Environmental Quality Commission

SPECIAL MEETING AGENDA

Date: 9/27/2017
Time: 6:30 p.m.
City Hall/Administration Building
701 Laurel St., Menlo Park, CA 94025

A. Call To Order

B. Roll Call -- Bedwell, DeCardy, Dickerson, Chair London, Marshall, Vice Chair Martin, Smolke

C. Public Comment

Under "Public Comment," the public may address the Commission on any subject not listed on the agenda. Each speaker may address the Commission once under Public Comment for a limit of three minutes. Please clearly state your name and address or political jurisdiction in which you live. The Commission cannot act on items not listed on the agenda and, therefore, the Commission cannot respond to non-agenda issues brought up under Public Comment other than to provide general information.

D. Regular Business

D1. Update and discuss City's progress for Electric Vehicle Charging station infrastructure – 30 min

D2. Discuss 2018 to 2020 Climate Action Plan initiatives (Attachment) – 30 min

D3. Discuss greenhouse gas reduction goal beyond 2020 (Attachment) – 30 min

D4. Approve the August 23, 2017, Environmental Quality Commission meeting minutes (Attachment) – 5 mins

E. Reports and Announcements

E1. Commissioner reports – 10 min

E2. Staff update and announcements – 10 min

E3. Future agenda items – 5 min

F. Adjournment

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CITY OF MENLO PARK

October 2015

Climate Action Plan Update and Status Report

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Introduction

Background

For approximately 1,000 years before the Industrial Revolution, the amount of Greenhouse Gas (GHG) emissions in the atmosphere remained relatively constant. During the 20th century, however, scientists observed a rapid change in the climate change GHG emissions that are attributable to human activities, such as use of fossil fuels to power vehicles and buildings, and disposing of waste in landfills that release GHG emissions.

The Intergovernmental Panel on Climate Change (IPCC) has identified four major GHG emissions—water vapor, carbon dioxide (CO_2), methane (CH4), and ozone (O3)—that are the likely cause of an increase in global average temperatures observed within the 20th and 21st centuries. CO_2 is one the most prevalent GHG emissions resulting from human activity. According to the IPCC, the amount of CO_2 has increased by more than 35 percent since preindustrial times and has increased at an average rate of 1.4 parts per million (ppm) per year since 1960, mainly due to combustion of fossil fuels and deforestation.

Climate-change impacts are affected by varying degrees of uncertainty. IPCC's 2007 Fourth Assessment Report projects that the global mean temperature increase from 1990 to 2100, under different climate-change scenarios, will range from 1.4 to 5.8 degrees Celsius (°C) (2.5 to 10.4 degrees Fahrenheit (°F)). In the past, gradual changes in the earth's temperature changed the distribution of species, availability of water, etc. In California potential impacts resulting from climate change are:

- Poor air quality made worse due to more severe heat waves
- Decreasing Sierra Nevada snow pack, affecting adequate water supplies
- Reduction in available renewable hydropower
- Declined productivity in agriculture due to irregular blooms and harvest and increased pests and pathogens.
- Accelerated sea level rise, impacting beaches and infrastructure
- Increased and more severe wildfire seasons
- Increasing threats from pests and pathogens from warmer weather
- Altered timing for wild life migrations and loss of species, impacting food chain and ecosystems.

With this understanding, many local, state, and federal governments around the world are taking action to reduce global GHG emissions. The purpose of Menlo Park's Climate Action Plan (CAP) is to provide strategies that reduce local greenhouse gas (GHG) emissions and assist Menlo Park to meet or exceed the emission reduction targets of AB 32 (California's Global Warming Solutions Act of 2006). AB 32 sets a goal for the state to reduce greenhouse gas emissions to 1990 levels by 2020, and 80% below 1990 levels by 2050. In April 2015, the Governor of California issued an executive order to establish a GHG reduction target of 40% below 1990 levels by 2030.

Menlo Park's first Climate Action Plan was approved by the City Council in 2009 and the Council stated that the Climate Action Plan was intended to be a 'living document' to be updated periodically as current strategies are implemented and as new emission reduction strategies and technologies emerge that effectively reduce emissions. On an annual basis, the Council reviews and approves a report on Menlo

Park's Greenhouse Gas Inventory trend and five year Climate Action Plan strategies and implementation status.

Menlo Park City Council Actions

The City of Menlo Park has taken a number of actions in recent years to address climate change. To provide context and facilitate retrieval of that history, Figure 1 below provides an overview of Menlo Park's climate action planning to date. Appendix A provides a history of the Climate Action Planning reports which have been presented to the City Council.

In addition to the milestones and City Council actions shown below, the City's Environmental Quality Commission meets monthly to discuss a variety of climate action planning related topics, and the City's environmental staff provides leadership in completing climate action planning projects, along with other compliance and regulatory duties. A number of Menlo Park non-profit organizations support these efforts as well.

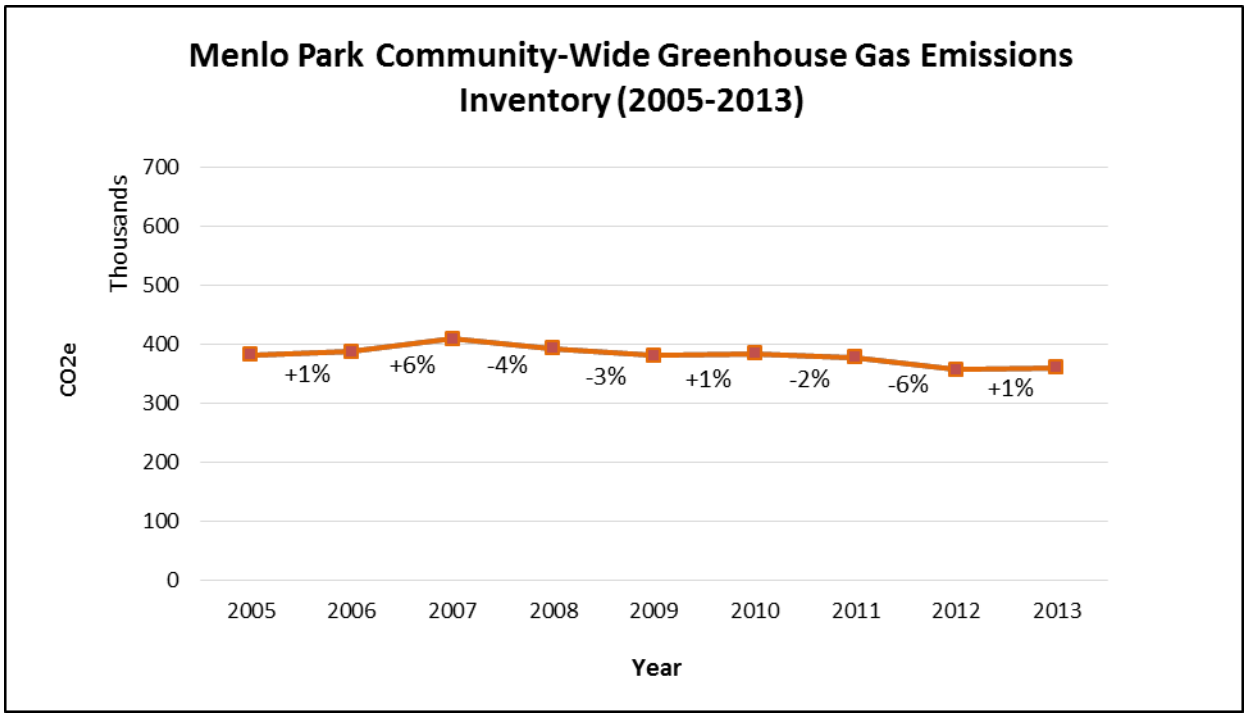
Figure 1 – Previous Menlo Park Climate Action Planning Milestones

Year	Milestone
2005	Green Ribbon Panel – 100+ participants
2005	1st Greenhouse Gas (GHG) Inventory
2008	Approval to develop a Climate Action Plan (CAP)
2009	1st CAP drafted and approved
2011	CAP update
2013	CAP update and adoption of 27% GHG reduction goal from 2005 levels by 2020
2014	CAP update

Community-Wide Greenhouse Gas Inventory Results Between 2005 and 2013

Using ICLEI's (Local Governments for Sustainability) updated Clean Air and Climate Protection (CACP) Software, Menlo Park was able to complete greenhouse gas inventories between 2005 and the current inventory using the most current available data for 2013. GHG emissions were measured from building energy usage, solid waste sent to the landfill, estimated fuel consumption, and methane produced from a closed landfill (Bedwell Bayfront Park) in Menlo Park.[1] Figure 2 shows the annual trend in community-wide greenhouse gas emissions from all sources combined, while Figure 3 shows Menlo Park's inventory for 2013 broken down by source.

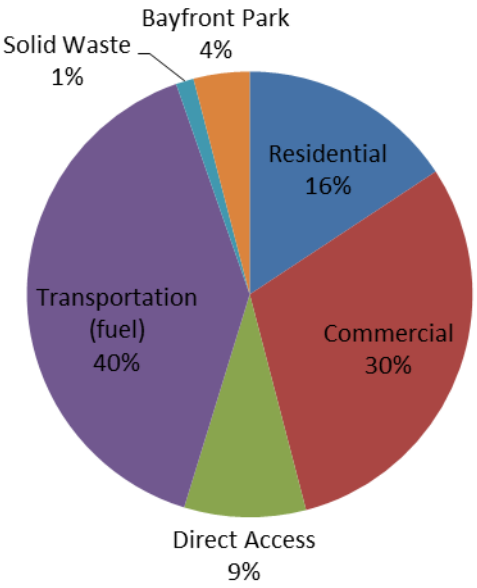
Figure 2 – Community-Wide Greenhouse Gas Emission Inventory 2005-2013



For reference, GHG emission can also be expressed as carbon dioxide equivalents (CO_2e). The trends show GHG emissions going up or down slightly each year, based on factors such as the PG&E energy emissions factors, economic growth or decline.

[1] Energy data obtained from PG&E. Transportation calculated using total gasoline sales data provided by Menlo Park's Finance Department with an assumption that 95% of sales are fuel sales, and applying the average cost per gallon of gasoline in California from the California Energy Almanac produced by the California Energy Commission. Solid Waste Data obtained CalRecycle, and Bayfront Park data was provided by Fortistar, contracted operator of the landfill. **Final CO_2e count being verified by staff, direct access figures are under review as of 7/15/15.*

Figure 3 – 2013 Menlo Park Community-Wide Greenhouse Gas Emissions by Source



In 2013, the City of Menlo Park's community-wide emissions totaled 360,427 tons of CO_2e. Appendix B shows the GHG emissions attributed directly to City of Menlo Park operations, which are a small portion of Menlo Park's overall GHG emissions.

Emissions from electricity and natural gas use in the residential sector totaled 16%, followed by commercial customers at 30%, and Direct Access energy users at 9%. Emissions from transportation (fuel purchases) totaled 40%, followed by the closed Bayfront Park landfill at 4% and solid waste at 1%.

When compared to Menlo Park's 2012 community-wide inventory (356,521 tons) there is a 1% increase in emissions. This one percent increase can be attributed to the following community trends:

- Increase in energy consumption in both the residential and commercial sectors. For example, there was a 3.4% increase in residential energy use and 5.5% increase in commercial energy use from 2012-2013.

- Increase in development projects occurring in Menlo Park, which can be seen in the differences in finalized building permits for new construction that went from 78 building permits in 2012 to 117 in 2013, a 50% increase over 2012.

- In 2012, the former Sun Microsystems corporate campus was not occupied by Facebook as re-modeling was occurring at the site. In 2013, Facebook moved 6,500 employees to the former Sun Microsystems campus. Facebook has submitted plans for campus expansion which will

roughly triple its current size by 2020. Rebuilding and infill new construction in the residential and commercial sector are expected to result in continued rise in energy demand in Menlo Park for several years to come.

- PG&E emission factors slightly increased from 0.4440 lbs. CO_2/kWh to 0.4990 lbs. CO_2/kWh between 2012 and 2013

The current trend will not meet State AB 32 goals to reduce emissions to 1990 levels by 2020 and 80% below 1990 levels by 2050, unless significant local policies and programs are implemented to achieve this statewide goal. The next section provides an overview of strategies that Menlo Park will review and potentially implement over the next five years.

Recommendations for Greenhouse Gas Reduction Strategies Between 2015 and 2020

The following list of measures, in Figure 4, are recommended community and municipal strategies to aid in meeting Menlo Park's GHG emissions reduction targets. Additional measures may be needed at the international, national, statewide, and local level in order to fully reach Menlo Park's climate action goals.

Figure 4 – Menlo Park Five Year Community GHG Reduction Strategies 2015-2020

Fiscal Year 2015-16

- Complete installation of Solar PV on four City buildings
- Complete installation of four Electric Vehicle (EV) Charging stations at City public parking locations
- Incorporate CAP strategies and GHG emission reductions into General Plan update
- Complete energy efficient upgrades and renewable energy installation at city facilities
- Consider Community Choice Energy (CCE) options to gain additional renewable power in Menlo Park's portfolio
- Complete evaluation of methane capture and treatment at Bedwell Bayfront Park (Closed Landfill)

Fiscal Year 2016-17

- Incorporate Zero Net Energy and LEED Silver requirements into Planning requirements and Building Codes to increase efficiency in new buildings
- Implement Energy Star ratings requirement, or other performance tracking methodology, into Planning requirements for new buildings
- Consider changes to City's solid waste, recycling, and organics collection franchise that encourage zero waste and decrease waste to landfill
- Consider developing an energy efficient/renewable energy plan for commercial and residential sector to re-invigorate energy upgrades for existing buildings
- Re-invigorate a social marketing program to increase biking, public transit, and walking in the community
- Implement CCE, if selected as an option

Figure 4 – Continued

Fiscal Year 2017-18

- Support Transportation Commission's car sharing program
- Support Bicycle Commission's bike sharing program
- Consider program to increase Caltrain ridership by downtown employees
- Encourage local food production through social marketing, education, and community garden programs
- Consider large scale renewable energy generation within Menlo Park (such as solar farm on a portion of open space, or large number of solar roof-top installations)

Fiscal Year 2018-19

- Revisit City Environmental Purchasing Program (EPP) to consider requiring new City buildings, facilities, and vehicles meet certain minimum environmental attributes
- Revise 2004 City Street Tree Master Plan, with the support of the City Arborist, to increase urban tree canopy
- Consider fuel switching strategies to move residential and commercial energy from natural gas and other fuels to renewable electricity portfolio
- Consider consumption based community engagement program to reduce GHG impacts of plug load, food and consumer goods purchased in Menlo Park

Fiscal Year 2019-20

- Consider replacement of all remaining City non-LED street lights with LED fixtures
- Consider height and density limit adjustments to promote active and public transportation
- Consider resiliency strategies for protecting Menlo Park land in the projected Sea Level Rise (SLR) zone
- Robust Climate Action Plan update community engagement program to craft Menlo Park's strategy looking forward to 2040

For All Years 2015-2020:

- Continue implementation of City EPP, residential and commercial water, waste and energy efficiency programs

The above is a recommended timeline only. New policies and programs related to GHG reductions may require a comprehensive cost-benefit analysis. Nearly all policies and programs would require City Council approval prior to implementation. In addition, the five year strategy also reflects what can be accomplished with current staff resources.

Status on Projects Approved by Council from 2014 Update

In April 2014, Council approved of a five-year CAP strategy. The following is the status of projects previously discussed. The projects are listed roughly in the order in which they were originally planned to be implemented. The progress highlights the varied speed in which projects can move forward within the context of the larger City effort.

Planned Implementation FY 2011-12

Participation in Energy Upgrade California	In April 2015, the City, San Mateo County, and Bay Area Regional Energy Network (BayREN) cosponsored a homeowner energy efficiency workshop at the Belle Haven neighborhood center. The workshop was attended by 30 residents. The City continues to conduct outreach regarding energy efficiency opportunities for both residents and businesses, through bill inserts, Facebook, Twitter and NextDoor social media campaigns. The State Energy Watch program provides up to $4,500 in rebates to homeowners and $750 per unit to multi-family dwelling owners that complete energy efficient upgrades. City Council approved a rebate program in 2011 that provided partial payment to residents for completing a home energy audit, and full rebate if any recommended energy efficient upgrades are made. According to San Mateo County Energy Watch reports, Menlo Park had the third highest participation rate in the program for the county behind San Mateo and San Bruno. Approximately 25 projects were completed in Menlo Park. The City maintains a small fund for energy audit rebates; however, the nearby non-profit agency that offered audits to residents has experienced program changes which have resulted in a reduced number of requests for the funds.
Status Current, On-Going, with Program Changes	

Establish Climate Action Plan Greenhouse Gas Reduction Target	A GHG reduction target of 27% by 2020 from 2005 level was adopted by Council in March 2013.
Status Completed in 2013	

Mandatory Commercial Recycling Ordinance	State-wide mandatory commercial recycling was enacted in 2013 via AB 341 and State-wide mandatory commercial organics recovery was enacted in 2014 via AB 1826, thus removing the perceived need for local ordinances. The South Bay Waste Management Authority (also referred to as SBWMA or RethinkWaste) is taking the lead in publicizing and implementing these laws on behalf of its member agencies, including Menlo Park.
Status Removed	

Energy Performance Contracting and Solar Power Purchase Agreements	Environmental Programs worked with San Mateo County Energy Watch to provide a free energy audit of the City's administration building, and an Energy Management System (EMS) was recommended. The City Council appropriated over $1M in the Capital Improvement Program (CIP) for FY 2014-15, and FY 2015-16 for the energy efficiency projects at City facilities, these include variable frequency drives, Energy Monitoring Systems (EMS) and new chillers, which are estimated to save 578 tons of CO2e. On October 6, 2015 the City Council accepted the chillers and variable frequency drives as completed by the contractor. The EMS implementation is underway, thus the project is halfway completed relative to its budget. In 2013, Council also approved participating in the regional renewable energy procurement project (R-REP) to install solar on four city facilities (Arrillaga Gymnasium, Arrillaga Gymnastics Center, Onetta Harris Center, and Corporation Yard). Construction of the solar power facilities is underway and is expected to be completed in November 2015. • The combined solar system sizes equal 390.4 kW • The annual solar output is estimated to be 580,889 kWh • Over the course of the 20 year Power Purchase Agreement (PPA), the City is expected to save over $461,000 in energy costs (when compared to PG&E), with minimal capital outlay by the City • The installations are estimated to reduce the City's Municipal GHG emissions by 419 metric tons annually, which is equivalent to removing eighty-eight passenger cars from the road every year.
Status Nearing Completion in 2015	

Adopt Environmental Purchasing Policy for City Operations	Implementation and reporting on the results of the policy are still in progress. The City established an Environmental Purchasing Policy (EPP) working group consisting of members from all departments that helped craft the policy, which was adopted in 2014. The committee has not met since adoption due to other city priorities and limited staff resources. Reporting is expected to begin in FY 2015-16.
Status Completed in 2014	

Improve Methane Capture at Bedwell Bayfront Park	Delays are due to expected changes in methane production due to the age of the landfill and unexpected changes in regulatory standards for operating the closed landfill. A consultant was hired to study this issue in FY 2013-14 and a revised plan is expected in 2016.
Status In Progress	

Phase II Sustainable Building Standards Development	Staff anticipates bringing changes to the building code to City Council along with required updates required under the California universal building code, which is updated every three years. Expected completion FY2016-17.
Status In Progress, projected completion FY2016-17	

Planned Implementation FY2012-13

Expand Green Business Certification Program	San Mateo County revived the program using a one-year Climate Fellow staff person in FY2014-15. Menlo Park businesses were certified. City staff helped to publicize the program and the businesses in 2015. Follow up is needed to ensure the County continues the program on an on-going basis.
Status Implemented in FY2014-15	

Maximize Recycling and Composting at all City facilities to a 75% measured diversion rate	Staff has provided outreach on how to properly use the programs to City staff, reporting and follow up are pending additional staff time availability.
Status Current, On-Going	

Consider Adopting Zero Waste Policy	This project is currently planned for the FY2016-17 CIP and would need to coincide with possible Collection Franchise negotiations.
Status Moved to FY2016-17	

Implement Civic Green Building Policy for New City facilities or major renovations	Due to limited staff resources, this project is on hold until the Environmental Purchasing Policy is fully implemented. In 2014 the City's Environmental Purchasing Policy was adopted, additional staff time is needed to complete department level follow up, training and reporting. Environmental staff is planning to assist the City Hall remodeling team in choosing green building materials whenever possible. If the project qualifies, the City may certify the project under the LEED O+M (Operations and Management) framework.
Status On Hold	

Planned Implementation FY2012-13

Car Sharing and Public Transportation Marketing	These projects were de-emphasized in the CAP to reflect the Transportation and Bicycle Commissions as main drivers of these projects, and reduce duplication of effort.
Status Implemented FY 2014-15	

Social Marketing Program for Alternative Transportation	City staff and volunteers implemented a social media campaign for active transportation in 2014 via the transportation division's Facebook and Twitter accounts.
Status Implemented FY 2014-15	Bicycle infrastructure improvements and campaigns to promote active transportation and commute alternatives to single occupancy vehicles were completed by the Bicycle and Transportation commissions and staff in 2014.

Planned Implementation FY2014-15

Consider Electric Vehicle Charging Stations	In 2014 the City won a grant, as part of a regional effort, for EV chargers. Appropriate accessible parking locations for the chargers have been identified and the City is working on estimates for the costs to run electrical conduit and enhanced electrical service to the selected locations. Although the cost of the chargers and the installation of the chargers are covered by the grant, the City will need to contribute approximately $30,000 to provide the conduit and electrical service upgrades required, and a small number of parking spaces will be lost as a result of accessibility requirements.
Status In Progress	

Recommended Next Steps of GHG Emission Reduction Strategies

This annual update and status report is intended to complete a high level analysis of the City's current GHG emissions and five year reduction strategies and identify new strategies for consideration over the next five years.

For FY2015-16 the City Council Approved $100,000 in the Capital Improvement Plan (CIP) for Climate Action Plan activities. These funds will be used to pursue the strategies listed in Figure $ for FY2015-16.

The next recommended steps include:

- City Council review the community and municipal GHG inventories for 2013 (above, accomplished at this meeting).
- Staff to continue to consider and implement strategies identified in the report through the annual Capital Improvement Plan and/or city budget process.
- EQC to advise staff and City Council regarding updates to the General Plan, which will facilitate GHG reductions in the near and long term.
- Staff to track statewide changes, such as Governor's Executive Orders, which impact the City's Climate Action Planning.

Appendix A – Previous Menlo Park Climate Action Planning City Council Reports

Council Report	Date	Action
07-075	5/1/2007	Adoption of a resolution appropriating $35,000 from the General Fund Reserve for consultant and staff costs to conduct a Greenhouse Gas Emissions Inventory and authorizing the City Manager to enter into a contract for $24,100 with ICLEI – Local Governments for Sustainability to conduct the inventory, and adoption of a resolution endorsing the U.S. Mayors Climate Protection Agreement, as modified. (Staff Report #07-075)
08-031	3/4/2008	Receipt of updates to the Menlo Park Greenhouse Gas Emissions Inventory Analysis; approval of a resolution authorizing the City Manager to execute a grant agreement in the amount of $25,000 with the Bay Area Air Quality Management District for developing a Climate Action Plan and to execute a contract in the amount of $30,600 with ICLEI-Local Governments for Sustainability to develop a Climate Action Plan; and appointment of a Council Member to the Core Team for planning. (Staff Report #08-031)
08-039	3/25/2008	Consideration of purchasing offset credit for Greenhouse Gas Emissions from City operations through the PG&E Climate Smart Program (Staff Report #08-039)
08-040	3/25/2008	Core Team for drafting the Climate Action Plan (Staff Report #08-040)
08-048	4/22/2008	Adopt the Climate Action Assessment Plan Report and authorize use of remaining funds from the Green@Home contract with Acterra to provide additional energy efficiency incentives that would increase Menlo Park's participation in the regional Energy Upgrade California Program (Staff report #11-128)
13-051	4/2/2013	Provide direction on the Climate Action Plan Update and Status Report, new measuring methodology for transportation greenhouse gas emissions, and a community greenhouse reduction target, and provide direction on funding in order to achieve target. (Staff report #13-051)
14-113	06/17/2014	Receive annual community greenhouse gas inventory information and approve updated five year Climate Action Plan strategy (Staff report #14-113)
14-115	06/17/2014	Approve a resolution authorizing the City Manager to execute an agreement with the Bay Area Climate Collaborative, ABM, and ChargePoint to install four electric vehicle charging stations in Menlo Park with grant funds from the California Energy Commission (Staff report #14-115)
14-178	10/07/2014	Approve a resolution making findings necessary to authorize an energy services contract for Power Purchase Agreements (PPA) at the Arrillaga Gymnasium, Arrillaga Gymnastics Center, Onetta Harris Center, and City Corporation Yard; authorize the City Attorney to finalize the agreement and authorize the City Manager to execute the agreement; and amend the existing consulting contract with Optony, Inc. to include construction management services (Staff report #14-178

Appendix B - City of Menlo Park Municipal Operations GHG Emissions

The City of Menlo Park conducted the following Municipal GHG Inventory in 2009, which showed an increase in GHG of 594 tons due to expansion of City infrastructure/facilities and changes in emissions factors. The 2009 Municipal Inventory has not been officially updated; however, the City has tracked information reflecting the municipal energy saving projects conducted with the support of PG&E. The projects which were completed in 2010 through 2013 provide a GHG savings of 100 tons (a number of additional projects were conducted; however, they were not counted in this calculation, because the year of completion has not been established).

In addition, the City Council has approved the following municipal energy-efficiency related projects, which are in progress, and are expected to save an additional amount of more than 578 tons of GHG:

October 2014:

- Project: Approved $64,272 in funding to install variable frequency drive systems at the Burgess Park and Belle Haven Park pools.

  Estimated annual CO2e reduction: 38 tons Status: in progress

- Project: Approved four Power Purchase Agreements (PPA) with Cupertino Electric as part of the Regional Renewable Energy Procurement Project (R-REP) with Alameda County to install solar PV systems on municipal buildings (rooftop and solar carport). Solar will be installed on the Arrillaga Family Gymnasium, Arrillaga Family Gymnastics Center, City Corporation Yard, and Onetta Harris Community Center.

  Estimated annual CO2e reduction: 419 tons Status: completion November 2015.

April 2015 (For the City's Administrative Building and Library):

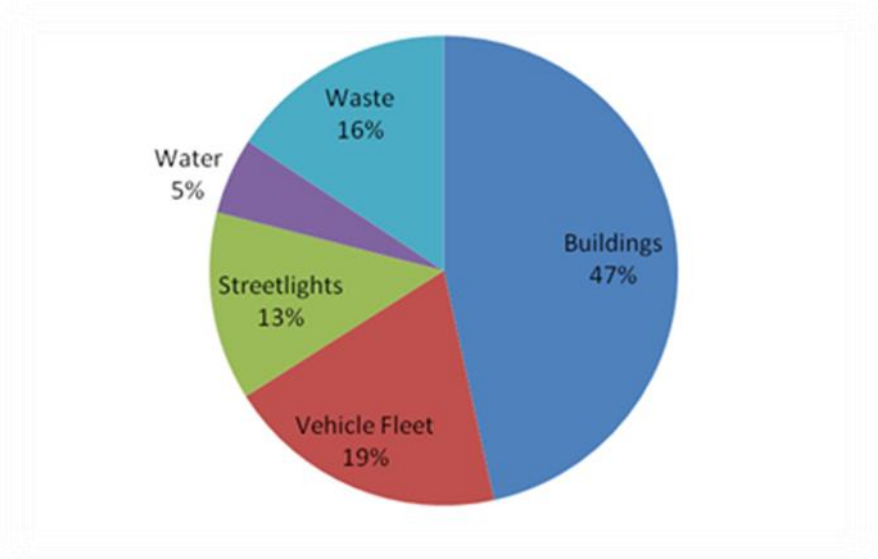
- Project: Approved $375,000 in funding to purchase a new Energy Monitoring System

  Estimated annual CO2e reduction: 120 lbs Status: in progress

- Project: Approved $606,160 in funding to purchase new chillers and variable frequency drives.

  Estimated annual CO2e reduction: 121 tons Status: Completed October 6, 2015

Municipal Operations Greenhouse Gas Emissions Inventory 2009 By Source (2,889 tons CO_2e)



Emissions from the City are embedded within the community-wide totals. Government operations are therefore a subset of total community emissions. In the year 2009, the City of Menlo Park's municipal operations generated 2,889 tons of CO_2e, which constitutes 0.004% of the community's total greenhouse gas emissions. This is a 25% increase compared to 2005 total emissions (2,305 tons).

Electricity and natural gas use in the City's buildings contributed to 47%, the vehicle fleet contributed 19% of this total, and the remainder of CO_2e came from streetlights, waste, and the electricity for pumping water and storm water.

Municipal Buildings - Electricity and natural gas use in the City's buildings contributed to 47% of CO2e from municipal operations. This is up 14% compared to City buildings contributing 33% of CO2e toward municipal operations in 2005. This increase can be attributed to a couple reasons; PG&E's greenhouse gas CO2 emission rates for electricity increased from KWh x (0.489 lbs/kWh / 2,204.6 lbs/metric ton) in 2005 to KWh x (0.641 lbs/kWh / 2,204.6 lbs/metric ton) in 2009. The increase in emissions rates means that each kWh consumed in 2009 contributed approximately 31.1% more CO2 than in 2005. Another reason for the increase in fuel and electricity consumption from municipal buildings is the construction of new buildings from 2005-2009.

Vehicle Fleet - In 2009, Menlo Park's municipal vehicle fleet is responsible for the second largest share of overall municipal emissions at 19%. Compared to 2005's 28.4%, this is a 9.4% reduction. Menlo Park's vehicle fleet consists of analyzing the fuel consumed by City vehicles and equipment, such as police vehicles, and the tractors used for landscaping

Streetlights - The energy consumed by the City's street lights accounted for 13% of municipal operations greenhouse gas emissions in 2009. This analysis included the energy consumed by streetlights, traffic signals, park lighting, decorative lights, and parking lot lights. Compared to 2005's 11.9%, this is a 1.1%

increase. This increase can be attributed to the addition of more streetlights, including signal cameras added throughout the city in 2008.

Water/Sewage - The emissions resulting from the energy used to pump water and waste water remained the same at 5% in 2005 and 2009. This analysis excludes pumping and treatment of wastewater that is carried out by the West Bay Sanitary District (WBSD), East Palo Alto Sanitary District (EPASD), and the South Bayside System Authority (SBSA).

Waste - In 2009, the relative contribution of landfilled waste from municipal operations to greenhouse gas emissions is 16%. Compared to landfilled waste contributing 20.8% to municipal operations in 2005, there is a 4.8% decrease. This decrease can be attributed to the reduction of solid waste sent to the landfill from year to year.

CITY OF
PALO ALTO

SUSTAINABILITY AND CLIMATE ACTION PLAN

Framework, Principles, Guidelines, Goals & Strategies

November 2016

FORWARD

We live in a time of challenge and change. The California economy, powered by the innovation engine of Silicon Valley, anchored in Palo Alto, has transformed the world. Companies like Google, Twitter, and Facebook have transformed the way we live and work. Now the world threatens to transform California. The drought—or, as some suggest, the "multi-decadal mega-drought"[1]—challenges not just our lawns, agriculture and hydroelectric power supplies, but the premise on which California civilization was built. Climate chaos may not devastate us the way that it threatens to devastate coastal regions from Bangladesh to south Florida, but heat, flooding and super storms will take their toll, and will take hundreds of billions of dollars to adapt to.

And yet… this cloud presents a silver lining. Perhaps a golden one. For in the challenge of responding to climate change, we find ourselves facing what Pogo called insurmountable opportunities, what those wild-eyed radicals at Goldman Sachs see as the massive economic opportunity of a new energy economy–once again anchored here.

We are called upon to lead. Many would say the United States has lagged in response to climate challenge, compared to Europe, or China, though President Obama's recent Executive Orders on emissions and energy has called the federal government to the challenge. Many would say that California has led in response to climate challenge–from revolutionizing utility regulation in the 1970s to driving the market for clean energy to our world-leading climate goals–now ratcheted up again by Governor Brown's recent Executive Orders on emissions, energy and water. Many would say that Palo Alto has been a leader in this process, with our early climate action plan, our carbon neutral electricity, and our actions to support green buildings and electric vehicles. Well, it's time for us to lead again, with a new sustainability and climate action plan that sets a new bar for leadership, that builds quality-of-life, prosperity and resilience for this community, and that sets an example once again for other communities to emulate.

We must understand and prepare for the risks ahead: climate change, with hotter and drier weather, combined with sea level rise and flooding; disruptions in resource flows and human migrations; the rise and collapse of companies and even industries; and the challenge of reinventing a way of life that was based on conditions that we may never see again.

This plan identifies a pathway to reduce our emissions 80% by 2030. Governor Brown has proposed 40% emissions reductions for California by 2030. Palo Alto is already at 36%. But achieving that next 40% will not be easy, since it will require transforming transportation and dramatically reducing the climate impact of our use of natural gas for heating our buildings and water.

Because we can do this. Here.

[1] http://www.climatecentral.org/news/is-the-wests-dry-spell-really-a-megadrought-16824

INTRODUCTION

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

While cities around the world ratchet up their own sustainability initiatives, Palo Alto will need to act boldly in order to maintain its legendary leadership position—and to ensure the wellbeing of this community in the face of the challenges ahead.

In the nine years since Palo Alto created one of the first climate protection plans in United States, the world has gotten hotter, the west has gotten dryer, and more cities have stepped into the ranks of climate leadership.

Palo Alto is poised to take the next step in climate and sustainability leadership. The Sustainability and Climate Action Plan (S/CAP) is Palo Alto's ambitious plan to create a prosperous, resilient city for all residents. To support Palo Alto's leadership position on climate protection, the S/CAP provides a roadmap for how the City will continue its environmental stewardship, and exceed state requirements for greenhouse gas (GHG) emission reductions.

The Framework is intended as a strategic plan that sets direction and overall goals, suggests initial priority actions and proposes high-level implementation pathways to achieve them. This document—a subset of the draft S/CAP presented to Council in April—provides the overall strategic framework for the SCAP, including goals, key strategic initiatives to meet those goals, and principles, guidelines and criteria to guide Council, staff and community in the development of implementation plans to fulfill these goals. Staff will bring initial 2016-2020 implementation plans—including both actions from the April draft that have been removed from this Framework, and additional actions that have been developed by staff teams over the last six months—to Council for view and action in the coming months.

The S/CAP presents a scenario, not a prediction. It presents a clear direction—move rapidly toward deep de-carbonization through a suggested portfolio of measures that show net positive financial benefit, and an estimate of the upfront investment required to generate those benefits. The specific measures, rates of adoption and impacts presented here are best estimates based on currently available information in a rapidly changing technology landscape; in order to be agile, adaptive and effective in the face of these changes, Palo Alto will update the S/CAP every five years, and develop more granular five-year work plans and short-term programs, rather than attempt to build a detailed 14-year work plan.

The time to act is now. In this new climate action plan, we identify a roadmap to move from carbon neutral electricity to a carbon neutral utility—and ultimately towards a carbon neutral city.

A ROADMAP:
TOWARD A CARBON NEUTRAL CITY

Palo Alto's Greenhouse Gas Baseline and Trends

By 2015, Palo Alto had already reduced GHG emissions an estimated 36% since 1990[2]—a remarkable achievement in 24 years, with most of it accomplished in the ten years since 2005—largely as a result of the leadership of Palo Alto Utilities and the City Council's 2013 commitment to carbon neutral electricity. Palo Alto's largest remaining sources of greenhouse gas emissions are road transportation (approximately 65%) followed by natural gas use (approximately 26%). **Figure 2** illustrates this trend, and Figure 3 provides another view of the relative size of Palo Alto's emissions sources in 2015.

The estimated 36% GHG reductions to date were achieved through building efficiency measures and introduction of carbon neutral electricity (as well as societal trends such as more efficient appliances, not shown explicitly here). Over the next 13 years, a variety of external trends (designated in this Plan as "business as usual 1" or BAU1), 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 2030[3]—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—provided Council maintains support for existing programs and approves these programs when they come before them. This reflects Palo Alto's longstanding commitment and initiatives already underway to drive deep carbon reductions ahead of the state or those being pursued by most other cities. Even though these Palo Alto plans are both aggressive and innovative, for the purpose of this report we categorize them as "business as usual "—since these efforts are already in the queue.

The additional GHG reduction between those already "in-the-pipeline" reductions and the 80% reduction target for 2030 is about 224,600 MT CO2e[4], and is Palo Alto's target "GHG reduction budget." The Draft 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 CO2e, or 4% from continuation and extension of Palo Alto's zero waste initiatives. The Draft S/CAP also proposes other sustainability measure that don't have direct or easy to determine GHG impacts but that are important for other reasons, such as water sustainability, health of the natural environment and community resilience.

[2] Palo Alto emissions in the 1990 baseline year are estimated at 780,119 MTCO2e, 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 measured. Transportation emissions are modeled every few years; solid waste related emissions are calculated using established EPA protocols. Solid waste related emissions were not included in the CompPlan DEIR.

[3] Based on the "business as usual" analysis conducted for the CompPlan DEIR.

[4] MT CO2e = metric tons of CO2 equivalent

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

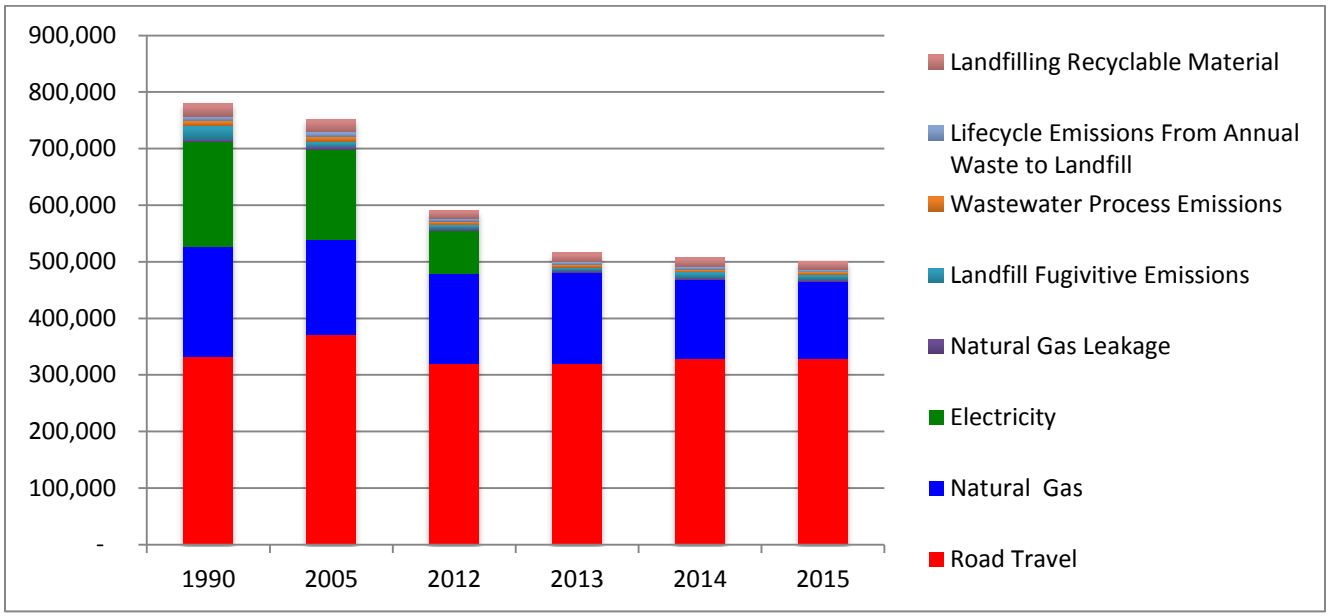
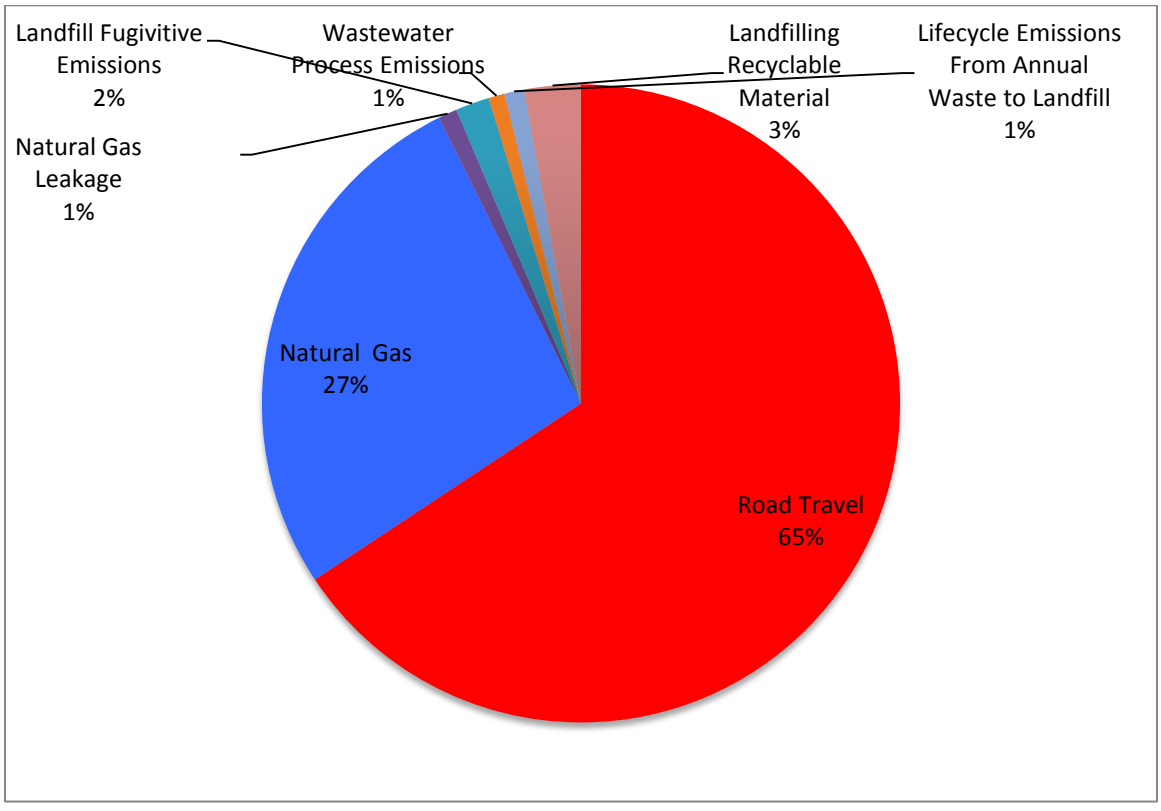
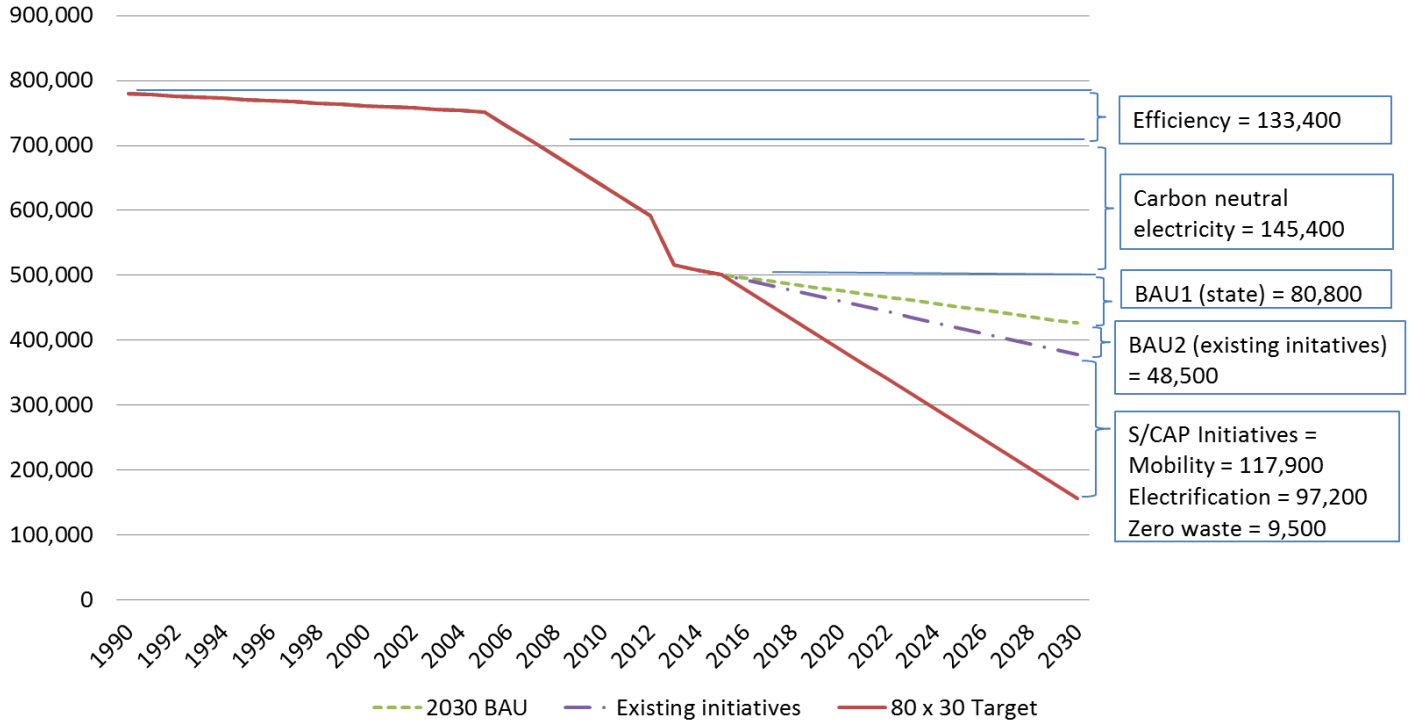


Figure 2. Palo Alto 2015 Community-wide GHG Emissions Sectors



A detailed emissions analysis can be found in Appendix D.

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

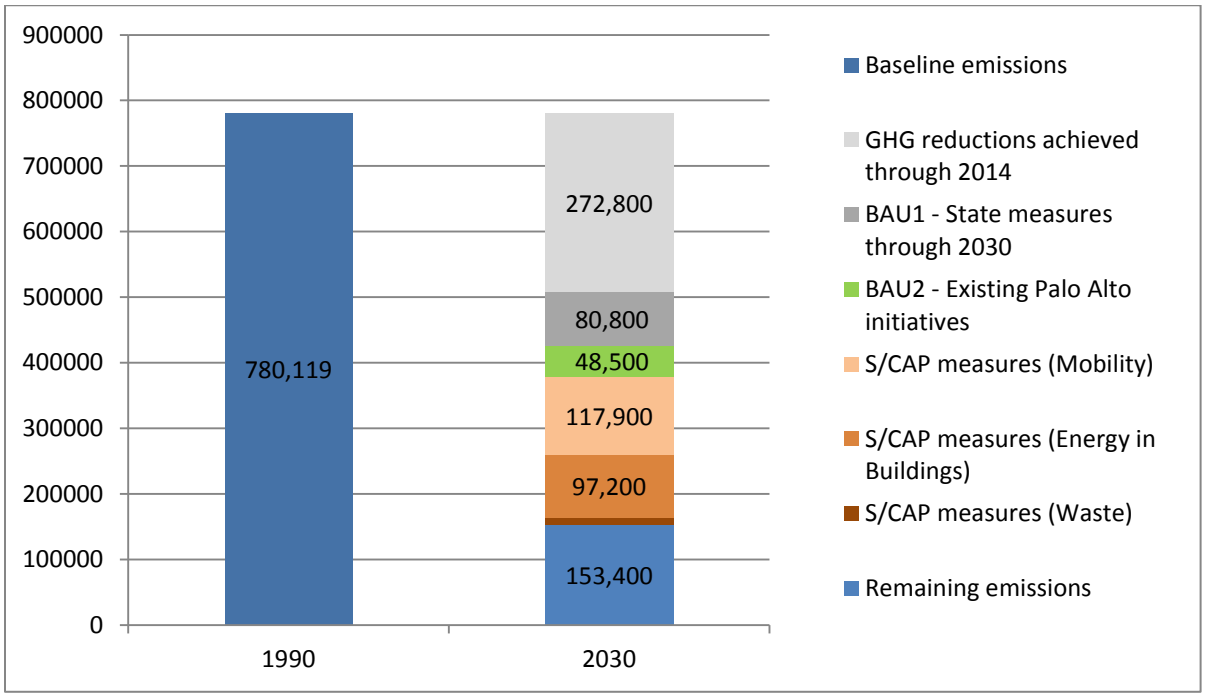


A Roadmap for "80 x 30"

Palo Alto has substantially exceeded the 20% reduction goals set by Council in 2007 Climate Protection Plan, and is positioned to establish new goals for Palo Alto to continue its global leadership, commit to a low- or zero-carbon future, and create a roadmap to that future.

This plan focuses on pathways to a low-carbon future, and initiatives addressing water, green infrastructure, adaptation and regeneration as part of a holistic framework for sustainability. Specifically, it contains Goals and Strategies for reducing Palo Alto's GHG emissions from the current level of 36% 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 260,000 tons (as shown in Figure 5 and detailed below), and will be possible only if Palo Alto continues its longstanding commitment to sustainability and if a number of assumptions that are outside the City's control come to fruition.

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



Reducing greenhouse gas emissions in order to avoid potentially catastrophic climate change is a key driver for the S/CAP, but it is not the only indicator for sustainability. Therefore, the S/CAP is organized around seven 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. These are summarized below, and described in more detail in the chapters that follow.

Chapters for Sustainability and Climate Action

S/CAP's Goals and Strategies for GHG reduction are summarized here:

- **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 systems[5] 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**
    - 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:**

[5] See analysis of electrification strategies, Staff Report 5971, August 2015

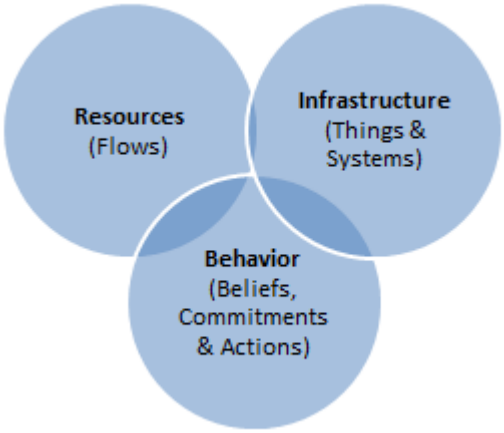
- ***Advance "smart city" platforms*** for transportation, utilities, buildings, operations, finance, etc.
- Provide ***transparent reporting and open data*** to track performance, build knowledge and fuel innovation

- **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.

These measures will require strategies that address three domains of action (shown in **Figure 5**), all of which are critical to realizing the sustainability vision:

- institutions that form the structure of policies and programs,
- behavioral change to modify mindsets and personal actions, and
- financial considerations that drive markets.

Figure 5. S/CAP Three Domains of Action



A few core moves

Palo Alto's sustainability strategies ultimately rely on a few "core moves" for reducing impact on the environment and GHG emissions, and doing so in ways that improve the quality of life of our community:

- Reducing resource use, for example through energy efficiency measures;
- Shifting resource use impacts, for example by electrification;
- Transforming systems, for example by outcompeting single occupancy driving with mobility services.

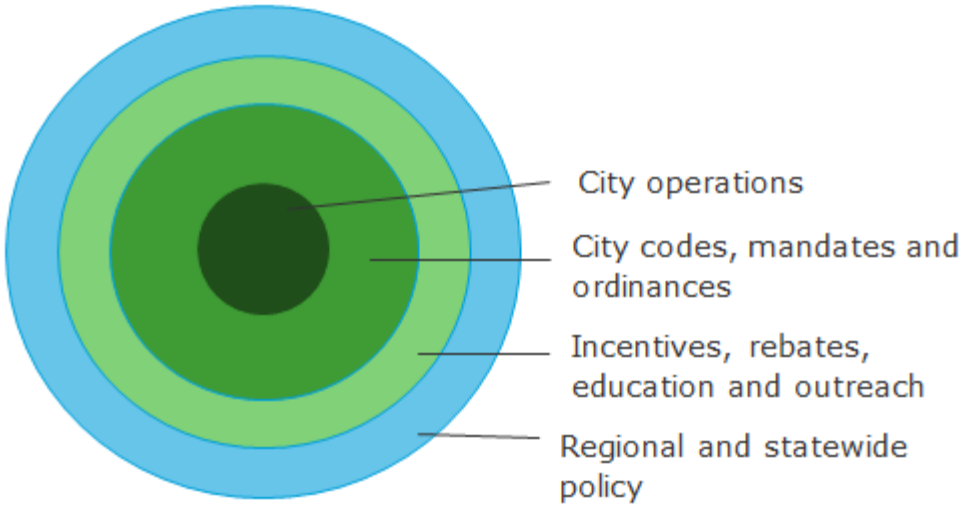
- Energy efficiency
- Water conservation
- Walking/biking instead of driving
- Zero waste
- Convert to electric vehicles
- Electrify water and space heating
- Greywater or rainwater instead of potable water
- Mobility as a Service instead of individual car ownership
- Walkable/bikeable neighborhoods and Transit-oriented development
- Utility of the Future

Zones of Control and Influence

Palo Alto's ability to enact these core moves throughout the community is embedded within a regional, state and global context of regulatory and jurisdictional boundaries. **Figure 6** illustrates Palo Alto's levels of control and influence.

- City government has control over its own operations, including municipal buildings, fleet, procurement and service delivery—for example, environmentally preferable purchasing.
- It can establish policies, codes, mandates, regulations and standards that drive the GHG emissions reductions of our residents and workforce—for example, our photovoltaic (PV) readiness requirements for new construction and major renovations.
- It can influence community behavior through education, outreach and voluntary programs—such as CPAU's incentive programs.
- And it can work with neighboring jurisdictions and regional authorities to develop collaborative initiatives—such as regional transportation initiatives— and to influence regional, state and national policy.

Figure 6. Palo Alto Jurisdictional Influence and Control



Levers, Goals, Strategies and Actions

Figure 7 presents the key components of Palo Alto's path to further GHG reductions:

- The primary levers with which we can shift emission trends
- The goals we will establish to activate those levers
- The strategies and actions by which we will achieve those goals

Figure 8 summarizes the emissions reduction potential of the proposed strategies, and the key players responsible for implementation, and **Figure 9** shows this summary by goal. For several strategies, Palo Alto will need to work with regional and state entities to advocate for policies and programs to support Palo Alto efforts and initiatives. The levers, goals, strategies and actions are based on Palo Alto's baseline emissions sources, existing and planned initiatives and a literature review of best practices for city climate action planning for effective new GHG reduction opportunities. (Note: Not all the strategies and actions in this Plan are summarized here, since some don't have direct GHG reduction impacts, or those impacts are impossible to estimate at this time.)

Figure 7. Overview of 3 Key Levers, Goals and Strategies for GHG Reductions

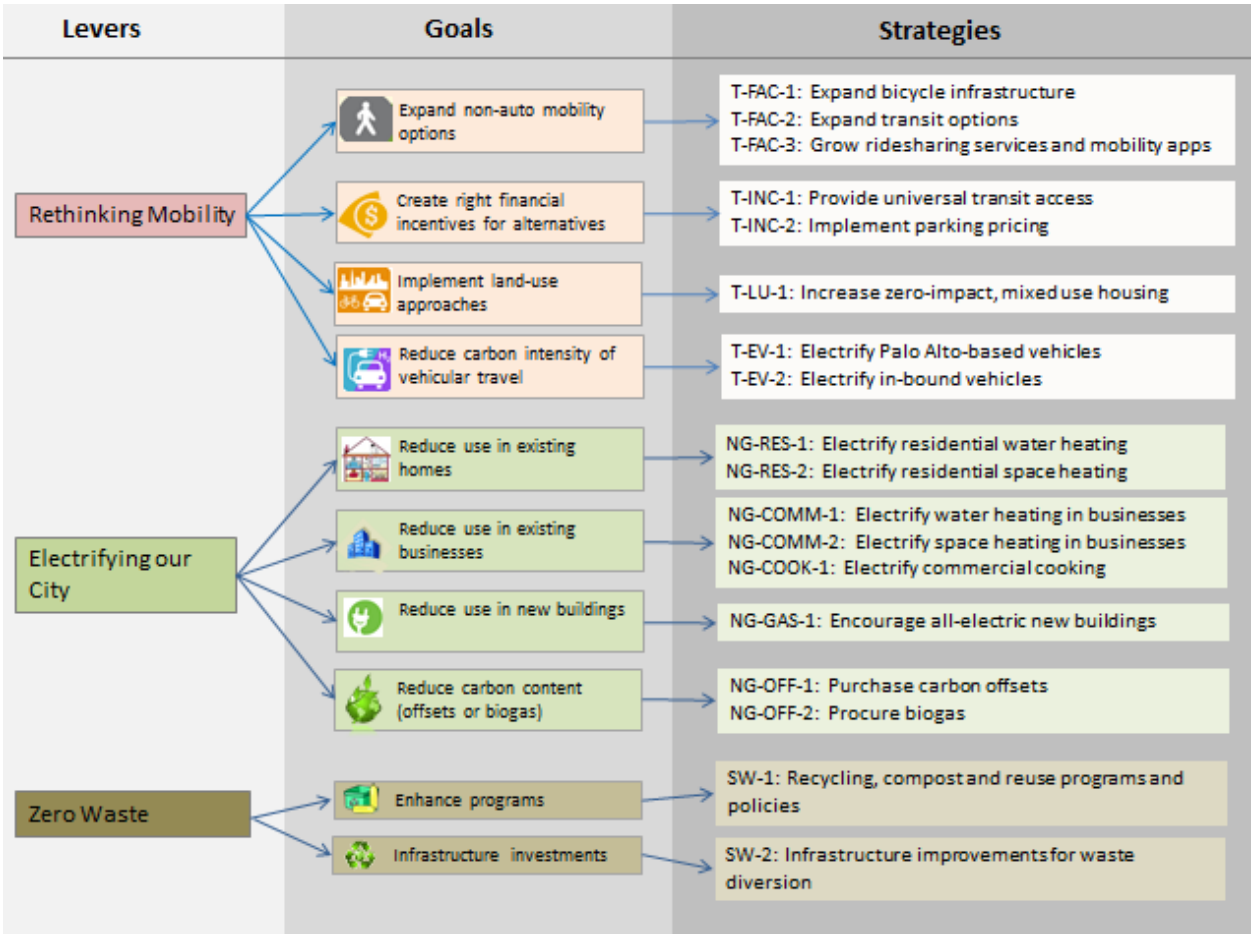
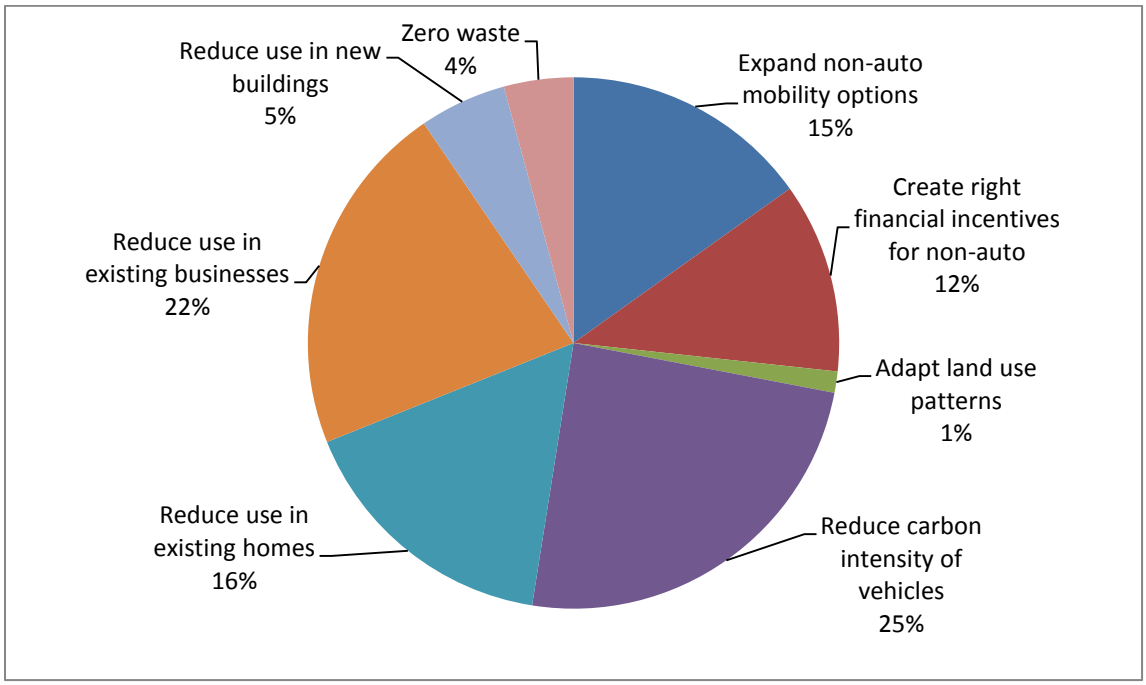


Figure 8. S/CAP Strategies to Achieve 80 x 30 Goal[6]

Levers	Goals	Strategy	Jurisdiction PA = Palo Alto R = Regional S = State	GHG Avoided in 2030 (MT CO2e)	Percent of Total S/CAP Emissions Reductions	Percent of Reductions from 1990 Baseline
Rethinking Mobility	Expand non-auto mobility options	T-FAC-1. Expand bicycle infrastructure	PA	8,400	4%	1%
		T-FAC-2. Expand transit options	PA, R	19,200	9%	2%
		T-FAC-3. Grow ridesharing services and mobility apps	PA	6,400	3%	1%
	Create right financial incentives	T-INC-1. Provide universal transit passes	PA	7,600	3%	1%
		T-INC-2. Implement parking pricing and feebates	PA	18,400	8%	2%
	Adapt land use patterns	T-LU-1. Increase zero-impact, mixed use housing	PA	2,900	1%	0.5%
	Reduce carbon intensity of vehicles	T-EV-1. Electrify Palo Alto-based vehicles	PA	25,200	11%	3%
		T-EV-2. Electrify inbound vehicles	PA, R	29,800	13%	4%
Electrifying our City	Reduce use in existing businesses	NG-COMM-1. Electrify water heating in businesses	PA, S	21,200	9%	3%
		NG-COMM-2. Electrify space heating in businesses	PA, S	15,900	7%	2%
		NG-COOK-1. Electrify commercial cooking	PA, S	11,300	5%	1%
	Reduce use in existing homes	NG-RES-1. Electrify residential water heating	PA, S	13,600	6%	2%
		NG-RES-2. Electrify residential space heating	PA, S	23,300	10%	3%
	Reduce use in new buildings	NG-GAS-1. Encourage all-electric new buildings	PA, S	11,900	5%	2%
Zero Waste	Enhance programs and infrastructure	SW-1. Achieve zero waste	PA	9,500	4%	2%
TOTAL				224,600	100%	29%

[6] The figures in this table are *estimates* based on staff and consultant analyses of the estimated GHG reductions from each strategy. These estimates are built on documented assumptions, and are subject to many factors (including technology and costs) that could change over the 2030 horizon.

Figure 9. Summary of Anticipated S/CAP Emissions Reductions



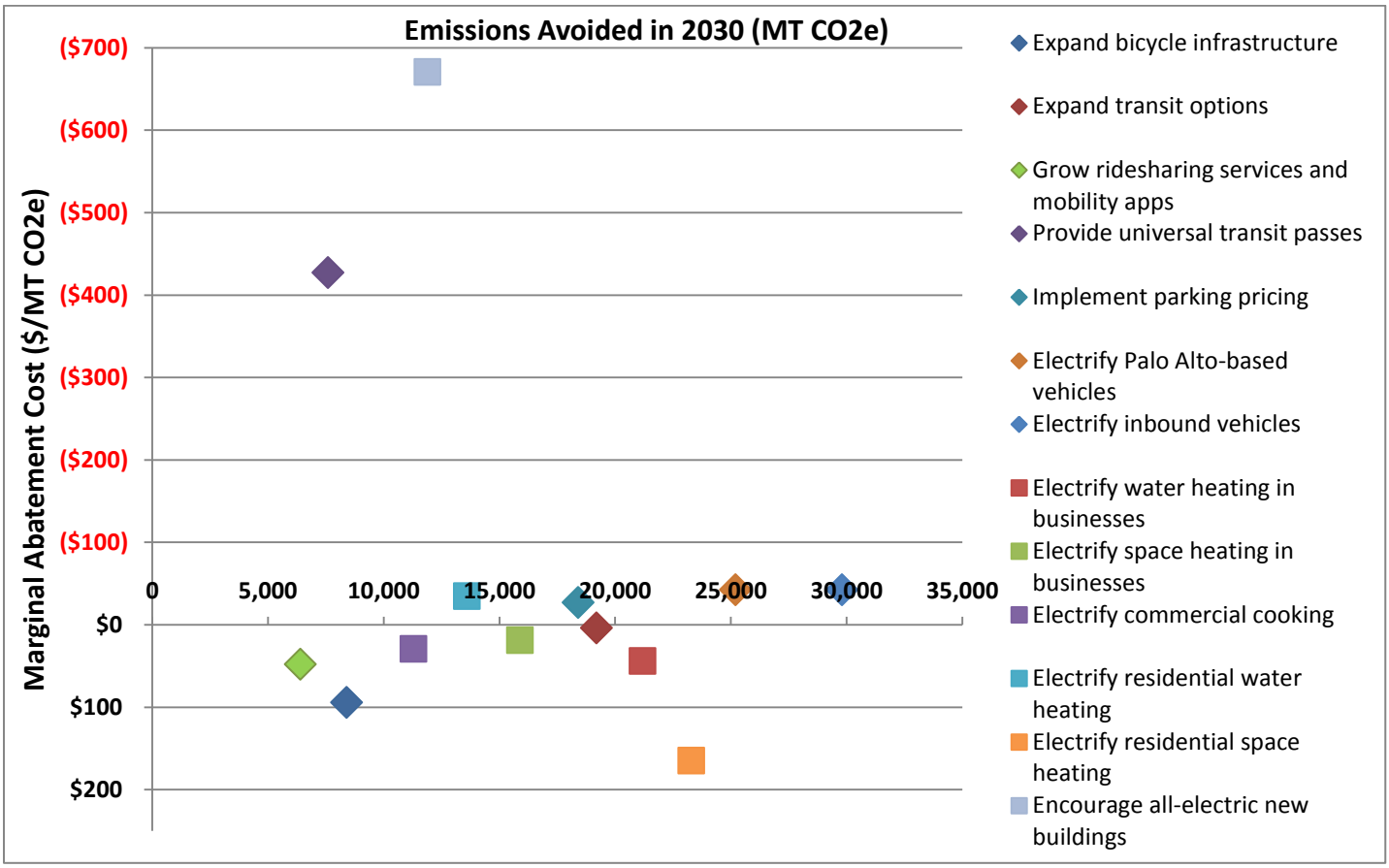
Key assumptions

The key assumptions underlying the projections for the impacts of these initiatives are shown in Table 8. Some are controversial, but will hopefully provoke a grounded exploration of options and consequences.[7] Many are ambitious, and will require rapid rates of uptake of new technologies. For example, S/CAP projects that 90% of vehicles owned in Palo Alto will be EVs by 2030. Is that possible? We don't know, given that the State projects only 30%. More useful questions might be "What measures could we undertake to accelerate that change, or to take advantage of potential market changes that move more quickly than projected (as we have seen for years with PVs, EVs and other technologies)?" and "What policies could we pursue that might eliminate barriers that would otherwise hinder the rapid expansion and proliferation of Electric Vehicles in Palo Alto?"

The relative GHG reduction impacts (in metric Tons CO2e) and associated "mitigation costs" (in $/mT) are shown in Figure 10. (The measures further to the right indicate greater impact; the measures higher on the chart indicate more favorable economics.)

[7] Note that in all these scenarios, reductions are partially driven by factors outside our control, including Federal and state policy, legal and regulatory constraints, cost-effectiveness of measures and technology, the pace of technology innovation, and behavioral changes by our population. In this way, the S/CAP may be similar to California Air Resources Board's (CARB's) update to the State's scoping plan, which suggests that near-term actions and targets need to be specific, quantifiable, and within an agency's control, while longer term actions and targets may require changes in technology and/or actions by others, and could be less precise. It should be noted, however, that the Draft S/CAP in some cases builds on the assumptions in the State's Scoping Plan, suggesting – for example – that the City seek to achieve a level of Electrical Vehicle (EV) ownership (for residents and commuters) three times what the CARB is targeting state-wide for 2030.

Figure 10. Prioritizing Actions by GHG Impact & Mitigation Cost[8]



The Power of "Unreasonable" Goals

The SCAP goals are ambitious, as called for by the Paris climate agreement. They also may be uniquely achievable by Palo Alto, because of the city's significant head start, its carbon neutral electricity platform and its control of Palo Alto Utilities. They are in any event not certain to be successfully accomplished, since they depend on many variables, both within our control—such as the desirability of CPAU services and incentives and the effectiveness of City programs—and many factors outside our control—such as the pace of price/performance improvement of electric vehicles and the effectiveness of State climate programs.

Despite that uncertainty, stretch goals drive innovation better than safe ones. Setting a big goal and perhaps not fully reaching will likely get us farther than setting a safe goal and reaching it, especially in a time of rapid change. Our key question should not be "Are we confident we can achieve it?" No one knows if ambitious climate goals are achievable, based on today's knowhow and experience; Johanna Partin, Director of the Carbon Neutral Cities Alliance, observes that "most of the CNCA cities…have a pretty good sense of how they're going to get to somewhere between 25-70% of their target by 2020/25/30, but no one yet knows exactly how they're going to get to 100% of their goal." We only know that we must do our best to find ways to achieve them.

Better questions might be: Is the goal worthy? Is the strategic direction right? Are the first steps right? If so, then let's get going, and re-evaluate goals and progress in five years; let's support proposed goals with bottom up

[8] This chart presents a synthesis of staff and consultant analyses of the "marginal abatement costs" of key GHG reduction strategies, based in the estimated GHG reductions from each strategy and the estimated investments that would be required to achieve them.

analyses, assessing "what combination of measures might make it possible to meet that specific goal?" As General (and later, President) Dwight D. Eisenhower observed, “Plans are useless. Planning is essential.”

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.”[9]

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.
- 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

In both evaluating this S/CAP, and in developing and evaluating future programs guided by it, Palo Alto is guided by these 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

In selecting specific programs and policies to pursue, and in allocating public resources to support them, Palo Alto will be guided by these decision criteria:

[9] http://www.paloaltocompplan.org/plan-contents/governance-element/

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

Overarching Policies and Legal Issues

The proposals set forth in the draft S/CAP will need to be specifically analyzed in the context of applicable local, state and federal legal requirements, policy tradeoffs, budget and cost considerations, technological feasibility and economic impacts to the City prior to any adoption. Implementation of any of the new policies and programs described in the draft S/CAP will also be subject to the same considerations, as determined periodically by the Palo Alto City Council, and will continue to take into account existing local, state, and federal laws, regulations, and programs to avoid unnecessary duplication, minimize uncertainty, and maximize predictability.

Measures presented here constitute a preliminary menu of options for Council to consider as potential methods for achieving greenhouse gas reduction goals adopted by Council; the proposals set forth in the draft S/CAP are for discussion and the City of Palo Alto.

1. MOBILITY

Road transportation represents about 61% of Palo Alto's carbon footprint—and a congestion headache for everyone. Palo Alto's existing Comprehensive Plan calls for reducing reliance on the automobile, and we've made some progress, with reductions in commute trips by Single Occupant Vehicles (SOV) from 75% to 62% between 2000 and 2014 and to 55% for commuters to Downtown. We've also dramatically reduced car trips to Palo Alto schools, with 44% of high school students commuting by bicycle. Beyond our borders, federal CAFE standards have reduced the carbon intensity of the US vehicle fleet. But congestion continues unabated, and the majority of Palo Altans, and commuters to Palo Alto still make SOV trips in fossil fuel powered vehicles.

GHGs from road travel are a function of two factors: Vehicle Miles Traveled (VMT), and the carbon intensity of that travel (GHG/VMT). Reducing GHG/VMT is largely a function of vehicle technology, driven for example by Federal CAFE standards, state policy, improved fuel efficiency, electrification and customer adoption. Most of these factors are outside the purview of cities, but Palo Alto has some ways to influence VMT, by developing attractive alternatives to SOV trips, and GHG/VMT, largely by encouraging electrification of City, resident and commuter fleets.

Traditional approaches to transportation—adding capacity by building roads and parking—send the wrong signals, encourage SOV travel and add pain. But what if we asked a different question: **How could we make it more convenient for anyone, anywhere, anytime to not have to get into a car and drive?**

The key tools the City has for doing so include:

- Optimizing transit
- Electrifying Vehicles
- Incentivizing People to change their travel modes
- Integrating Transportation Network Companies (TNCs) and Autonomous Vehicles
- Implementing land use policies that support these shifts.

TDM/TMA: The City supports a number of emerging transportation demand management (TDM) initiatives including its first Transportation Management Association (TMA), which will develop, manage, and market transportation programs to reduce single occupancy vehicle trips in the Downtown Core area. The Comprehensive Plan Update also provides an opportunity to establish policies that outline when TDM should be applied and programs that specify how compliance will be periodically measured and enforced. TDM plans for individual development projects can establish TDM requirements and set enforceable SOV mode-share targets. TDM plans would establish a list of acceptable TDM measures that include transit use, prepaid transit passes, commuter checks, car sharing, carpooling, parking cash-out, bicycling, walking, and education and outreach to support the use of these modes. They should provide a system for incorporating alternative measures as new ideas for TDM are developed.

1.1 Goal: Expand non-auto mobility options

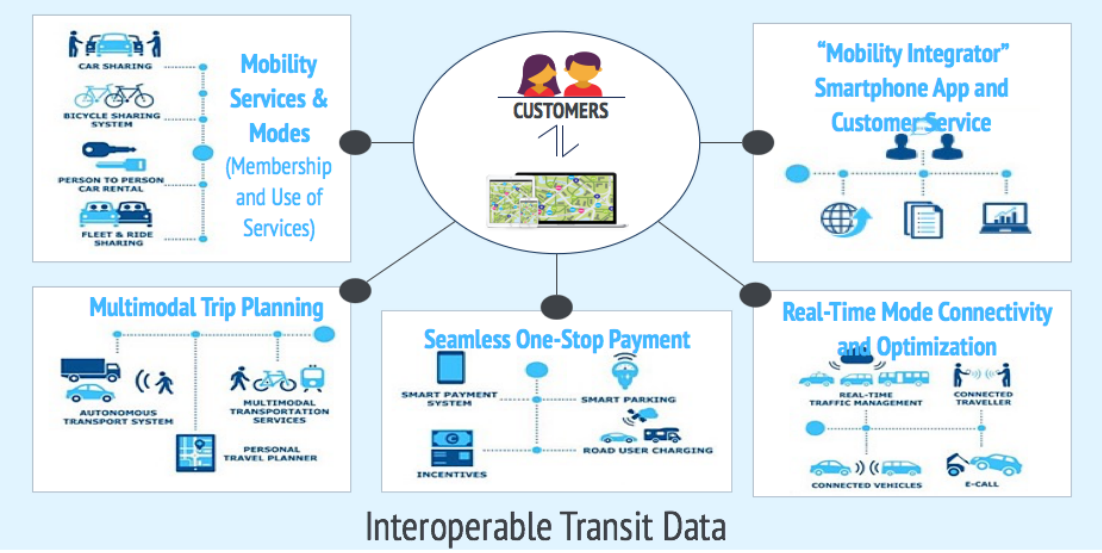
This goal focuses on improving alternative modes of transportation to support non-automobile based mobility. The key: making it more convenient for anyone, anywhere, at any time, not *have* to drive by

- Expanding existing initiatives (such as bike infrastructure)
- Targeting specific populations with relevant non-SOV services that they can afford
- Developing advanced, software-based solutions (MaaS)
- Continually tracking performance of these programs overtime

"Mobility as a Service" (MaaS) is an integrative approach that proposes to shift the traditional focus from fixed transportation to flexible, responsive transportation services designed to meet people's diverse and changing needs

by providing seamless regional multi-modal mobility services, including improved transit, and bike share; dynamic, on-demand shuttles; flexible first & last mile solutions; walkable/bikeable communities; and smart apps that provide convenient access to all of these.

Figure 11. Mobility as a Service (MaaS) Schematic



Source: Finland Ministry of Transport and Communications & Rocky Mountain Institute

Strategy	2030 Target	2030 GHG Emissions Reduction
T-FAC-1. Expand bicycle infrastructure	Increase bike boulevard miles to 26 miles Increase bike mode share, including work commute trips, from 7% to 25%	8,400 MTCO2e
T-FAC-2. Expand transit options	Increase transit ridership by 60%	19,200 MTCO2e
T-FAC-3. Grow ridesharing services and mobility apps	Increase in rideshare mode	6,400 MTCO2e

1.1.1 Strategy: Expand bicycle infrastructure (T-FAC-1)

1.1.2 Strategy: Expand transit options (T-FAC-2

1.1.3 Strategy: Grow ridesharing services and mobility apps (T-FAC-3)

1.2 Goal: Create the right incentives for mobility

Despite the goal in Palo Alto's 1998 Comprehensive Plan to reduce dependence on the private automobile, the City provides free parking in public lots and garages—thus incentivizing driving to the tune for $3600/year[10]—and has plans to build additional parking capacity. Instead, Palo Alto will identify ways (starting with a paid parking study this spring) to phase out automobile subsidies by charging for parking—ideally in coordination with neighboring jurisdictions—and investing the proceeds (as Stanford has successfully done[11]) in alternatives like transit, bicycle infrastructure, ride sharing, walkable neighborhoods, etc.

Strategy	2030 Target	2030 GHG Emissions Reduction
T-INC-1. Provide universal transit passes	75% of residents and employees have universal transit passes	7,600 MTC02e
T-INC-2. Implement parking pricing	100% of City sites and 50% of private sites have parking pricing	18,400 MTCO2e

1.2.1 Strategy: Provide universal transit access (T-INC-1)

1.2.2 Strategy: Implement parking pricing (T-INC-2)

1.3 Goal: Seek balanced development

Palo Alto can potentially reduce commute-related VMT though development patterns that support shorter commutes and complete neighborhoods, by enabling people to live closer to where they work. This is a sensitive and controversial topic, but its impact is so significant that it must be included here, and discussed and resolved in the community.

Palo Alto has long had an imbalance between jobs and housing, with almost three times as many jobs and employed residents in 2014. This imbalance between jobs and employed residents contributes to local and regional traffic, greenhouse gas emissions, and other impacts, as some workers travel long distances between their residence and workplace. The imbalance is projected to grow if the City does not take affirmative steps to address the issue through the Comprehensive Plan Update. These steps could include:

- Increased housing densities
- Increased areas under existing maximum zoning rules
- Additional regulation of employment densities
- Additional commercial downzoning

This strategy would include adopting a land use and transportation scenario to enable additional growth and development in transit accessible areas, *provided that all such development was designed for low traffic/energy/carbon/water impact* and would be approved only with an integral plan resulting in no in no net increase in vehicle trips to/from Palo Alto. (Mitigation Measure Trans1a in the Comprehensive Plan EIR would provide this type of requirement.)

[10] Amortized cost of providing parking spaces at investment of ~$60,000 per space.

[11] Stanford's program has reduced SOV rates from 72% to 42%, and avoided $107 in capital expenditures for parking structures that were no longer needed. See, for example, http://bit.ly/1RCmSS2

Strategy	2030 Target	2030 GHG Emissions Reduction
T-LU-1. Develop zero-impact, mixed-use housing	Target 2.95 jobs-housing ratio[12]	2,900 MTCO2e

1.3.1 Strategy: Increase zero-impact, mixed-use, "transit-oriented" housing (T-LU-1)

1.4 Goal: Reduce the carbon intensity of vehicular travel

Vehicle Trip Cap:

Mountain View sets *maximum* parking requirements and eliminates minimum off-street requirements, and targets 30-45% single-occupancy vehicle mode share, depending on the density of employment within buildings. One employer faces penalties of $100K for each 1% over the cap. Similar caps are in place in Sunnyvale, Menlo Park and Cupertino.

A mitigation measure in the Comp Plan Draft EIR suggests a similar approach, requiring aggressive TDM plans, with quantitative performance measures and enforcement, as well as requirements to off-set any new trips that cannot be reduced through TDM.

Expanding the percentage of trips taken in EVs would have the largest impact on emissions from road transportation, which is in turn the largest category of Palo Alto emissions. Since the city's electricity is 100% from renewable resources, taking steps to encourage all new vehicles purchased to be EVs or other zero emissions technology would significantly reduce emissions associated with on-road vehicles.

Palo Alto already has one of the highest rates of EV ownership in the country (estimated by staff at 3-4% of registered vehicles), but several factors limit EV adoption, including price (which is dropping rapidly), total cost of ownership (often poorly understood), and vehicle performance— especially "range anxiety."

Initiatives to overcome these barriers, and keep Palo Alto's EV adoption well ahead of the State's aggressive goals, could include: public education, target incentives and charging infrastructure development.

Based on the ratio of jobs to employed residents and an analysis of VMT, approximately 93% of Palo Alto's transportation-related emissions are estimated to be related to trips into or out of Palo Alto for work, shopping and other purposes (i.e. the VMT is not associated with trips that are internal to Palo Alto). An estimated 78% of the total vehicle trips have origins or destinations external to Palo Alto. [13]

Strategy	2030 Target	2030 GHG Emissions Reduction
T-EV-1. Electrify Palo Alto-based vehicles	90% of vehicles in Palo Alto are zero emission	22,900 MTCO2e

[12]This jobs-housing ratio is expressed as the ratio between jobs and employed residents. Staff has analyzed the GHG impacts of various job housing ratios. We have included a moderately aggressive option here, recognizing that Council will determine appropriate targets; the alternate scenarios are available for Council's consideration.

[13] Estimated 95,742 jobs and 34,428 employed residents. (Source: 2016 Official City Data Set.) Estimates of Internal, Internal-External, and External-Internal VMT and vehicle trips are from the Comp Plan Draft EIR p. 4.13-45. S/CAP allocates road emissions differently than the CompPlan analysis, where emissions from all trips, which are assumed to be round trips, are equally split between inbound and outbound. Since potential strategies available to Palo Alto to affect those trips are different for inbound vehicles than for those based in Palo Alto, the S/CAP allocates these emissions based on trip origination.

T-EV-2. Electrify inbound vehicles	50% of inbound vehicles (non-Palo Alto based) are zero emission	27,000 MTCO2e

1.4.1 Strategy: Explore ways to expand charging infrastructure across Palo Alto (T-EV-0)

1.4.2 Strategy: Electrify and decarbonize Palo Alto-based vehicles (T-EV-1)

1.4.3 Strategy: Electrify and decarbonize inbound vehicles (T-EV-2)

2. BUILDING ENERGY, EFFICIENCY and ELECTRIFICATION

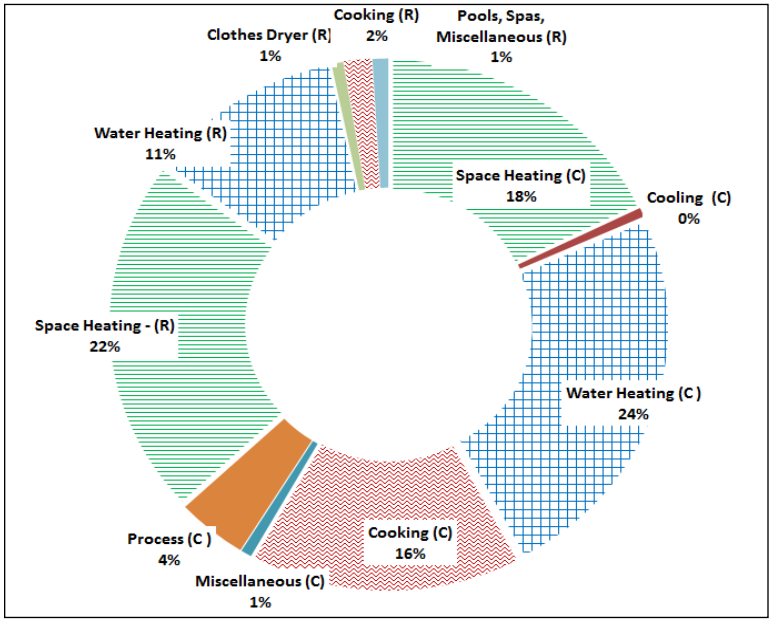
Palo Alto has made remarkable progress in advancing energy efficiency, through CPAU's incentive programs and the City's nation-leading Green Building Ordinances and Energy Reach Codes, and in decarbonizing its electricity sector, through CPAU's carbon neutral electricity (CNE) initiative, which is largely responsible for Palo Alto's remarkable 36% GHG emissions reduction to date. The CNE Resource Plan, adopted in 2013, directed CPAU to eliminate fossil-generated electricity by (1) expanding purchases of long-term renewable energy contracts to about half of Palo Alto's electricity needs by 2017, (2) relying on existing carbon-free hydroelectric resources for the other half of electric supply needs, and (3) purchasing short-term renewable resources and/or renewable energy credits (RECs) to counterbalance emissions from remaining "brown" or "market power purchases until those long-term renewable energy contracts are in the place.

Emissions from natural gas use currently represent ~25% of Palo Alto's remaining carbon footprint.[14] CNE opens to opportunity reduce natural gas use through electrification—"fuel switching" various natural gas uses to electricity—in addition to continued efficiency measures.

The vast majority of natural gas usage is related to today's building stock (existing buildings), with commercial and industrial buildings accounting for 63% of natural gas usage in the City. Palo Alto will first seek to reduce natural gas usage through energy efficiency and conservation, followed by electrification of water heating, space heating and cooking where cost effective. Figure 12 illustrates the estimated distribution of natural gas usage in Palo Alto.

[14] Natural Gas (i.e., methane) is a potent greenhouse gas, with a global warming potential (GWP) at least 23 times that of CO2. Recent research suggests that the climate impacts may be 80-100% higher.

Figure 132: Summary of Natural Gas Usage in Palo Alto Buildings



The S/CAP roadmap is based on six leverage points:

- *Tenant improvement pathway:* energy efficiency upgrades, and electrification requirements
- *Voluntary retrofit pathway:* Palo Alto Utilities incentive programs (point-of-sale/distributors and contractors), education/outreach
- *Predictive failure analysis:* to anticipate potential equipment replacement opportunities…
- *Replace-on-burnout:* develop programs to quickly retrofit with efficient electric equipment, particularly for small businesses.
- *Time-of-sale pathway:* energy efficiency upgrades and electrification requirements
- *Institutional pathway:* removing barriers by streamlining permitting, advocating at the state level to address California Energy Commission (CEC) requirements for cost-effectiveness (so we can require electric equipment), making it easier to "do the right thing" (service and convenience)

2.1 Goal: Reduce GHG emissions and energy consumption in buildings through energy efficiency and design

Efficiency comes first. More efficient buildings require less electricity, natural gas and water, ultimately reducing carbon emissions while minimizing demand on CPAU and saving customers money. Reduced electrical demand from efficiency—even of Palo Alto's already carbon neutral electricity—provides more capacity to meet electricity needs generated by the EV growth and the fuel switching initiatives described below.

New construction offers a unique opportunity to build zero net energy buildings with low or no incremental costs, , while existing buildings offer the largest opportunity to reduce total GHG emissions by improving their efficiency over the lifecycle of the building. In parallel, measurement and verification are key to ensure we meet the emission goals we have targeted. Finally, to achieve our emission goals we need to pursue Zero Net Energy (ZNE) Buildings and Districts that focus on offsetting building energy needs through on-site renewables at the building and district scale. California is requiring "net zero energy" for all new

residential construction by 2020, and all new commercial construction by 2030. Palo Alto is currently considering whether and how to accelerate those deadlines in future Building Code cycles.

2.1.1 Strategy: Require advanced efficiency standards that exceed state minimum requirements. (NG-EE-1)

2.1.2 Strategy: Examine the life-cycle of buildings and determine appropriate triggers in the permitting process to mandate deeper efficiency retrofits for existing buildings.

2.1.3 Strategy: Require Net Zero (or Net Positive) buildings in advance of State standards.

2.1.4 Strategy: Participate in the formation of Zero Net Energy District(s) in collaboration with industry stakeholders.

2.1.5 Ensure residents and business are informed about advanced efficiency and electrification options.

2.1.4 Strategy: Ensure residents and businesses are well informed about efficiency and electrification options

2.2 Goal: Use performance requirements and transparency to drive learning and accountability around building efficiency

In order to understand how new and existing building are operating before and after construction we need benchmark and commissioning data. Transparent performance tracking can be an unusually effective and economical tool for driving and ensuring improved building performance, and focusing awareness on progress and opportunities.

2.2.1 Strategy: Ensure buildings perform as designed, through commissioning programs and other post-occupancy performance tracking and regulatory processes.

2.2.2 Strategy: Drive performance improvement through benchmarking programs that collect and report sustainability performance data on buildings in Palo Alto.

2.3 Goal: Reduce natural gas use in buildings through electrification

Reduce natural gas usage through energy efficiency and conservation, followed by electrification of water heating, space heating and cooking where cost effective. Find ways to reduce or eliminate gas use by encouraging the more efficient gas or all electric appliances such as cook tops and cloths driers.

2.3.1 Strategy: Periodically evaluate electrification of water heating and space heating for cost effectiveness and technical feasibility, and to identify barriers and policy levers.

2.3.2 Strategy: Incentivize all-electric new buildings (NG-GAS-1)

2.3.3 Strategy: Develop options to incentivize electrification of existing buildings.

2.4 Goal: Reduce the carbon intensity of natural gas use

Palo Alto will continue to explore opportunities to procure biogas and/or carbon offsets in the short term, while we work towards reduced natural gas consumption.

2.4.1 Strategy: Eliminate natural gas emissions with carbon offsets or biogas (NG-OFF-1)

3. ZERO WASTE AND THE CIRCULAR ECONOMY

Reducing the amount of waste discarded in landfills is an important strategy for both greenhouse gas reductions and overall sustainability. Diverting waste from landfills occurs through product changes, material use reduction, reuse, recycling and composting. .Equally important, these diversion strategies will create a "circular economy" where materials, water and energy do not create waste or pollute, but rather contribute their value back into a sustainable, circular cycle of human and ecosystem activity.

Achieving a "zero waste" will require reducing the overall amount of waste generated within the City—through purchasing decisions and material use reduction (and ultimately product design), as well as more effective sorting, recovery and recycling.

In 2007, the City completed a Zero Waste Operational Plan established a goal of 73% diversion by 2011 and 90% by 2021— well beyond state requirements[15]. This new S/CAP sets a new goal of 95% Diversion by 2030.

3.1 Goal: Divert 95% of waste from landfills by 2030, and ultimately achieve Zero Waste to landfills

3.1.1 Strategy: Perform new waste characterization and establish new programs to reduce waste

3.1.2 Strategy: Improve existing programs to reduce waste

3.1.3 Strategy: Utilize local rules and state laws to increase Extended Producer Responsibility (EPR) for Waste

3.2 Goal: Minimize energy use and pollutant formation from waste collection, transportation and processing

3.2.1 Strategy: Change waste collection fleet to lower carbon-use vehicles

3.2.2 Strategy: Use local and more efficient processing facilities

[15] California Assembly Bill 939 was passed in 1989, and mandated local jurisdictions to meet a solid waste diversion goal of 50% by 2000. Furthermore, each jurisdiction was required to create an Integrated Waste Management Plan that looked at recycling programs, purchasing of recycled products and waste minimization.

4. WATER MANAGEMENT

Palo Alto has done an outstanding job of meeting annual water use reduction requirements of the current "drought." But both potable water supplies and hydroelectric needs could be challenged by long-term shifts in California's precipitation regime.

With shifting climate patterns[16], significant uncertainty exists about whether drought conditions are the "new normal" for California, with a possible "new normal" of less (and less reliable) precipitation. Moreover, most climate projections show increases in average temperatures and reduced snowpack where Palo Alto sources much of its water—which could impact Palo Alto's hydroelectric power and thus its carbon neutral electricity strategy.

Given current climatic projections, long-term increases in water supplies from San Francisco Public Utilities Commission (SFPUC) appear highly unlikely. It would be prudent to reduce water consumption while exploring ways to increase the availability and use of recycled water.

4.1 Goal: Reduce consumption of water

CPAU water demand management measures (DMMs) have supported customers in reducing water use 27% between 2000 and 2010. CPAU's drought response programs have enabled the City to reduce water use by 24% in 2015 compared with 2013 levels, far ahead of the State's mandated reduction requirements. Long-term water reduction strategies should focus not only on implementing these procedures during times of drought, but rather using the incentives and policy drivers listed in the water management plan to drive sustained water consumption reduction.

4.2 Goal: Utilize the right water supply for the right use

4.3 Goal: Ensure sufficient water quantity and quality

4.4 Goal: Protect the Bay, other surface waters, and groundwater

4.5 Goal: Lead in sustainable water management

(NOTE: The strategies that follow apply to multiple goals.)

[16] The California Department of Water Resources (http://www.sei-international.org/news-and-media/3252), the Association of California Water Agencies (http://www.acwa.com/events/2016-executive-briefing-defining-new-normal) and others are examining the potential impacts of Climate Change on Hydrologic Trends and Water Management.

4.5.1 Strategy: Verify Ability to Meet City's long term water needs

4.5.2 Strategy: Encourage Water Conservation for Existing Infrastructure

4.5.3 Strategy: Improve Palo Alto's Recycled Water Quality

4.5.4 Strategy: Investigate all potential uses of Recycled Water

4.5.5 Strategy: Investigate ways to reuse Non-traditional Water Sources

4.5.6 Strategy: Minimize Water Use in new Buildings, Renovations, and Landscaping

4.5.7 Strategy: Continue to Improve Quality of Storm water

4.5.8 Strategy: Capture and Infiltrate Storm Water/Maintain Hydrologic Cycle

4.5.9 Strategy: Convert the RWQCP to a Beneficial Resource Recovery Facility

4.5.10 Strategy: Support both Regional and Building-level Net-Zero Water Efforts

5. MUNICIPAL OPERATIONS – LEADING THE WAY

The City of Palo Alto has long demonstrated its commitment to sustainability and reductions of greenhouse gas emissions through its municipal operations. Palo Alto city government's environmental footprint is small—3.1% of citywide electricity use, 2.9% of natural gas use and 5.3% of water use in FY 2014. But resource efficiency, low carbon and other sustainability initiatives can save money, improve operating performance, reduce emissions, and provide leadership for the community. And the City's important role in leading by example has a powerful impact, both by providing a governing framework that supports sustainability throughout the community and inspiring within our community and to neighboring communities. The city government's commitment: "We walk the talk, and we go first."

5.1 Goal: Create energy and water efficient City buildings

The City spends approximately $6 million annually on utilities; "typical" 10-20% potential efficiency savings could result in more than $600,000 saved per year. The City requires LEED certification for all new City buildings over 10,000 square feet, and assessment of "green building" potential for substantial renovations and additions over 5,000 square feet. These requirements may not have captured all opportunities, and advances in green building design and technology continually open new ones.

5.1.1 Strategy: Use existing Capital Improvement Program (CIP) projects as mechanism to implement feasible electrification, efficiency and advanced technology opportunities

5.1.2 Strategy: Use city buildings as demonstration projects for advanced building Technologies

5.1.3 Strategy: Strengthen the current energy efficiency and sustainability requirements (including LEED requirements) for City building projects

5.1.4 Strategy: Develop energy efficiency and electrification plans for City buildings

5.1.5 Strategy: Track and report energy use by City buildings

5.2 Goal: Minimize emissions and maximize efficiency of the City fleet

5.2.1 Strategy: Continue to electrify City fleet vehicles wherever possible

5.2.2 Strategy: Explore new models for City fleet vehicle operations

-

5.3 Goal: "Default to Green" Procurement for Products and Services

In 2007, the City authorized the implementation of a green purchasing program, and subsequently adopted a Green Purchasing Policy (GPP) in 2008, which supports existing environmental policies and Council direction to reduce GHG, pesticides and mercury, and achieve Zero Waste and pollution prevention goals. In 2015, the City Manager established a "default to green" strategy that makes the greener product the norm rather than the exception. Staff will always have the option to purchase alternative products, wherever cost or performance requirements make the green product inappropriate, but by making the greener purchase easier, and supported by tools that assist staff in choosing the best option, the City hopes to embed greener purchasing into City processes. (This has been accomplished for paper and toner purchases, and is underway for fleet purchases.)

[A 2014 OSS analysis showed that the Scope 3 GHG impacts of City purchases would add an estimated 25% to City government emissions.]

5.3.1 Strategy: Establish Green Purchasing criteria in all priority categories

5.3.2 Strategy: Fund Green Purchasing programs, products and services

5.3.3 Strategy: Embed Green Purchasing into City procedures

5.3.4 Strategy: Educate staff about Green Purchasing policies

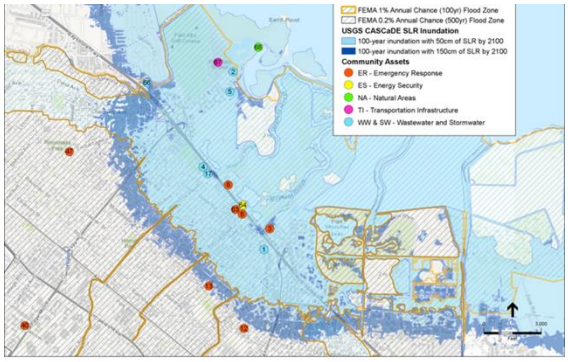
5.3.5 Strategy: Track and report progress

5.4 Goal: Embed sustainability in City management systems, processes and operations

Wherever possible, the City will embed sustainability criteria in City management systems processes and Operations, to ensure that the programs identified in this Plan are addressed early, as part of standard operating procedure rather than special "sustainability add-ons."

5.4.1 Strategy: Infuse sustainability throughout City operations

6. ADAPTING TO CLIMATE CHANGE & SEA LEVEL RISE



The first imperative of climate change planning is mitigation, the reduction in the emissions of greenhouse gases so that the impacts can be kept as small as possible. However, even if all carbon emissions were stopped today, some of these effects are likely to continue for decades into the future. Palo Alto's greatest climate change risks are a product of the City's bayside setting, the inherent sensitivities of its Mediterranean climate, and its dependence on imported water from the distant Sierra Nevada mountains as its primary water and hydro- electric supply.

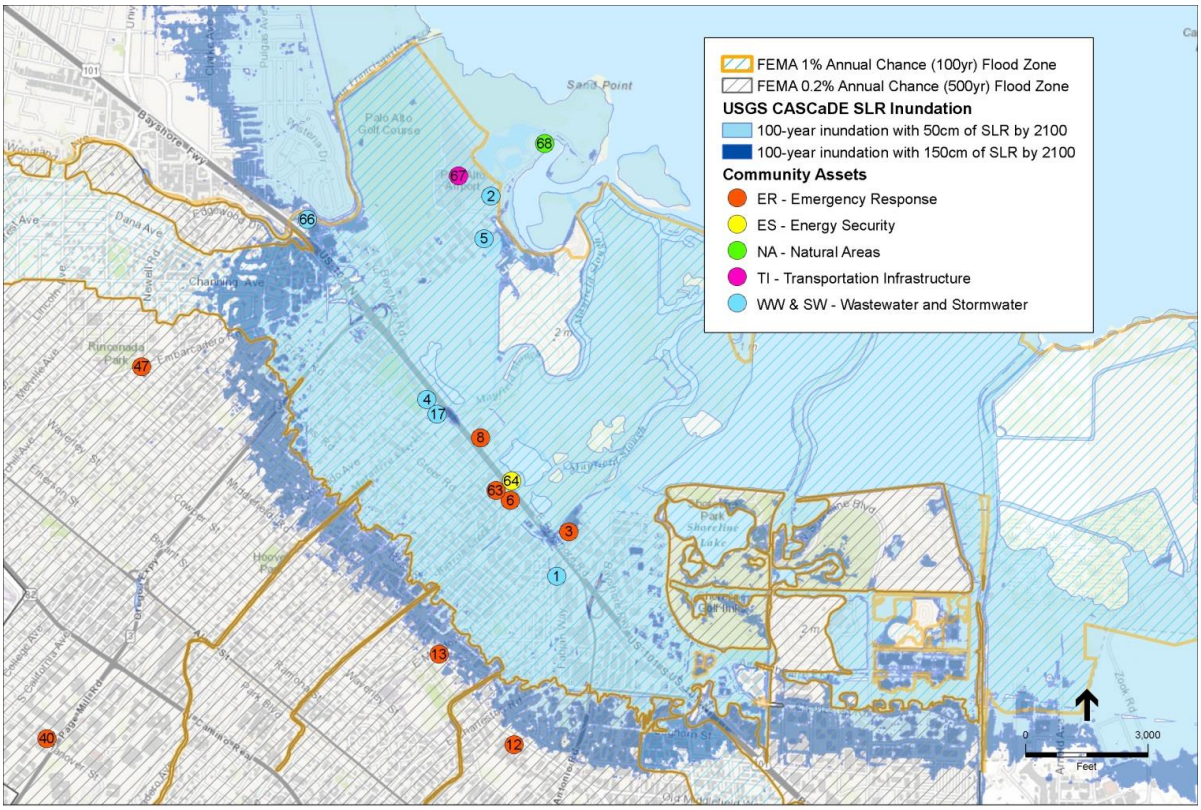
Sea-level rise is expected to affect low-lying areas of Palo Alto surrounding the San Francisco Bay with more frequent and severe flooding. The State of California has adopted guidance and planning sea level rise projections for the San Francisco Bay region from the National Research Council (NRC, 2012[17]) of projected 11 inches of sea level rise by 2050 (with a range of 5 to 24 inches) and 36 inches by 2100 (with a range of 17 to 66 inches by 2100.[18]

Figure 16 and **Figure 17** provide an overview (leveraging Silicon Valley 2.0, a regional planning effort to minimize the anticipated impacts of climate change) of community assets identified at risk of sea level rise/flooding and fire risk. (See detailed assessment of risks and potential responses in Appendix F.) City staff have several related work streams underway.

[17] National Research Council (NRC), 2012. *Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future.* http://www.nap.edu/catalog.php?record_id=13389

[18] California, via the Ocean Protection Council, (OPC, 2013[18]), has adopted the San Francisco Bay region sea level rise projections from the National Research Council (NRC, 2012[18]), which includes an allowance for vertical land motion.

Figure 14. Palo Alto Community Assets at Risk from Sea Level Rise and Associated Flooding

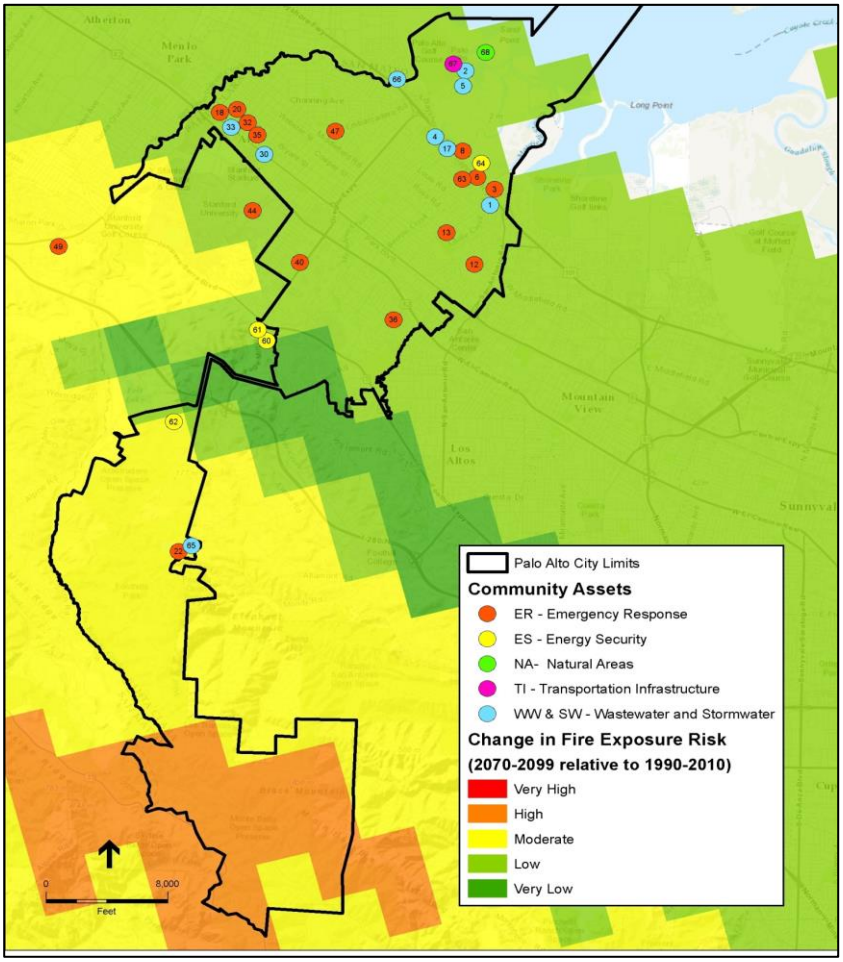


SOURCE: USGS (SLR inundation), FEMA (flood zones), City of Palo Alto (City Limits, asset locations), ESRI (basemap background)

City of Palo Alto SCAP . D140455.00

Palo Alto Flood Risk and Community Assets Map

Figure 15. Change in Fire Exposure Risk, Showing Community Asset Locations



Guiding Principles for Sea Level Rise Response

Recognizing the most immediate risks related to sea level, particularly for critical facilities along the San Francisco Bay Shoreline, Palo Alto has identified six guiding principles:

(1) For city of Palo Alto capital projects, use sea level rise assumptions consistent with the State of California adopted guidance, with a minimum of 55 inches based on Bay Conservation Development Corporation (BCDC) numbers.
(2) Continue to monitor latest climate change and sea level rise science and adapt as needed if sea level rise occurs at a more rapid pace and/or higher levels than projected
(3) Ensure engineering solutions are adaptable to changing climate predictions
(4) Consider tools to protect, adapt and retreat as appropriate and cost-effective
(5) For areas that are to be protected, consider additional tools in case severity and speed of sea level rise increase, such as designing structure that can get wet and locating sensitive equipment higher in a building
(6) Continue to collaborate with regional planning efforts on studies of climate impacts and strategies to respond to sea level rise

6.1 Goal: Plan for coming changes in our climate and environment

6.1.1 Strategy: Ensure appropriate water and energy forecasting and Supply

6.2 Goal: Protect the City from climate change induced hazards

6.2.1 Strategy: Build resiliency into City planning and CIP projects

6.2.2 Strategy: Protect existing public & private infrastructure and critical services

6.2.3 Strategy: Optimize and preserve ecosystem services as protections from the sea

6.2.4 Strategy: Implement County Hazard Mitigation Plan

6.2.5 Strategy: Secure funding for coastal protection projects

6.3 Goal: Adapt to current and projected environmental conditions

6.3.1 Strategy: Strengthen City building requirements and buildings

6.3.2 Strategy: Adopt policies to support adaptation6.3.3 Strategy: Consider and plan for managed retreat where needed

6.4 Goal: Empower the local community and foster regional collaboration

6.4.1 Strategy: Participate in regional alliances

6.4.2 Strategy: Improve governance of SLR issues

6.4.3 Strategy: Strengthen communications with local corporations

6.4.4 Strategy: Strengthen neighborhood connections

6.4.5 Strategy: Encourage residents to participate in the City's Storm Water Incentive Programs

7. NATURAL ENVIRONMENT

Sustainability is not only about mitigation and resiliency to change, but also about regeneration and identifying opportunities for renewal, restoration and growth of our natural resources and environment. Green infrastructure management provides one of the rare opportunities to enhance ecosystem positives such as sequestration of carbon, recharge of groundwater reserves, local food, walk-ability and bike-ability, and improved human health rather than solely reduction of negative impacts such as pollution and waste. Sequestering and storing carbon in trees, vegetation and soil will be an increasing part of climate solutions. The urban forest also shades, cools, slows water evaporation from soils and has many contributions to other non-carbon aspects of sustainability which are addressed in the S/CAP framework below.

Palo Alto will continue to build the natural resources, "common wealth" and biocapacity that sustains it: soils, vegetation, tree canopy, biodiversity, water and many other critical components. Green infrastructure refers to natural areas and systems to provide habitat, flood protection, storm water management, cleaner air and cleaner water.

7.1 Goal: Renew, restore and enhance resilience of our natural environment

7.1.1 Strategy: Adapt canopy, parklands, biodiversity, soil health to changing climatic regimes

7.1.2 Strategy: Value and enhance the common wealth for future generations.

7.1.3 Strategy: Deploy Green Infrastructure.

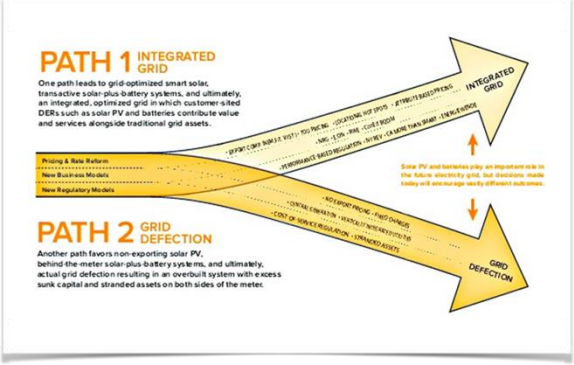
7.2 Goal: Align S/CAP planning for the Natural Environment with other City Plans

7.2.1 Strategy: Reference, Summarize and Interpret Relevant Plans

7.3 Goal: Maximize Carbon Sequestration and Storage in the Natural Environment

7.3.1 Strategy: Manage Soil, Plants, and Trees to Maximize Carbon Benefits and Other Ecosystem Services

8. PALO ALTO'S UTILITY OF THE FUTURE



The utility industry is changing. Rapidly dropping costs of renewable and distributed power sources, energy storage, electric vehicles and energy-related telecommunications are combining to challenge the traditional utility framework and business. CPAU is tracking these trends, has begun piloting residential "smart meters" in a few hundred locations and begun assessing the load and storage impacts of electric vehicles on the grid. These trends intersect sustainability and climate action concerns, and raise both significant challenges and opportunities for CPAU.

CPAU will explore and evaluate the "Utility of the Future" concept—including potentially moving from a centralized utility provisioning model to a more agile one of greater embracing distributed energy generation and storage, an increased focus on energy services in addition to energy generation and distribution.

8.1 Goal: Advance smart grid strategies

Smart grid strategies connect to Palo Alto's existing, smart city and open data strategies, and offer the promise of more responsive and efficient energy systems, and more connected and satisfied customers.,

8.1.1 Strategy: Deploy Smart Grid as key part of "smart and connected city"

8.1.2 Strategy: Evaluate and advance appropriate distributed generation and storage strategies

8.2 Goal: Evaluate and adapt the CPAU business model

The utility industry faces a potentially disruptive future—driven by changing technology, economics and customer expectations, as well as policy changes—that could include the challenge of "grid defection" as customers become their own providers, and of new regulatory models and new competitors that shift revenues from utilities to other participants in the energy system. Few utilities have begun to consider how to adapt to the creative destruction in by the proliferation of distributed generation and energy efficiency; many are actively resisting the transition. CPAU, small and locally controlled, has the capabilities to rapidly evolve the business models these trends are demanding.

8.2.1 Strategy: Consider long-term CPAU strategy in light of rapidly changing technology

8.2.2 Strategy: Leverage the resiliency and potential cost benefits of distributed energy resources (e.g., solar, storage, microgrids)

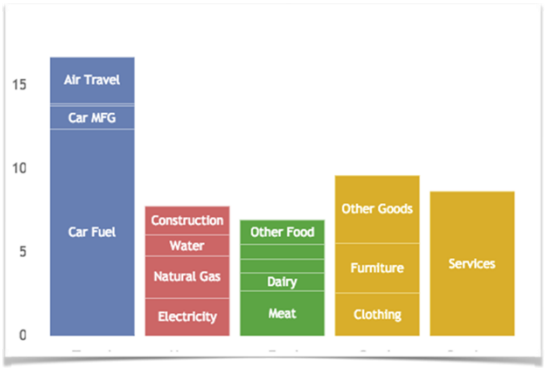
8.3 Goal: Continue to advance carbon neutrality

CPAU will continue to play a central role in Palo Alto's carbon neutrality trajectory.

8.3.1 Strategy: Continue to support electrification programs and requirements, including restructuring rates and upgrading grid, as warranted

8.3.2 Strategy: Develop hydroelectric power contingency plans

9. COMMUNITY BEHAVIOR, CULTURE & INNOVATION



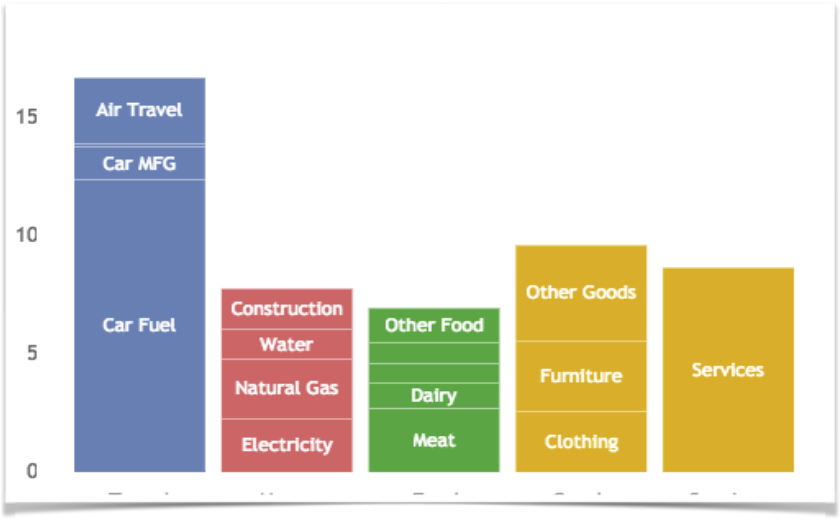
Ultimately the way individuals and businesses act dictates our consumption patterns and thus our impact on natural resources. To truly address the challenges of climate change and sustainability, individual behavior will have to continue to change. In fact, the GHG impact of individual purchasing decisions—not reflected in Palo Alto's GHG inventory, above—is significant. (See Figure 16, below.) Achieving that change will require broad community engagement, participation, guidance— and individual initiative. To support that, the City will actively inform & convene stakeholders, support individual & collaborative action, and disclose and report impacts of both City and community-wide initiatives and impacts.

9.1 Goal: Provide a platform for community change in culture, behavior and innovation

9.1.1 Strategy: Shift cultural norms to encourage supportive change in behavior, lifestyle, purchasing and investment

9.1.2 Strategy: Facilitate personal and neighborhood action

Figure 17: Palo Alto Per Capita GHG emissions, including "Scope 3" Impact of Purchases



9.1.3 Strategy: Develop Smart City and Power of Open Data

10. FINANCING, FUNDING AND INVESTMENTS

The total financial impact of the goals and strategies identified in this plan is estimated to result in a net present value of $400 million generated by estimated City investments of $10 million combined with investments across the Palo Alto economy of approximately $760 million over the next 14 years. (These are best estimates in the face of rapidly evolving technologies and rapidly improving price/performance ratios in energy, mobility and other sectors; they should be revised regularly.)

This return on investment may seem surprising that reducing GHG emissions are estimated to provide a net positive economic benefit, since most people have long thought that environmental quality costs money. But efficiency has long delivered good return on investment, and renewable energy is becoming increasingly competitive compared to fossil fuels. This makes carbon neutrality a good investment seen in the light of alternative costs if Palo Alto were to continue to source its energy from fossil fuels. Additionally, the levers and strategies identified in this plan also contribute to improving the health and quality of life for Palo Alto residents and businesses by reducing congestion, noise and local pollution.

Financing these pathways

Staff has identified a variety of potential sources of funds to finance the S/CAP; all of these sources (including private financial vehicles) need a more complete assessment of applicable legal and regulatory requirements and the risks and obligations associated with the various approaches.[19] These include operating savings, parking feebates, utility rates, revolving loan funds, local offsets, carbon tax or fee, voluntary contributions, green bonds, transfer taxes, public/private partnerships and private financial vehicles.[20] There is evidence that market demand exceeds supply for well-constructed sustainability and climate related investment opportunities; as a result some initiatives discussed here may be financeable through private investors.

Capital formation

People—and companies—sometimes resist environmental improvements for fear they are too expensive, or say we'll do as much as we can afford. But as the late Ray Anderson, founder and CEO of Interface, would say, "If you think sustainability is expensive, you're doing it wrong."

Analysis shows that sustainability can be a good investment. But it is an investment—and like any other can be structured in many ways

[19] The City of Palo Alto has just been award an $85k grant from USDN for a multi-city exploration of potential sustainability financing strategies

[20] This despite a common misperception: Most people who have not been deeply engaged in sustainability work assume that low-carbon and other sustainability initiatives will necessarily require financial, performance or quality of life sacrifices, because "better usually costs more." As we've seen in the world's product innovation, green building, and corporate eco-efficiency, this is not necessarily the case; in fact a growing body of evidence documents that attractive returns on investment are possible from well-designed and well-executed sustainability initiatives.

Many funding options are available and new forms are continually emerging. In most cases, innovation comes from combining instruments in creative ways to achieve specific goals rather than creating entirely new mechanisms. The "best" choice of funding vehicle for a particular entity is one that compliments the current political and cultural context of a region by allocating costs and benefits equitably. Figure 18 summarizes key financing options and their estimated scale.

Figure 18: Potential Financing Sources and Amounts

STRATEGIES	DESCRIPTION	POTENTIAL FUNDS	COMMENTS
Utility Costs Operating Savings	Allocate 50% of cost savings from retrofit of City buildings	$0.6m/yr	Current spend ~$6m/year; estimated 10% savings
Parking Feebates	Phase out free parking; apply revenues to commute alternatives	$10-20m/yr	(Modeled on the Stanford engine)
Utility Reserve	Apply 10% of Utility Reserve to finance low-carbon initiatives	$5m/yr	
Revolving Loan Fund	Establish bond-funded low-interest revolving loan fund for on-bill financing of efficiency projects	TBD	
Green Bonds	Issue green bonds to finance green infrastructure and low carbon initiatives	TBD	Beneficial interest rates since demand exceeds supply
Local Offsets	Switch GreenGas to opt-out; use portion of funds to finance qualified local projects (5% first year)	$1.6m/year	
Carbon Tax	Explore and pilot local carbon tax or fee	$5-15m/yr	See Boulder, for example. Would likely require ballot measure.
Total		$22.2-32.2m/yr	

10.1 Goal: Utilize diverse financial pathways to drive S/CAP implementation

- Evaluate the economic and legal feasibility of the financing measures identified in Figures 18. ___
- Utilize the general fund to incentivize investments to promote appliance switching, which may not be possible for the Enterprise funds to finance due to legal restrictions.
- Establish internal carbon pricing for all City departments and financial activities.
- To the extent feasible, include carbon pricing into the gas rates to fund efficiencies and fuel switching.
- Identify a neighborhood or commercial district as a special district to carry out innovative pilot projects around GHG reduction, electric transportation development, or other approaches.

11. IMPLEMENTATION: TURNING VISION INTO ACTION

Achieving the emissions reductions detailed in this plan requires that the strategies are implemented in a timely, coordinated and sustained way. Partial or poorly coordinated implementation will reduce the emissions reduction potential of the S/CAP.

Monitoring and Tracking Progress

The Office of Sustainability will be responsible for monitoring and reporting on the progress of the S/CAP on the following schedule:

- Community greenhouse gas inventory: Annually.
- S/CAP Strategy Indicators: Annually

Below, we summarize the key performance indicators associated with each Strategy:

Table 1. Summary of S/CAP Strategy Indicators for Monitoring Progress[21]

Levers	Goals	Strategy	2030 Performance Target	2030 GHG Emissions Reduction (MTCO2e)
Rethinking Mobility	Expand non-auto mobility options	T-FAC-1. Expand bicycle infrastructure	Increase bike boulevard miles to 26 miles Increase in bike mode share to 30%	8,400
		T-FAC-2. Expand transit options	Increase transit ridership by 60%	19,200
		T-FAC-3. Grow ridesharing services	Increase in rideshare mode	6,400
	Create right financial incentives	T-INC-1. Provide universal transit passes	75% of residents and employees have universal transit passes	7,600
		T-INC-2. Implement parking pricing	50% of sites have parking pricing	18,400
	Implement land use approaches	T-LU-1. Increase zero-impact housing	Target 2.95 jobs-housing ratio	2,900
	Reduce carbon intensity of vehicles	T-EV-1. Electrify Palo Alto-based vehicles	90% of vehicles based in Palo Alto are zero emission	25,200
		T-EV-2. Electrify inbound vehicles	50% of inbound (not based in Palo Alto) vehicles are zero emission	29,800
Electrifying our	Reduce use in existing businesses	NG-COMM-1. Electrify water heating in businesses	85% of commercial water heating is electric	21,200
		NG-COMM-2. Electrify space	85% of commercial space heating is	

[21] The figures in this table are *estimates* based on staff and consultant analyses of the estimated GHG reductions from each strategy. These estimates are built on documented assumptions, and are subject to many factors that could change over the 2030 horizon.

		heating in businesses	electric	15,900
		NG-COOK-1. Electrify commercial cooking	50% of commercial cooking is electric	11,300
	Reduce use in existing homes	NG-RES-1. Electrify residential water heating	Close to 100% of water heaters are electric	13,600
		NG-RES-2. Electrify residential space heating	70% of residential space heating is electric	23,300
	Reduce use in new buildings	NG-GAS-1. Encourage all-electric new buildings	New buildings are zero net energy ahead of state targets	11,900
Zero Waste	Enhance programs and infrastructure	SW-1. Achieve zero waste	Achieve 95% diversion rate	9,500

CONCLUSION

Climate change is a global problem and only through local solutions designed to meet the needs of our community can we mitigate and adapt to its impacts and protect the environment. While the challenge of climate change is unprecedented, local-level solutions can reduce emissions, increase efficiency, promote economic development, and improve quality of life for residents.

Together, we can continue to foster a vibrant economy, increase our resiliency and support Palo Alto's vision for a livable and sustainable community for generations to come. The City of Palo Alto has taken a significant step toward a more sustainable future with this climate action plan. This Plan has identified areas and opportunities to reduce GHG emissions within the community and City operations that along with statewide efforts can achieve our environmental goals.

While an important first step, this plan will remain a living document, to be updated as technology and policies progress, to support the City's efforts to manage GHG emissions for a sustainable future for all.

GLOSSARY

BAU: Business as Usual. Measures, initiatives or impacts that do not depend on new City of Palo Alto action

BAU 1: BAU resulting from demographic projections, external (State and Federal) policy choices. Based on CompPlan analysis, modified by S/CAP consultants to distinguish certain elements. (See BAU2)

BAU 2: BAU resulting from existing (enacted and/or in progress)

Palo Alto: The entire Palo Alto community, including COPA, residents and businesses

CNE: Carbon Neutral Electricity

CPAU: City of Palo Alto Utilities

COPA or The City: City of Palo Alto municipal government, including City of Palo Alto Utilities

EV: Electric Vehicle

GHG: Greenhouse gas emissions

MaaS : Mobility as a Service

PV: Photovoltaic System

SOV: Single Occupant Vehicles

S/CAP: Sustainability and Climate Action Plan

TNCs: Transportation Network Companies

VMT: Vehicle Miles Traveled

CITY OF MENLO PARK

REGULAR MEETING MINUTES - DRAFT

Date: 8/23/2017
Time: 6:30 p.m.
City Council Chambers
701 Laurel St., Menlo Park, CA 94025

A. Chair London called the meeting to order at 6:30 p.m.

B. Roll Call

Present: Allan Bedwell, Chris DeCardy, Janelle London, Scott Marshall
Absent: Joyce Dickerson, Deb Martin, Christina Smolke
Staff: Rebecca Lucky

C. Public Comment

No public comment was received

D. Regular Business

D1. Update and consideration of the next steps regarding the Commission's recommendations on the Middle Plaza at 500 El Camino Real (300-550 El Camino Real).

ACTION: Motion and second (Bedwell/London) to redistribute the Environmental Quality Commission's letter regarding Middle Plaza at 500 El Camino Real to all City Council members, and designate a representative from the Environmental Quality Commission to present on the matter when it is placed on the next City Council agenda passes unanimously (4-0-3, Dickerson, Martin, Smolke absent).

D2. Discussion of the Climate Action Plan update and consideration of future targets beyond 2020.

Public Comment: Tom Kabat provided a list of initiatives that the City could take to achieve greater greenhouse gas reductions in the community, such as an ordinance for requiring electric water heaters.

ACTION: Consensus to continue to discuss at September 2017 meeting.

D3. Approve the July 26, 2017, Environmental Quality Commission meeting minutes.

ACTION: Motion and second (London/DeCardy) to approve the July 26, Environmental Quality Commission meeting minutes passes (3-1-3; Marshall abstains; Dickerson, Martin, and Smolke absent).

E. Reports and Announcements

E1. Staff updates and announcements

Rebecca Lucky, Sustainability Manager, provided the Environmental Quality Commission with a verbal update on progress of the solid waste rates, Zero Waste Plan, staff recruitment, and general focus for the Sustainability Office over the next four months.

F. Adjournment

Chair London adjourned the meeting at 8:30 p.m.

Minutes prepared by Rebecca Lucky