. This is in addition to paper used for utility bill inserts, letterhead and most vendor printer paper which has been 100% recycled content for several years. Custodial papers (toilet paper, hand towels, seat covers) are transitioning to 100% recycled content as replacement product is ordered.</p>

		<p>IT implementation of copier “Abacus” software will be key to tracking and further reducing paper use. A paper reduction has been formed to make recommendations on other paper reduction opportunities to further efforts made over many years (e.g., default duplexing on copiers and printers when possible, junk mail reduction).</p>
<p>The City provides dedicated staff and budget to implement green purchasing (Goal 3).</p>	<p>Define the department(s) responsible for implementing green purchasing policies and determine if additional staffing and funding is needed to implement the policies</p>	<p>Roles and responsibilities have been drafted and staff has requested contract funds to implement green purchasing. The current vision is that:</p> <ol style="list-style-type: none"> 1. ASD has a .5 FTE Green Purchasing contractor to: <ol style="list-style-type: none"> a. Lead Green Purchasing discussions and embed green purchasing policies and procedures into City processes; share information and build relationships with other Purchasing staff; develop streamlined implementation plans; b. Pilot new Green Purchasing tools that could help organizational procurement performance (e.g., Product Bio, USDN Sustainability Playbook best practices); c. Track compliance of and impact of green purchasing policies; d. Provide education and outreach on City green purchasing requirements; e. Initiate discussions to get CMO and upper management support 2. PWD, Utilities and other departments: <ol style="list-style-type: none"> a. Collaborate with Green Purchasing staff/contractor to Set work plan priorities for the year; b. Provide consultative expertise on specs or green purchasing strategies; c. Share project/program implementation and reporting responsibilities; a. ESD could continue funding a green purchasing consultant who can be tasked to research various green purchasing best practices and product specs (about \$5K/year).

Top Two Sustainability Initiatives for 2018

Sustainability Initiative	Objective	Anticipated Outcome(s)
The City provides dedicated staff and budget to implement green purchasing (Goal 3).	Identify funding for contracted staff to help implement program objectives.	It is uncertain if contract funds can be allocated for a contractor assistance to implement green purchasing. Progress on green purchasing will be slower than ideal if staffing is not identified.
The City’s “default to green” procurement policy is the standard for aligning Purchasing procedures with the City’s environmental policies, regulatory requirements and Council directives (Goal 1);	Implement Abacus Software on City copiers to meet 25% paper reduction target (this will be done parallel to other paper reduction efforts, but is key to getting data about the City’s copy paper use which is the highest volume of paper used.	IT staff is targeting Abacus software installation and roll out for 2018.

Challenges:

- The City’s green purchasing initiative lacks dedicated budget and dedicated staff resources, which slows or prohibits progress on certain objectives;
- Current reporting systems, both from vendors and internal, don’t provide sufficient information to evaluate and manage the initiative. This may be improved with new ERP software that will be identified in 2018.

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Supplemental Materials:

Please see attached:

- [Audit of Green Purchasing Practices](#)
- [Green Purchasing Policy](#)

Department Name: Public Works – Engineering Services & Public Services

Background: The City of Palo Alto is committed to achieving LEED silver or better at all new City facilities, and achieved the highest level – Platinum - at its largest recent facility, the Mitchell Park Library and Community Center. The Public Works Department is committed to building, managing and operating City buildings and infrastructure in a sustainable manner. This includes libraries, community centers, theatres, fire stations, the Regional Water Quality Control Plant, offices and other buildings, parks, athletic fields, roads, bridges, sidewalks, and the Urban Forest. Sustainable practices are incorporated into major building renovations, maintenance, infrastructure projects and everyday work practices.

Strategy: Public Works assesses the performance of City-owned facilities, identifies areas for improvement, and develops phased improvement programs to be optimized through monitoring energy and resource use to provide high quality service to the Palo Alto community. Optimization is achieved through improved building management systems and regular assessments of these systems.

Goals: The overarching operational objective of Public Works is to design, construct and renovate efficient and healthful City facilities and infrastructure, and to operate and maintain them in good order for the comfort and productivity of occupants and users. By optimizing operations, the department seeks to reduce operating costs and the reliability of the building systems through continuous improvement of resource efficiency and extend the useful life of the buildings consistent with these goals.

Initiatives and Activities: Through various Capital Improvement Projects, Public Works is working to use energy more efficiently and reduce water usage. Parks renovations include drought-tolerant landscaping and trees, and more efficient irrigation systems. Building projects are utilizing efficient LED lighting, more efficient HVAC systems, cool roofing materials, and water saving fixtures. Street resurfacing and related concrete work are utilizing recycled aggregates and other waste products, such as tire rubber and fly ash. We are following the best business practices for recycling of construction-related debris on all projects. Storm water capture and pollution control measures are being implemented in building, parks, and street projects.

Green infrastructure is defined as storm drain infrastructure on public and private lands, such as roads and parking lots, that includes low impact development such as infiltration, biofiltration, and/or storage and use of best management practices to collect, retain, or detain stormwater runoff to limit the discharge of pollutants from streets to the storm drain system. Green infrastructure provides amenities with many benefits beyond water quality improvement and groundwater replenishment, including creation of attractive streetscapes, habitat, reduction of heat island effect, and bicycle and pedestrian accessibility. Palo Alto has completed a Green Infrastructure project in the Southgate Neighborhood, and is beginning to construct Green Infrastructure features in 2018 as part of the Charleston/Arastradero Corridor project. We have installed full trash capture devices on Storm Drain mains identified as

potentially having high trash content on Park Boulevard at Ventura Ave and a second location at Park Boulevard.

The City’s stormwater discharge is permitted by the Municipal Regional Stormwater Permit (MRP), a regional permit covering 76 Bay Area municipalities. The permit was reissued in 2016 and includes requirements for Green Infrastructure planning and development. The permit includes requirements to develop a Council-approved framework, a mechanism to prioritize projects and criteria, a list of prioritized projects, design guidelines/standard specifications, ordinance changes, and a funding plan. The permit also requires an update of relevant planning documents (such as comprehensive plan, specific plan, transportation plans, storm drain master plan, pavement work plan, and urban forestry plan).

Top Sustainability Initiatives in 2017

Sustainability Initiative	Objective	Outcome
Benchmark City buildings for comparison of resource use and cost	Create benchmarks to compare City building performance with similar buildings in the state and the nation, and identify and prioritize opportunities for improvement.	Utility Track Software has been acquired and installed in Facilities Management. Building performance data will be shared with Engineering Services to identify opportunities for improvement.
Install solar canopies and electric vehicle chargers at City facilities	Utilize an RFP process to select a private entity to install solar canopies and EV chargers at City-owned garages	Completed installation of solar canopies on four City garages, as well as 18 Level 2 EV charger ports, and electrical infrastructure for an additional 80 charger ports. Additional systems in two of the garages are operational and the remaining two are awaiting final building department signoff.
Water Efficiency Efforts	Reduce use of potable water in construction activities	Public Works construction projects require use of recycled water for dust control and other applications. Requirements for basement construction dewatering were further strengthened in 2016. In addition to existing requirements, basement dewatering sites must now adhere to a maximum 12-week

		dewatering period and must demonstrate that the flowrate of pumping is minimized.
Implementation of Title 24 Building Energy Efficiency Standards	Incorporate sustainable work practices for building system maintenance, including improvements in mechanical, electrical, and plumbing systems.	Mechanical improvements include the use of cool roofing materials to meet Title 24 Building Energy Efficiency Standards, replacing air conditioning units with more energy efficient units (when existing units need replacement) and using Building Management Systems (BMS) to control and monitor and mechanical and electrical equipment (including lighting) via computers in some facilities. Electrical improvements include the use of LED lighting, the use of occupancy sensors, and bi-level lighting for parking garages. Plumbing improvements include the use of low flow urinals and low flow toilets.
Park Renovation Projects	Incorporate sustainable landscaping and turf elimination in park renovation projects managed by Public Works to conserve water whenever possible.	The Parks Master Plan adopted in September 2017 includes multiple goals and policies that provide direction on sustainable practices within parks. Of the six goals drafted for the plan, two focus on sustainability practices as well as integration of nature and habitat in park settings and overall maintenance practices. Supporting those goals are nineteen separate policies identifying specific actions to guide future park renovation projects.
Procurement and Use of Environmentally	Include recycled aggregate in the asphalt mix and base	Major arterials are being paved with rubberized asphalt utilizing recycled tire rubber. Sidewalks,

Preferable Construction Materials	rock in street resurfacing projects.	curbs and gutters are replaced with concrete that contains approximately 25% fly ash by volume. Paving work on Middlefield Road in 2017 used 2,280 tons of rubberized asphalt.
Procurement and Use of Environmentally Preferable Consumables	Use City’s sustainable purchasing guidelines.	City facilities are cleaned with environmentally friendly Green Seal Certified cleaning chemicals and no chlorine and post-consumer content paper towels are supplied in restrooms. Pest management also focuses on prevention and then using non-toxic pesticides.

Top Sustainability Initiative for 2018

Sustainability Initiative	Objective	Anticipated Outcome(s)
Develop a City-wide energy management plan	Develop an energy management plan to guide the acquisition and installation of energy conservation measures in City –owned buildings	Approve and implement an energy management plan as part of the Sustainability/Climate Action Plan.
Complete construction of new LEED Silver Fire Station No. 3	Construction of a Fire Station No. 3 at Embarcadero Road and Newell Road incorporating sustainable features and processes to attain LEED Silver certification.	Substantial completion of project construction by the end of CY 2018.

Challenges:

- As stated in previous reports, as existing building systems are renovated or replaced, air conditioning is being added where it previously didn’t exist. This additional system tends to flatten the overall potential energy savings of the newer more efficient heating systems and lighting. (On the other hand, the more efficient systems mitigate the demand of the added air conditioning.)

- Historical preservation requirements are also a challenge. At Rinconada Library, the large grass lawn was a key historic feature of the overall site. It was therefore not possible to convert this to drought-tolerant landscaping and reduce irrigation needs. However, the project installed “purple pipe” so that it can easily be converted to recycled water when that system is expanded throughout the City.
- Public Works completed a third party independent Facilities Management Organizational Study (conducted by Matrix Consulting) to evaluate the efficiency of our maintenance of Facilities. In the study, Matrix called out 10 recommendations related to Energy Management. Our newly appointed Facilities Manager will be analyzing these recommendations with the Engineering Services Division in the coming months. Staff anticipates development of new processes to identify replacement priorities, standards for replacements and use of energy audits to guide continuous improvement. In this regard, reducing the energy and water usage is an important consideration. Energy and water usage can be tracked through our Utility Track software to determine the impact of efficiency and conservation initiatives.

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:

- 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.
- 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
- Perform preventive maintenance inspections and repairs on a daily basis to all of the vehicles and equipment
- Ensure regulatory compliance with the BAAQMD, BAR, CHP, DOORS, OSHA and CAL OSHA
- 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 emissions by electrifying and otherwise decarbonizing the fleet, maintaining it in top operating condition, training staff in safe and efficient operation and exploring effective options for meeting staff needs.

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

- Provide an increasingly **high level of service** to all members of the Palo Alto community.
- Identify new technologies and strategies to **reduce fleet GHG emissions**.
- **Reduce unleaded fuel consumption by at least 10% each year**, by scheduling replacement of all vehicles older than 10 years with current electric or low GHG emissions models.
- **Meet or exceed all** regulatory requirements for air pollution reduction and air emissions required by BAAQMD, BAR, DOORS, PERP and EPA.

Initiatives and Activities: Fleet Services provides and maintains the lowest emission vehicles available that meet city performance and financial requirements. In 2017 the Auditors Office conducted an audit of the City’s green purchasing practices. One of the directives of this audit was “Develop and implement a process to formally document the assessment and suitability of battery-electric and plug-in hybrid vehicles and an evaluation of the cost effectiveness as part of the fleet replacement capital improvement plan budget process. The assessment should consider lifecycle costs and environmental impacts in addition to the initial cost of the vehicle.

The City’s award-winning green purchasing program has “greened” performance criteria for several purchase categories, including City fleet. The City invested in a compressed natural gas (CNG) fueling station at the Municipal Service Center for the 10% CNG vehicles in the fleet (the lowest emission vehicles available at one point). Fleet services is now prioritizing zero- or -low GHG emissions vehicle, based on the still limited but expanding catalog of vehicles available from established manufacturers.

Based on City policy, the audit recommendation, and Office of Sustainability recommendations, the Fleet Division updated the vehicle and equipment use, maintenance and replacement.

Policy and procedure 4-01/PWD to include the following actions:

- Evaluate new alternative fuel vehicle product lines against a specific checklist of user needs (e.g., duty cycle, range requirements, etc.) and a “loading order” that prioritizes electric vehicles (EVs) first (based on availability and ability to meet user needs), followed by plug-in hybrids, hybrid vehicles, CNG powered vehicles, biofuel powered vehicles and gasoline or diesel powered vehicles, in that order.
- Assess cost-effectiveness based on total cost of operation (TCO) over the service life of the vehicle, using data from the US Department of Energy (DOE) Alternative Fuels Data Center Vehicle Cost Calculator⁹
- In assessing total cost of ownership (TCO), apply the federal "social cost of carbon," as periodically adjusted (currently \$36/ton for 2015 and \$42/ton for 2020¹⁰), to ensure accurate comparison of true costs).
- Wherever possible, alternative fuel vehicles shall be considered as outlined in City policy 4-01/PWD section IV- subsection E. A check list has been developed to determine the feasibility of replacing a fossil fuel-powered vehicle with zero- or -low GHG emissions vehicle.

Top Sustainability Initiatives in 2017:

Sustainability Initiative	Objective	Outcome
Reduce Greenhouse Gas emissions	Monitor and reduce GHG emissions associated with vehicles and equipment	Achieved a 29.1% GHG emissions reduction from 2005 baseline year through 2017 (not including CNG consumption for non-city operations), as a result of decreased consumption across all fuel types. Vehicle miles traveled has decreased slightly, despite serving a larger service population.
Reduce unleaded and diesel fuel	<ul style="list-style-type: none"> • Establish policies and procedures for the operators to minimize the 	<ul style="list-style-type: none"> • The City has been steadily reducing its unleaded fuel and diesel

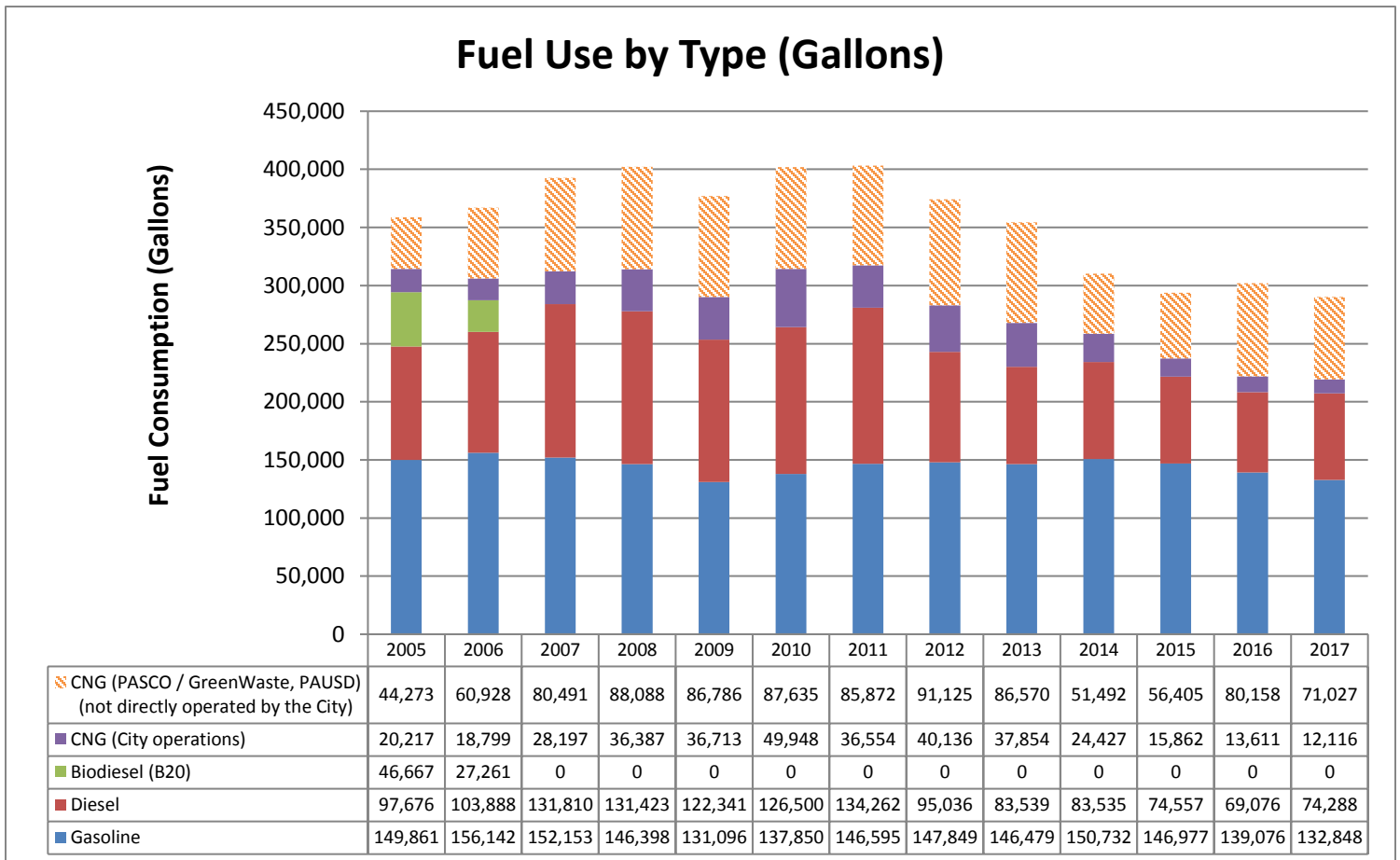
⁹ <https://www.afdc.energy.gov/calc/>

¹⁰ US Environmental Protection Agency (EPA) “Social Cost of Carbon” website. (<https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon.html>)

<p>consumption in the fleet</p>	<p>idle time on the vehicles and equipment.</p> <ul style="list-style-type: none"> • 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. 	<p>consumption. In addition, the City’s overall propane consumption is down due in part to modernization steps taken in Fleet.</p> <ul style="list-style-type: none"> • Additional measures are needed to reduce the Fleet Services’ reliance on fossil fuels—which can best be achieved by replacing older vehicles with current—and, where possible, alternative fuel—models. The City fleet currently has 74 alternative fuel vehicles, with 35% of nonemergency vehicles using alternative fuels or technologies.
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Data:

Figure 1: Fuel Use by Type¹¹ (Gallons), 2005-2017



¹¹ GreenWaste is the solid waste collection and processing provider that took over from PASCO in 2009

Figure 2: Fleet GHG Emissions (Metric Tons of Carbon Dioxide Equivalents, CO₂e), 2005-2017¹²

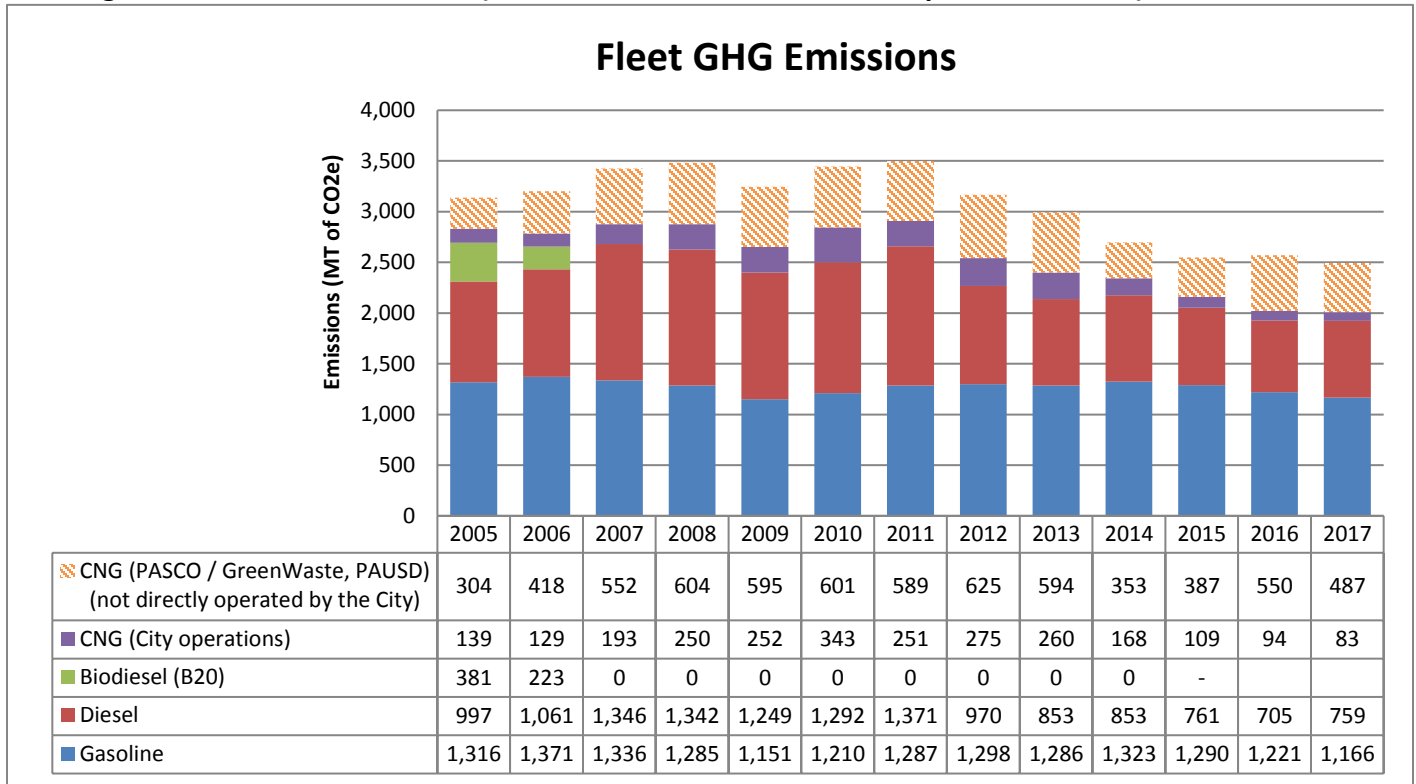


Table 1: Fleet GHG Emissions (Metric Tons of Carbon Dioxide Equivalents, CO₂e), 2005-2017

Fuel Type	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Emissions¹³ (excluding PASCO /Green Waste, PAUSD)	2,833	2,784	2,875	2,877	2,652	2,845	2,909	2,543	2,399	2,344	2,160	2,020	2,008
Percent Change from 2005 baseline		-1.8%	1.5%	1.6%	-6.4%	0.4%	2.7%	-10.2%	-15.3%	-17.3%	-23.7%	-28.7%	-29.1%

¹² PASCO / GreenWaste and PAUSD are not directly operated by the City, therefore their GHG emissions are not included in overall Fleet GHG Emissions. They are included in this graph for informational purposes only.

¹³ PASCO / Green-Waste and PAUSD are not directly operated by the City, therefore their GHG emissions are not included based on operational control reporting criterion.

Challenges:

- The City hired Mercury and Associates in August 2017, a fleet management consulting organization to conduct a cost recovery analysis and vehicle replacement schedule study. The preliminary recommendations from the Mercury Study are for the City to spend \$6 – 8 million to catch up in replacing older vehicles/equipment.
- The average age of the fleet is currently at 12.9 years. The ideal fleet age should be less than 10 years. The older the average age of the fleet, the more it costs to operate and maintain (with EVs generally costing less to maintain than fossil fuel vehicles), and the more GHG emissions it generates. The city currently replaces an average of 40 vehicles and other equipment each year out of a total fleet of 600; to bring the fleet average to 10 years or less, the city needs to increase the number of units being replaced.
- Programs designed for traditional fleet maintenance goals haven't been focused on meeting the bold target of 80% GHG reduction by 2030; the department will need to develop new programs and manage its performance to achieve annual reduction targets.
- Electrifying the City Fleet requires a robust and adequate EV charging station infrastructure. The City has met and exceeded the target of 67 units by currently having a total of 74 total units of alternative fuel vehicles.

###

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 & Regional Water Quality Control Plant

Background: The Public Works–Watershed Protection Division, in collaboration with the Regional Water Quality Control Plant (RWQCP), works to reduce pollutants entering the San Francisco Bay through award-winning pollution prevention, pretreatment, stormwater, water quality, and air quality management programs. Since 1990, the goals of the RWQCP and Watershed Protection have been to:

- 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;
- Work with industry and businesses to prevent pollution;
- Ensure regulatory compliance with the RWQCP wastewater discharge permits, air quality permit, and the City’s Municipal Regional Stormwater Permit; and
- 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 organic pollutant discharges to San Francisco Bay. Similarly, given strict air quality permit requirements, Palo Alto must explore all feasible methods of reducing air pollutants such as greenhouse gases, nitrous oxides, and volatile organic compounds from its stationary sources. After initially focusing on pretreatment programs at major industrial facilities, the RWQCP expanded its efforts to include commercial and residential programs. Strategies to meet sustainability goals in the next 1 – 5 years include:

- Commercial and industrial pretreatment program that integrates pollution prevention into business requirements via a comprehensive City ordinance;
- Residential pretreatment program that provides 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; and workshops, tours and special events;
- Leverage opportunities to improve and expand recycled water use and infrastructure;
- Evaluate opportunities to improve and/or replace aging treatment process infrastructure and equipment (e.g., decommission sewage sludge incinerators).

Goals: Watershed Protection had several 2017 goals to reduce industrial, commercial and residential pollutants for stormwater and wastewater, including the following higher-profile efforts:

- Identify strategies to reduce greenhouse gases (GHGs) associated with wastewater treatment;
- Promote the use of RWQCP recycled water through the Truck-Fill Program, salinity reduction efforts, regional collaborations, and pipeline expansion efforts;
- Meet or exceed the RWQCP and Watershed Protection Program permit requirements for pollutant reduction.

For a complete summary of 2017 pollution prevention efforts see the 2018 Clean Bay Plan report available at cleanbay.org.

Initiatives and Activities:

Top Three Sustainability Initiatives in 2017:

Sustainability Initiative	Objective	Outcome(s)
RWQCP Greenhouse Gas (GHG) Reductions	Continue to reduce, track, and report GHG emissions associated with wastewater treatment.	<ul style="list-style-type: none"> • Anthropogenic emissions have decreased ~70% since 1990 mainly due to the purchase of green natural gas beginning in 2015, purchase of 100 percent green power electricity since 2013, use of landfill gas as a replacement for natural gas in the incinerator afterburner since 2005, and decreased incinerator hearth natural gas usage due to regular incinerator tuning (Figure 2). • RWQCP 2017 GHG emissions as calculated by the Local Government Operations Protocol, Version 1.1 (2010) were approximately 16,000 metric tons of carbon dioxide equivalents (MT CO₂e). • Construction began for the Sludge Dewatering and Loadout Facility. This represents the next step needed to phase out the City's sewage sludge incinerators as soon as possible. This is expected to reduce RWQCP anthropogenic GHG emissions. • A GHG and Energy Factsheet was updated to provide concise information regarding historical and projected GHG emissions. <p>** For more information, see the 2018 Clean Bay Plan available at cleanbay.org.</p>
Recycled Water Expansion	Promote the use and expansion of the RWQCP Recycled Water Program as a sustainable, local, and reliable alternative source of non-potable water.	<ul style="list-style-type: none"> • The RWQCP produced 223 million gallons of recycled water, a 2% increase from 2016 (Figure 3). • Continued to track and evaluate salinity reduction opportunities for improved recycled water quality (Figure 4). • Watershed Protection staff collaborated with ReNew Water, LLC to host another reverse osmosis pilot at the RWQCP.

		<ul style="list-style-type: none"> • Watershed Protection staff continued to work closely with the Santa Clara Valley Water District, the City of Mountain View, and the City of Palo Alto’s Utility Department to identify expansion opportunities for the RWQCP’s Recycled Water Program. • Watershed Protection staff, in collaboration with the Santa Clara Valley Water District and City of Mountain View, completed the Advanced Water Purification System Feasibility Study and Preliminary Design Report that evaluated reverse osmosis treatment systems for improved recycled water quality. <p>** For more information, see the 2018 Clean Bay Plan available at cleanbay.org.</p>
<p>Green Stormwater Infrastructure (GSI)</p>	<p>Establish a new stormwater management approach that considers GSI as a non-traditional flood management tool that helps to treat and infiltrate stormwater, rather than it entering the City’s conveyance system to the Bay.</p>	<ul style="list-style-type: none"> • GSI Framework completed and approved by the City Manager • Watershed Protection staff held two interdepartmental workgroup meetings to discuss framework development and plan process • Consultant Team contracted to support City in creating the City’s GSI Plan by June 2018 <p>** For more information, see the 2018 Clean Bay Plan available at cleanbay.org.</p>

Data:

Figure 1: RWQCP 2017 Anthropogenic Greenhouse Gas Emissions by Source (contains estimates for December 2017 natural gas usage; data not available at time of this writing)

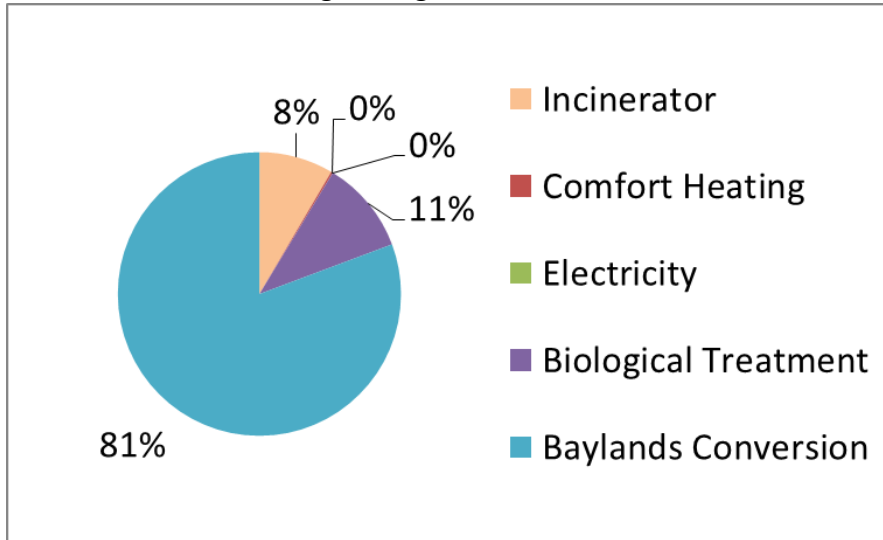


Figure 2: Historical RWQCP Greenhouse Gas Emissions as Calculated by the Local Government Operations Protocol, Version 1.1 (2010) (contains estimates for December 2017 natural gas usage; data not available at time of this writing)

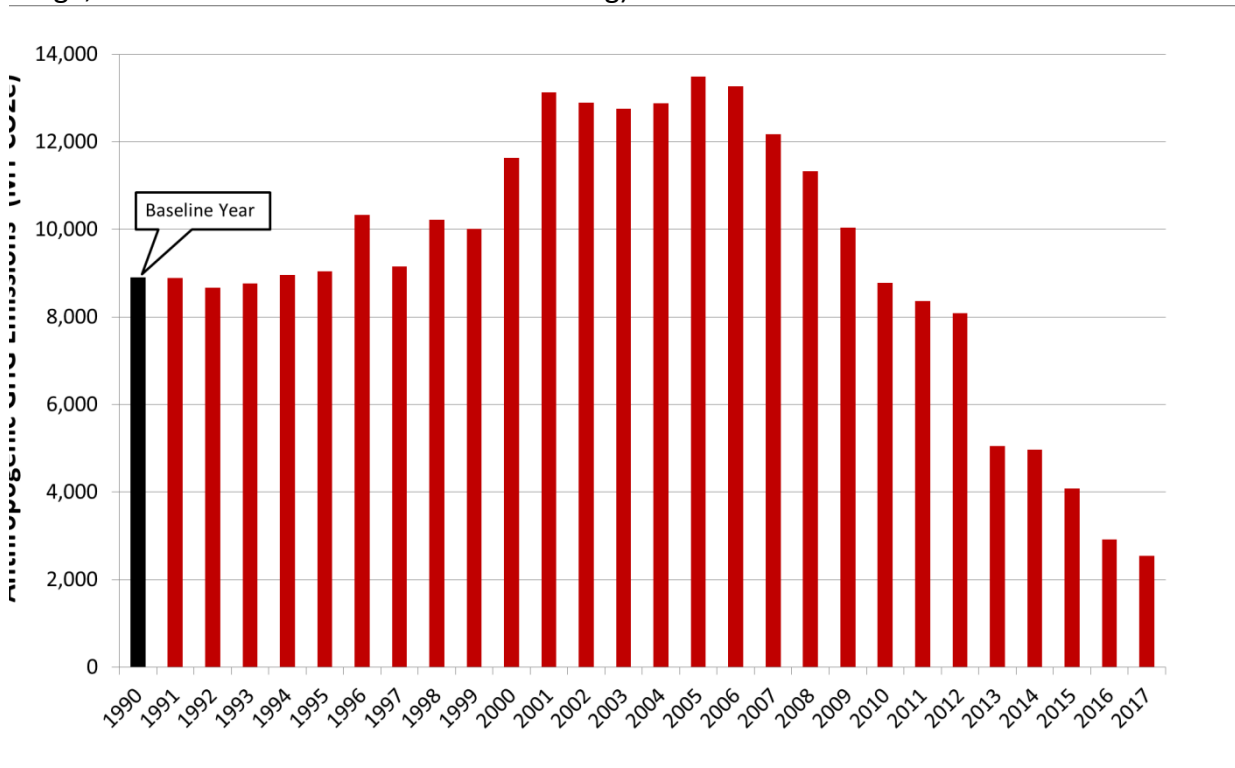


Figure 3: Historical Recycled Water Usage.

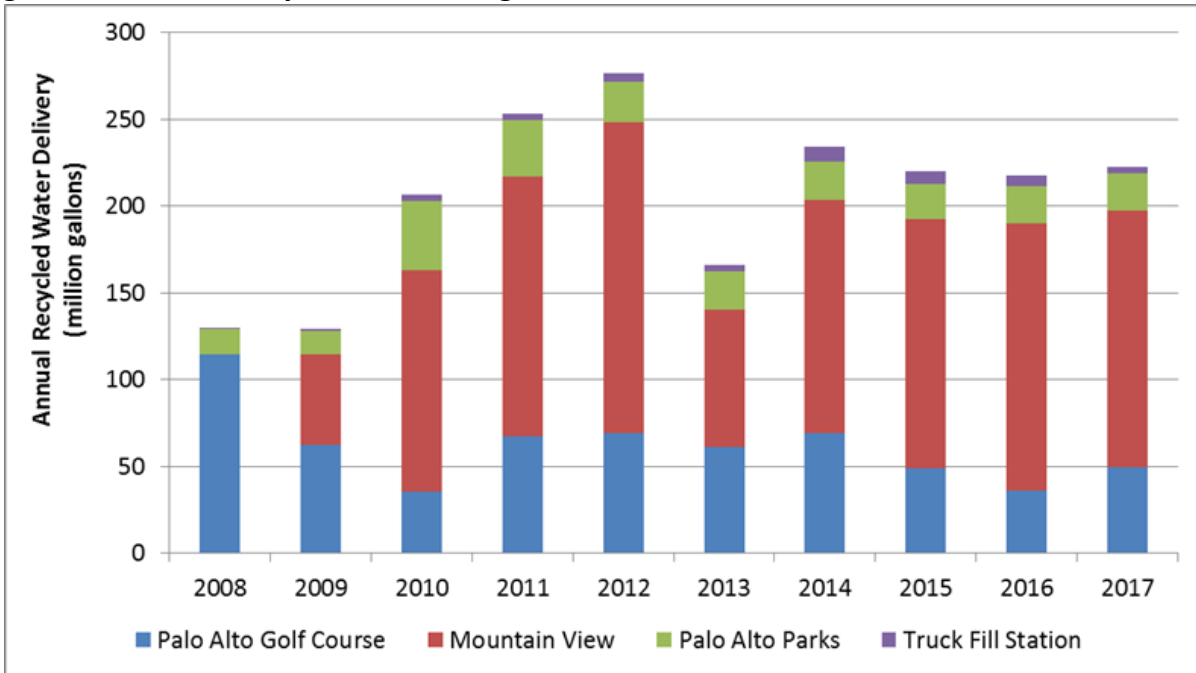
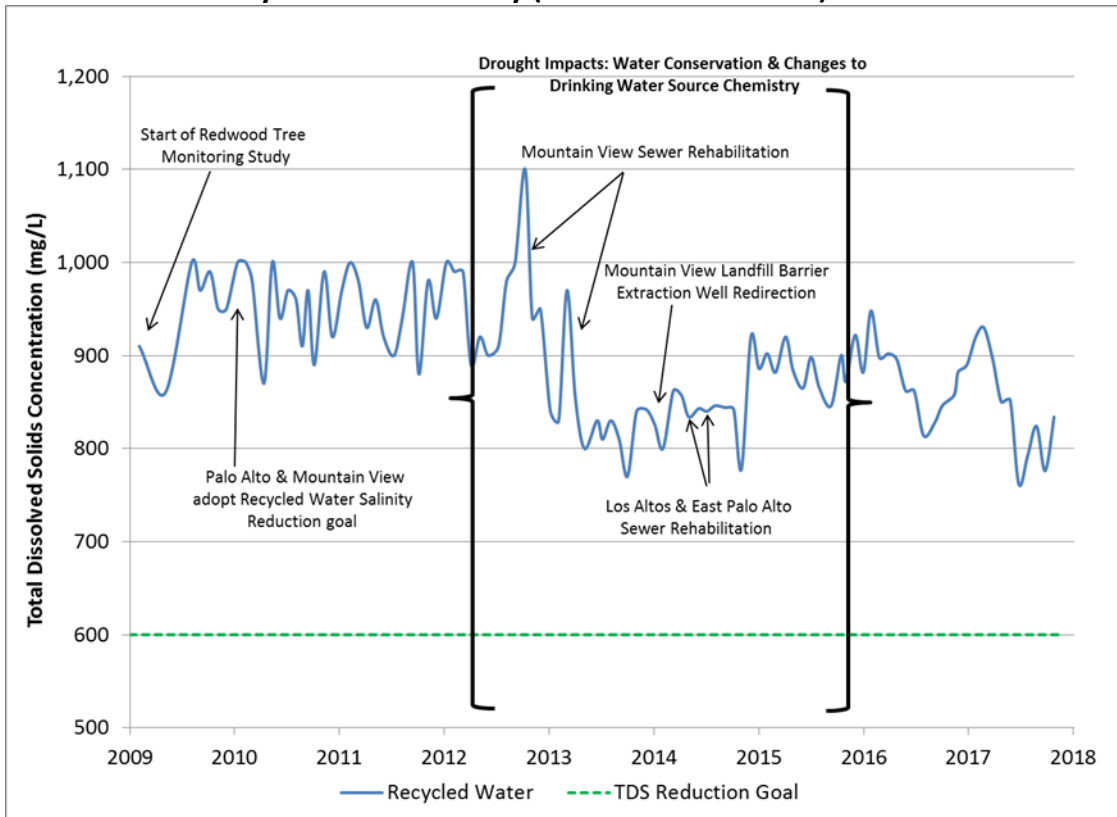


Figure 4: Historical Recycled Water Salinity (total dissolved solids).



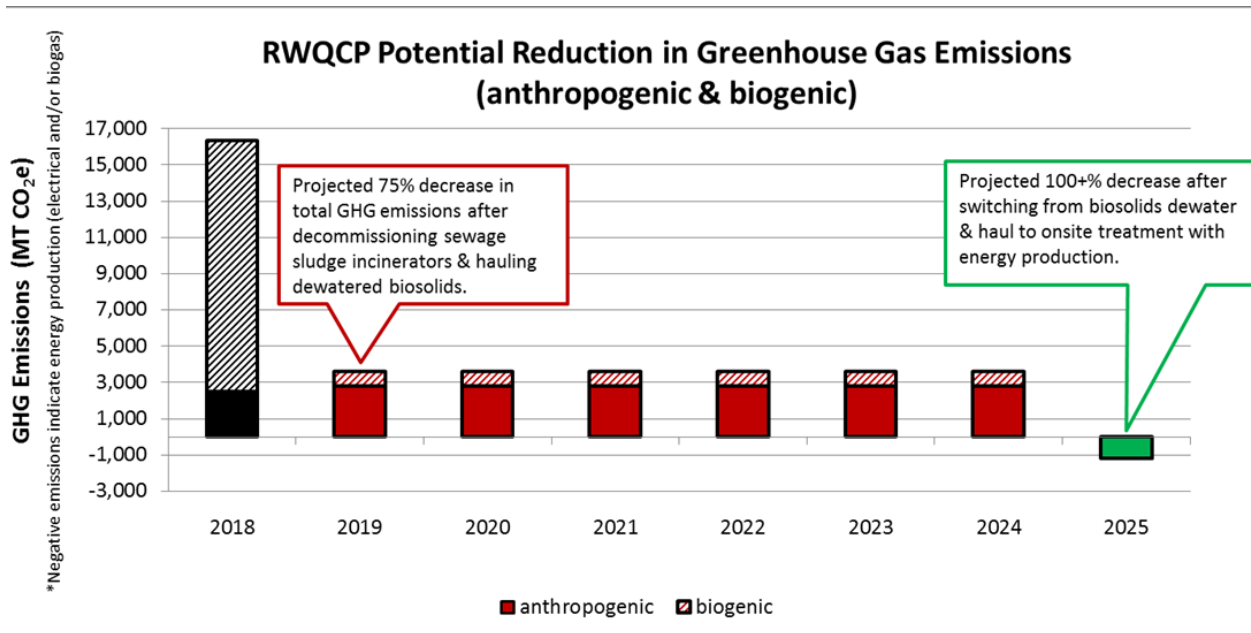
Top Three Sustainability Initiatives for 2018:

Sustainability Initiative	Objective(s)	Anticipated Outcome(s)
RWQCP Greenhouse Gas Reduction	<ul style="list-style-type: none"> • Continue to reduce, track, and report GHG emissions associated with wastewater treatment. • Adapt to sea level rise challenges. • Develop a policy to guide operations and coordinate with GSI planning in regards to flooding avoidance and multiple City and regional efforts to protect natural and built assets. 	<ul style="list-style-type: none"> • Track and report GHG emissions to City, state, and federal agencies. • Update the GHG Factsheet to accurately disperse information • Continue to make progress in decommissioning the sewage sludge incinerators by 2019, including building the Sludge Dewater and Loadout Facility. • Continue to purchase carbon-neutral electricity and natural gas for use at the RWQCP. • Adopt a sea level rise policy to guide operations.
Recycled Water Expansion	Promote the use and expansion of the RWQCP Recycled Water Program as a sustainable, local, and reliable alternative source of non-potable water.	<ul style="list-style-type: none"> • Continue to review and approve permit applications for use of the Truck-Fill Station. • Continue to collaborate with other agencies to evaluate appropriate expansion opportunities under the Northwest County Recycled Water Strategic Plan. • Continue to collaborate with ReNew Water, LLC on the reverse osmosis pilot system
Green Stormwater Infrastructure (GSI)	Establish a new stormwater management approach that considers GSI as a non-traditional flood management tool that helps to treat and infiltrate stormwater, rather than it entering the City's conveyance system to the Bay.	<ul style="list-style-type: none"> • Complete the Tracking Methodology Memo • Complete the Incorporation of GSI Language in City Plans and GSI Plan Funding Options Memos • Complete the Project/Areas Prioritization and Maps Memo • Complete the Incorporation of Countywide GDI Handbook into City Standards Memo • Complete the Maintenance and Monitoring Manual • Compose 50% draft City-wide GSI Plan

Challenges:

- 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, installation of variable frequency drive lift pump controls for the trickling filters, as well as purchasing greener energy options. Ongoing RWQCP optimization will continue, however the major GHG reductions from optimization projects have already occurred. RWQCP GHG emissions associated with biological treatment and baylands conversion are expected to gradually increase over time as water conservation increases and the service area population and economy grow. Future GHG reductions will be largely contingent on future plans to phase out sewage sludge incineration expected in 2019, the new biosolids treatment process expected in 2025, and the availability/quality of landfill gas as a replacement for natural gas in the incinerator (Figure 5).
- Emissions reporting:** RWQCP GHG emissions as reported to the California Air Resources Board and United States Environmental Protection Agency may differ from the values presented in this report due to finalized datasets, different high heat values, global warming potentials, and/or emission factors. RWQCP GHG emissions contained in this report 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 state and federal agencies periodically update their GHG calculation methods to better reflect recent advances in science and federal regulations.

Figure 5: RWQCP GHG Emissions & Projected Future Decreases from Change in Biosolids Treatment Processes.



- **Drought and Increased Economic Activity:** Drought conditions in the service area have increased water conservation efforts and significantly decreased flows entering the RWQCP. Additionally, the recent economic recovery and growth in the service area 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 (salinity). Higher pollutant loading and concentrations strain the current treatment process that was originally designed for treating more dilute wastewater. This issue is anticipated to pose continued challenges with meeting permit limits and internal goals (such as salinity reduction) should drought become more common with predicted climate change.
- **Recycled water quality:** Recycled water quality is dependent upon the quality of the wastewater that is sent to the RWQCP for treatment. Leaky sewer pipes increase the salinity that must be removed at the RWQCP for future expanded use of recycled water. Locating and subsequently relining these leaky pipes is challenging and requires not only special evaluations but also cross-departmental collaboration. Another challenge with the expansion of the RWQCP's Recycled Water Program is the required expansion of the recycled water transmission pipelines. Current pipelines are limited to the area adjacent to the RWQCP, therefore limiting the users to this geographic area. Expanding this pipeline is expensive and may not be cost effective depending on the expected demand for recycled water.
- **Green Stormwater Infrastructure (GSI):** The City of Palo Alto must adhere to requirements addressed in the 2015 Municipal Regional Permit, which identifies activities and pollutants that the City (in addition to other Bay area cities) must address in order to manage stormwater discharges into creeks, the Bay, and other waterbodies. To reduce stormwater flows and pollutants to the City's stormwater conveyance system (and later into the Bay) as well as erosion of nearby creeks, the MRP requires municipalities to incorporate, where possible, green stormwater infrastructure features in the public right-of-way and facilities. The methodology for doing so was outlined in a framework that was submitted to the Regional Water Board on July 1, 2017. In order to successfully identify an effective, long-term implementation approach, various City Departments and staff must buy in and take ownership of this new perspective of stormwater management. This culture shift will take time, energy and resources, though staff anticipates progress in 2018 due to the City's successful 2015 GSI project in the Southgate neighborhood and on-going inter-departmental meetings to meet various needs and concerns. In addition, the Community Services Department's parks maintenance staff, who has been maintaining the Southgate project (with a contractor's assistance), has limited funds to maintain additional GSI features. Thus, City staff will need to be creative in identifying funding sources and partnerships for both implementation and maintenance of GSI features.

###

Supplemental Materials:

- [2017 Clean Bay Plan](#)
- [City of Palo Alto Green Stormwater Infrastructure Plan Framework](#)
- [Regional Water Quality Control Website: www.cleanbay.org](http://www.cleanbay.org)

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 has dramatically reduced the amount of material going into landfills and now has a waste diversion rate of 82 percent, an increase from a 63 percent diversion rate in 2005.

The City's solid waste related greenhouse gas emissions stem primarily from three sources: (1) the fugitive emissions from the City's closed landfill where buried materials are slowly being degraded creating methane gas; 2) potential landfill emissions from the degradation of organic material such as food scraps which are included in the City's collected garbage and ultimately buried at the Kirby Canyon Landfill in San Jose; and (3) the emissions that result from having to mine or fabricate new resources (e.g., aluminum, glass, paper, plastic, etc.) for materials included in the garbage and buried at the Kirby Canyon Landfill in San Jose instead of recovering these resources from recycled materials.

Programs that have helped the City progress towards its greenhouse gas emissions reduction goals as well as zero waste goals include: simplifying the residential recycling collection process, collecting and composting commercial food scraps, and engaging the community with effective zero waste marketing campaigns. While increased economic activity and construction has had 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.

For solid waste collection, from 2015 to 2016 the amount of garbage collected decreased by 9% or 2,943 tons. In addition, the amount of compostable materials collected increased by 25% or 5,889 tons. The reduction in garbage and increase in compostables collected is a result of the implementation of new compostable collection programs.

Annual tonnages of solid waste materials collected.

Materials	2012	2013	2014	2015	2016
	(tons collected)				
Garbage	32,151	31,946	33,072	32,691	29,748
Recyclables	30,753	31,801	32,319	34,327	34,414
Compostables	25,631	24,514	24,705	23,763	29,652

Palo Alto's closed 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 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 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 (methane gas- created through the biological digestion of the buried waste in an oxygen free environment). Landfill

gas is collected via a set of buried pipes and combusted in either the neighboring Regional Water Quality Control Plant sludge incinerator facility to be beneficially utilized or flared.

Strategies: The City’s zero waste strategy seeks to eliminate the generation of waste wherever possible, and then manage, through reuse and recycling, the discards that are created. Most 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 environmentally preferred purchasing policies. For the City’s closed landfill staff has pursued two strategies to reduce greenhouse gas emissions: 1) capping the landfill (completed in 2015) to keep fugitive emissions to a minimum; and, 2) beneficially using the landfill collected gas.

Goals:

- Achieve a 95 percent diversion rate by 2030.
- Improve generation habits and reduce the total amount of material sent to the landfill.
- Provide local recycling and composting resources.
- Provide consistent maintenance of the landfill cap and gas control systems to minimize fugitive emissions;
- Maximize the amount of landfill gas sent to the Regional Water Quality Control Plant or identify new beneficial uses for the landfill gas.

Initiatives and Activities: In April 2016, the City began implementing the phased Recycling and Composting Ordinance that required certain commercial customers to subscribe to compost services and sort their waste properly. By the end of 2017 all Phase I & II customers have subscribed to compost services. As a result, the City has been able to divert over 4,500 tons of compostables from the landfill, with the material being processed into usable electricity and compost.

In 2017 the Zero Waste Group implemented new programs which furthered the City’s diversion and sustainability goals: 1) implemented Phase 2 (of 3 phases) of the City’s new recycling and composting ordinance requiring all commercial customers to subscribe to compost service and to sort their waste properly; 2)acquired and piloted Northern California’s first electric full-sized waste collection truck, which if successful could lead the City to help meet its sustainability goals; and 3) developed and implemented outreach and educational strategies for the diversion of residential food scraps (into green carts) with a goal of diverting over half of the 5,000 tons of residential food scraps from the garbage to beneficial use.

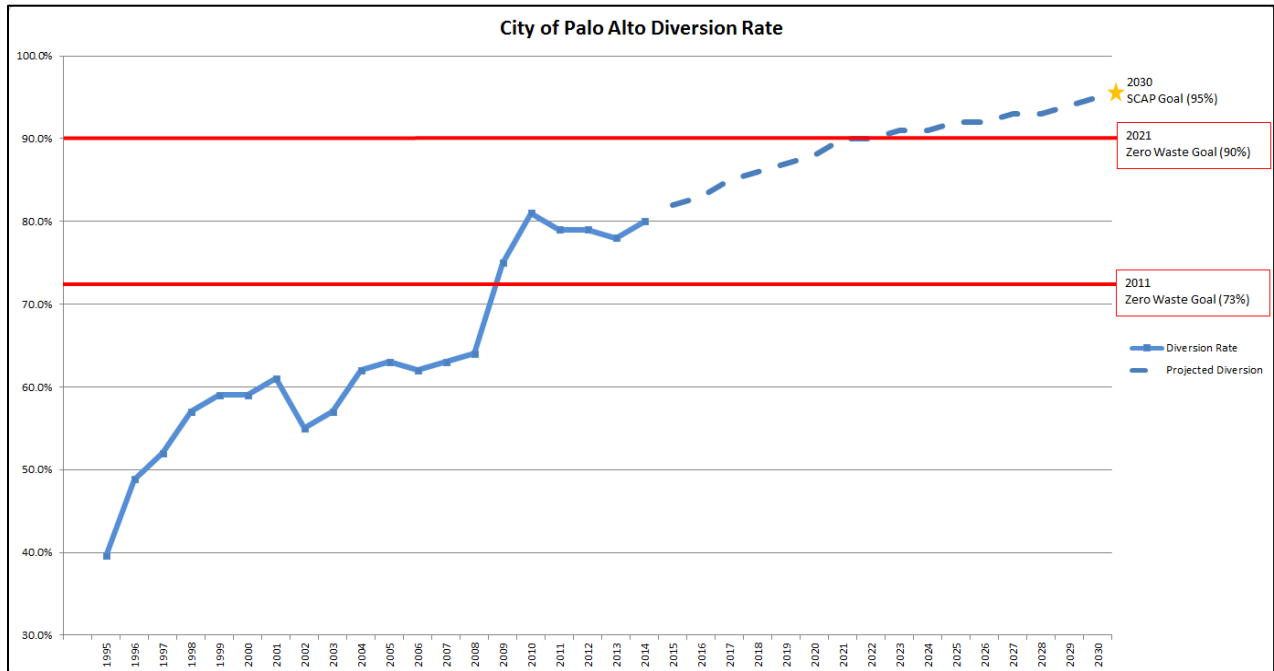
Top Three Sustainability Initiatives in 2017

Sustainability Initiative	Objective	Outcome
Recycling & Composting Ordinance Implementation	Perform audits to ensure commercial customers subscribe to compost service	The City has seen an increase in the diversion of compostable materials from the landfill.

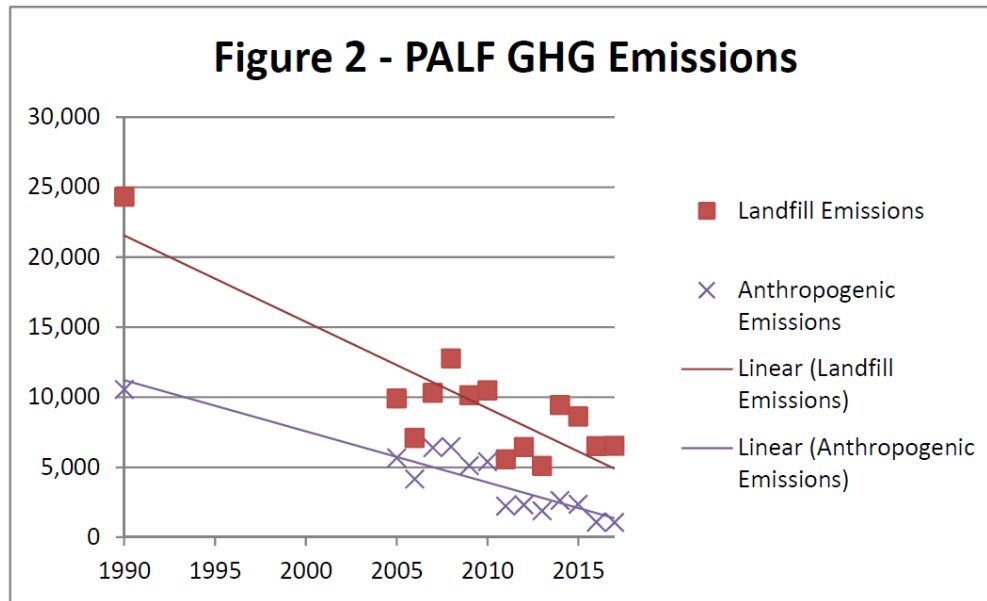
Ongoing Maintenance	Perform routine maintenance of the landfill gas collection system.	The landfill gas collection system is working effectively.
Alternative Uses of Landfill Gas	Consultant studying potential alternative uses of landfill gas.	Evaluating results of study and will make recommendations.

Data: The first graph is the *Annual Diversion Rate* graph showing the historical annual percentage of refuse (garbage, recycling, and compostable) diverted from being landfilled. The second graph is the *Historical Palo Alto Landfill Greenhouse Gas Emissions* graph showing the historical levels of landfill GHG emissions (Metric Tons - CO2 equivalents).

Annual Diversion Rate, 1995 - 2016



Historical City of Palo Alto Landfill GHG Emissions, 1990 - 2017



Overall the trend in the City of Palo Alto GHG emissions is downward. Historical fluctuations in GHG emissions are likely the result of closing and capping the landfill. The closure activities include construction of the soil cap, expansion of the gas collection system and completion of vegetative soil layer and planting

Forecast: Solid Waste Related GHG Emissions in metric tons (MT) carbon dioxide equivalents (CO_{2e}) for the Palo Alto Landfill.

Emissions Source	2018 Emissions	2019 Emissions	2020 Emissions
Palo Alto Landfill GHG emissions during the year	6,500	6,500	6,400

With the completion of the landfill cap and upgrades to the landfill gas collection system the City expects the Palo Alto Landfill GHG emissions to continue to trend downwards over the next 30 years. The rate of the drop in GHG emissions is difficult to estimate this early in the completion of the cap but as time goes on the rate should be more predictable.

Trend: Solid Waste Related GHG Emissions in metric tons (MT) carbon dioxide equivalents (CO_{2e}).

Emissions Source	2005 Emissions ¹ (baseline)	2014 Emissions	2015 Emissions	2016 Emissions	2017 Emissions (current)	Difference (current-baseline)	Percent Difference
Palo Alto Landfill fugitive emissions	9,900	9,427	8,617	6,527	6,538	3362	41%
Landfilling organic wastes ³	2,883	1,919	1,986	1,850	2,213	(670)	26%
Landfilling recyclable materials ³	13,650	8,892	9,910	9,905	11,623	(2027)	16%

¹2005 GHG Emissions are baseline calculations.

²Code of Federal Regulations (CFR) Title 40, Part 98, Subpart HH model used to calculate greenhouse gas emissions produced by Palo Alto Landfill.

³EPA Waste Reduction Model (WARM) used to calculate greenhouse gas emissions produced by handling and disposal of City generated solid waste containing organics (mostly food scraps and food soiled paper) and recyclables at the Sunnyvale Material Recovery and Transfer Station. The data has been revised to use the latest EPA WARM version 14.

Challenges:

- How to increase our waste diversion rate, which has remained flat over the last few years, after many years of consistent improvement.
- How to effectively reduce or recover larger quantities of packaging materials in our waste streams associated with deliveries of products.
- How to divert and recover larger quantities of demolition and construction wastes being generated leading to large quantities of waste being buried in landfills.
- How to create and implement outreach and education strategies that will lead to behavior change with multi-family complexes and other commercial customers that results in better sorting of their waste.
- Evaluating the feasibility of using other technologies to beneficially reuse the landfill gas.

Attachment E: Sustainability Policy and 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.

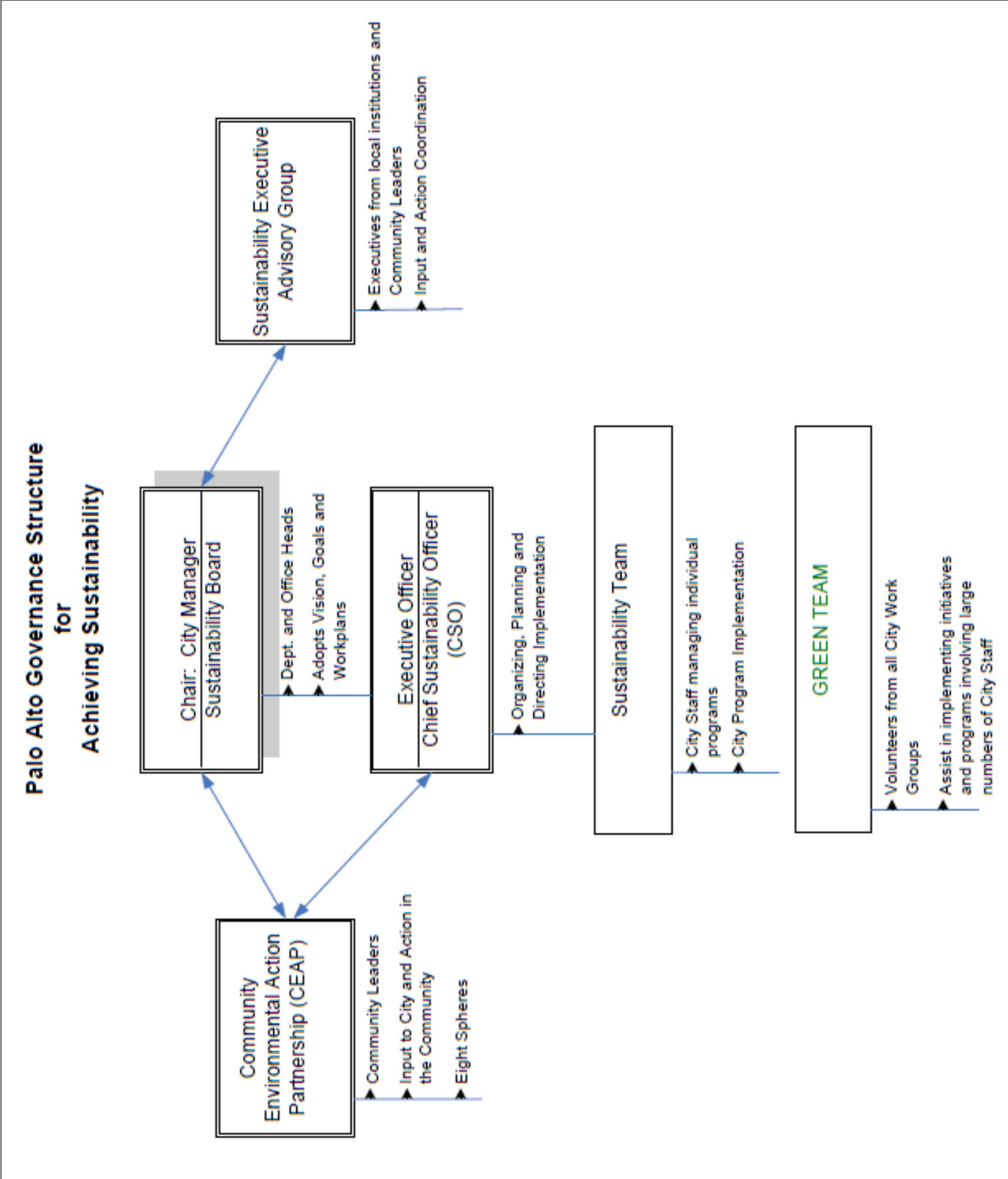
Sustainability Executive Advisory Group: To solicit input from outside the City, the City Manager will organize and lead such an ad hoc group, whose membership will include key executives from Palo Alto institutions, community leaders, and representatives from Stanford and large companies. The function 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.



City of Palo Alto Sustainability Policies

Since 1991, the Palo Alto City Council, City Manager, and City of Palo Alto Departments have adopted policies, plans, ordinances, resolutions, and principles that have helped to increase the sustainability of Palo Alto. In addition, the City of Palo Alto is currently integrating sustainability principles in the Comprehensive Plan.

Council Policies

- [Energy Risk Management Policies – October 21, 2002, Revised October 2005](#)
- Environmentally Preferred Purchasing Policy – February 6, 2008, Revised October 28, 2016 (Adopted as part of the 2007 Climate Action Plan)
- Extended Producer Responsibility Policy – December 2009 ([CMR 456:09](#))
- [Green Building Policy for City Buildings – April 21, 2003, Revised December 23, 2007 \(CMR 436:07\)](#)
- Integrated Pest Management – October 2001 ([CMR 343:01](#))
- Procurement of Recycled Paper and Recycled Paper Products – July 23, 1990, Revised June 2003
- Procurement of Recycled Products – June 2001
- [Recycled Water Salinity Reduction Policy – December 2009 \(CMR 111:10\)](#)
- Single-Use Plastic Policy – April 2009, Revised September 22, 2016 ([CMR 215:09](#))
- Support for Sustainability – April 2000, Revised June 18, 2007 ([CMR 260:07](#))

Council Approved Plans

- [2018-2020 Sustainability Implementation Plan \(SIP\) - December 11, 2017 \(Staff Report 8487\)](#)
- [Baylands Master Plan – 2008](#)
- [Bicycle and Pedestrian Transportation Plan – July 2012](#)
- [Bicycle Transportation Plan – May 2003](#)
- [Carbon Neutral Plan for the Electric Supply Portfolio – March 4, 2013 \(Staff Report 3550\)](#)
- [Clean Bay Pollution Prevention Plan – 2014](#)
- [Climate Protection Plan – December 3, 2007 \(CMR 435:07\)](#)
- [Disinfection Alternatives Work Plan – August 2005](#)
- [Gas Utility Long-Term Plan – April 23, 2012 \(Staff Report 2552\)](#)
- [Local Solar Plan – April 21, 2014 \(Staff Report 4608\)](#)
- [Long Term Energy Acquisition Plan \(LEAP\) – April 16, 2012 \(Staff Report 2710\)](#)
- [Palo Alto Comprehensive Plan – 2015 \(Staff Report 5969\)](#)
- [Recycled Water Facility Plan – December 2008](#)
- [Sustainability and Climate Action Plan – November 28, 2016 \(Staff Report 7304\)](#)
- [Urban Forest Master Plan – May 11, 2015 \(Staff Report 1332\)](#)
- [Urban Water Management Plan \(2010\) – June 2011](#)
- [Urban Water Management Plan \(2015\) – June 2016](#)
- [Utilities 2011 Strategic Plan – July 18, 2011, Revised August 5, 2013](#)

- [Zero Waste Strategic Plan – October 2005](#)
- [Zero Waste Operational Plan – June 2007](#)

Ordinances

- [Disposable Checkout Bag Ordinance – May 6, 2013 \(See website for more information\) \(Staff Report 3065\)](#)
- [Electric Vehicle Supply Equipment Ordinance 5263](#) - Effective September 2014 through 06/19/2015
- [Energy Reach Code Ordinance 5383](#) - Effective 01/01/2017
- [Energy Reach Code Ordinance 5345](#) - Effective 09/10/2015 through 12/31/2016
- [Green Building Ordinance 5393](#)- Effective 01/01/2017
- [Green Building Ordinance 5324](#) - Effective 06/22/2015 through 12/31/2016
- [Green Building Ordinance 5220](#) - Effective December 2013 through 06/19/2015
- [Polystyrene Reduction Ordinance – May 11, 2009, Revised April 29, 2010 \(See website for more information\) \(CMR 201:09\) \(CMR 206:10\)](#)
- [Recycled Water Infrastructure Ordinance – May 12, 2008 \(CMR 203:08\)](#)
- [Sewer Use Ordinance – June 21, 2010 \(CMR 252:10\)](#)
- [Smoking Ordinance – October 3, 1995, updated December 5, 2016 \(Staff Report 7544\)](#)
- [Stormwater Pollution Prevention Ordinance - January 10, 2011](#)

Resolutions and Adopted Principles

- [Ahwahnee Water Principles Resolution No. 8560 - 2005 \(Modified Ahwahnee Water Principles\)](#)
- [Bay Friendly Landscaping Resolution – January 22, 2008](#)
- [Carbon Neutral Natural Gas Plan for the Gas Supply Portfolio Resolution No. 9649 - December 5, 2016 \(Staff Report 7284\)](#)
- [Carbon Neutral Plan for the Electric Supply Portfolio Resolution No. 9322 – March 4, 2013](#)
- [Establishing a Local Solar Plan Resolution No. 9402 – April 21, 2014](#)
- [Green Business Program Resolution No. 7877 – July 19, 1999](#)
- [Palo Alto Energy Risk Management Policy Resolution No. 9454 – October 6, 2014](#)
- [Potential Impacts of Climate Change and Externality Costs Resolution No. 9013 – December 7, 2009](#)
- [Renewables Portfolio Standards Enforcement Program Resolution No. 9214 – December 12, 2011](#)
- [Renewable Energy Resources Procurement Plan Resolution No. 9215 – December 12, 2011, Revised November 12, 2013 \(Staff Report 4168\)](#)
- [State and National Extended Producer Responsibility Actions Resolution No. 9017 – December 14, 2009](#)