

2012

City of San Pablo Climate Action Plan





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# ACRONYMS

AB	Assembly Bill
BART	Bay Area Rapid Transit
CARB	California Air Resources Board
CAP	Climate Action Plan
CCA	Community Choice Aggregation
CEC	California Energy Commission
CFL	Compact fluorescent light
CO <sub>2</sub> e	Carbon dioxide equivalent
CPUC	California Public Utilities Commission
CSI	California Solar Initiative
EPA	U.S. Environmental Protection Agency
GHG	Greenhouse gas
HVAC	Heating, ventilating, and air conditioning
ICLEI	International Council of Local Environmental Initiatives – Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
LED	Light-emitting diode
LEED	Leadership in Energy and Environmental Design
MTons	Metric tons
PDA	Priority Development Area
PG&E	Pacific Gas & Electric
PPM	Parts per million
SB	Senate Bill
TDM	Transportation demand management
TOD	Transit oriented development
USGBC	U.S. Green Building Council
VMT	Vehicle miles traveled

# San Pablo Climate Action Plan

# INTRODUCTION

This Climate Action Plan (CAP) was prepared by City staff in collaboration with Strategic Energy Innovations, members of the Small Cities Climate Action Partnership (SCCAP) team and Climate Corps Bay Area members. It is in response to the international scientific consensus that global temperatures are rising due predominantly to the emission of greenhouse gases (GHGs) by human activity. It has been found that continued temperature rise will result in significant changes to local climates. In recognition of the projected impacts of this global climate change on the San Pablo community, the City has developed a series of innovative programs to reduce the greenhouse gas (GHG) emissions of both government operations and the community at-large. The following CAP is a summary of these programs as they relate to statewide regulation mandating greenhouse gas monitoring and reductions. These reductions will not only reduce the City's carbon footprint, but will help to create a more livable, environmentally just and sustainable future for City of San Pablo residents.

## 1.1 Purpose and Scope

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In 2009, the San Pablo City Council showed its support for local, regional and state initiatives designed to address the major sources of pollution by passing Resolution 2009-063, which laid the groundwork for developing a CAP. City staff have since worked on developing a local greenhouse gas emissions inventory, emission forecasts and reduction measures to meet established pollution reduction goals.

### **PURPOSE**

The CAP is a policy-planning document which outlines a course of action for the City of San Pablo to reduce GHG emissions to 15% below 2005 levels by 2020 and 30% below 2005 levels by 2035, as recommended by Assembly Bill 32 (AB 32). The CAP includes a series of individual measures whose primary functions are to:

- Demonstrate San Pablo's commitment to help the State and the San Francisco Bay Area reach mandated greenhouse gas reduction goals according to Assembly Bill 32 (AB 32);

## San Pablo Climate Action Plan

- Provide guidance to the City in pursuing these GHG reductions through a series of objectives and strategies;
- Inspire residents, local businesses, and employees to participate in community efforts to reduce GHG emissions and help establish a healthy and prosperous community;
- Serve as a qualified action plan with clearly defined next-steps and feasible reduction strategies.

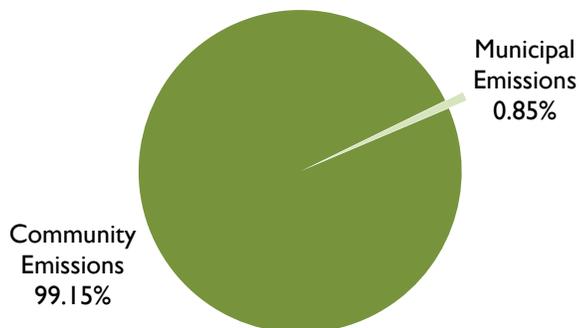
### SCOPE

The scope of the CAP is to investigate and quantify opportunities for GHG emissions reductions in both municipal and community activities within San Pablo. It sets forth objectives to address the four major sources of emissions: Energy Use; Transportation and Land Use; Solid Waste; and Water and Wastewater.

The CAP outlines municipal strategies to address the City's operational GHG emissions; these strategies are designed to save the City money and encourage climate action leadership in the municipal sector.

The CAP provides a 2005 baseline inventory of emissions associated with the four main focus areas. By understanding existing emissions trends, the City was then able to set a percentage reduction goal from this baseline and evaluate the reduction potential of existing and proposed policies, programs and projects. Below is a graph representing the portion of citywide emissions associated with municipal and community operations; while municipal data is included in the Community greenhouse gas baseline, it has been separated out to highlight those emissions that City operations are directly responsible for. As shown, the Municipal GHG emissions compared to the communitywide GHG emissions is negligible, but the Municipal measures still represent a significant opportunity for the City to lead by example by developing efficient and sustainable municipal operations.

Figure I-1: 2005 GHG Emissions Baseline by Sector



The CAP provides a framework for implementing and monitoring the effectiveness of proposed measures. The implementation strategy includes measure timelines, financing mechanisms and responsible parties where applicable.

## 1.2 Collaboration

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San Pablo's CAP is the result of strong collaboration between City staff, Strategic Energy Innovation (SEI), members of the Small Cities Climate Action Partnership (SCCAP) and Climate Corps Bay Area (CCBA) members. Staff have also, through a series of outreach measures (booths at events, online surveys, public meetings and presentations), garnered feedback from the San Pablo community on GHG reduction priorities, proposed measures and implementation strategies. This early community engagement will help to foster community involvement in the implementation of the CAP over time.

The Small Cities Climate Action Partnership (SCCAP) is a collaborative effort between the cities of El Cerrito, Albany, Piedmont and San Pablo, with consultation from Strategic Energy Innovations (SEI), and is funded by a grant from the Environmental Protection Agency (EPA). SEI is a nonprofit organization that works with a wide range of stakeholders, including local governments, to implement measures to reduce pollution and address energy and resource efficiency. SEI consultants provided guidance in the development of the GHG forecast and the quantification of the GHG reduction measures included in this CAP.

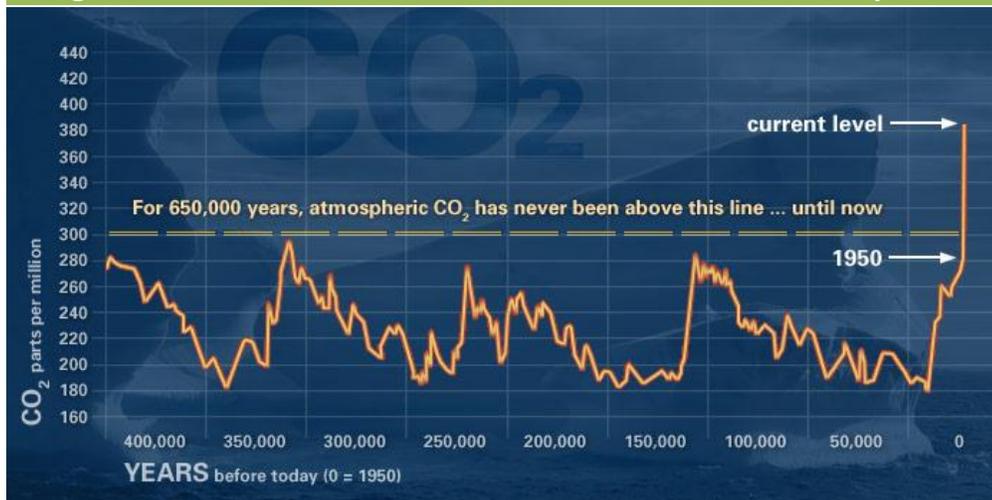
In addition, beginning in 2010, the City of San Pablo has participated in an AmeriCorps National Service program, Climate Corps Bay Area (CCBA). CCBA is an 11 month program that matches non-profit and local government partners with CCBA members to address climate change mitigation strategies. At the City, these members have been involved in the research, quantification and analysis of the City's past GHG emissions, existing efficiency strategies and proposed reduction measures. The program, which involves an extensive job training component, illustrates the City's commitment to sustainable workforce development.

## 1.3 The Need for Action

### CLIMATE CHANGE AND SAN PABLO

#### Rising Concentrations of Greenhouse Gas Emissions <sup>1</sup>

Figure I-2: Concentrations of CO<sub>2</sub> in the atmosphere



Rising concentrations of GHG emissions in the atmosphere are trapping solar radiation and causing the earth's average temperatures to rise. There are five major GHGs contributing to this warming: water vapor, carbon dioxide (CO<sub>2</sub>), methane, nitrous oxides, and chlorofluorocarbons. While GHGs are an essential part of our Earth's atmosphere, there is now scientific consensus that human-produced emissions are increasing GHG concentrations to an unsustainable level.

Prior to industrialization there were 280 parts per million (ppm) of CO<sub>2</sub> in the Earth's atmosphere; as of 2005 there are 379 ppm, a 7% increase since 1990. The United Nations International Panel on Climate Change (IPCC) stated in 2000 that in order to avoid reaching a dangerous level of climate change, atmospheric concentrations of carbon dioxide must stabilize between 350 and 400ppm.

The IPCC has developed global GHG emissions scenarios ranging from best to worst-case scenarios for the coming century. In order to stabilize the Earth's climate, there has to be a global reduction of 100 ppm of carbon in the atmosphere from even the most conservative future projections. This necessary reduction requires urgent action on the part of cities, countries and the global community in order to avoid sea-level rise, ecosystem degradation, rising temperatures and major, global climactic shifts.

## **EFFECTS OF CLIMATE CHANGE IN SAN PABLO**

Closer to home, new studies and planning efforts have focused on the effects of climate change in the San Francisco Bay Area. In particular, Bay Area communities will be threatened by extreme rain events in the winter, increased and more severe heat waves in the summer and fall, water shortages and sea-level rise. This plan is a call for action that will help avert these worst case scenarios and ensure resiliency in the face of these impacts as our water supplies, flood control measures and shorelines change.

### **Water Shortages**

The East Bay Municipal Utility District (EBMUD) 2040 Water Supply Management Program examined the potential effects of climate change on both water supply and on the utility's storage and distribution systems. The study found that EBMUD communities are vulnerable to lower springtime run-off due to a decreased Sierra snowpack, as well as increased water temperatures in the rivers that feed EBMUD reservoirs. The Sierra snowpack, EBMUD's primary source of water, has shrunk 10% in the last century and is projected to shrink an additional 70% by the end of the current century under a medium warming scenario<sup>ii</sup>. This decrease in snowpack will place stress on reservoir levels, particularly during drought years when high temperatures lead to increased demand. In studies published in 2008, climatologists at the Scripps Institute of Oceanography confirmed that mountains throughout the West are getting more rain and less snow, that the snowpack is breaking up faster and that more rivers are running dry by summer<sup>iii</sup>.

### **Sea Level Rise**

In 2008, the US Geological Survey conducted a detailed study of the potential impacts of sea-level rise to the Bay Area's shorelines. According to the study, Richmond could lose up to 110+ acres with a sea-level rise of between half a meter (1.6 feet) and five meters (16.4 feet)<sup>iv</sup>. Without proper planning, inundations that close to San Pablo would challenge the City's storm water, waste water, and transportation infrastructure and increase the chances of local flooding. In addition, San Pablo could see increases in population under these sea-level rise scenarios as residents in neighboring communities are forced to move. Finally, the cost of protecting the Bay Area and other coastal communities from sea level rise would place significant stress on already strained local, state and federal budgets.

### **Increase Risk of Wildfires**

While many of California's ecosystems rely on seasonal wildfires for sustained health, California's Fire and Resource Assessment Program has noted that the number and intensity of these fires has nearly doubled in the last ten years<sup>v</sup>. With an increased threat of drought, vegetation will have a

lower water content, increasing its flammability; in addition, these plants will be more susceptible to insects and disease which cause high tree and shrub mortality rates, creating extensive amounts of dead, highly flammable material. Coupled with increased temperatures, projections show a continual increase in the number of wildfires over the next ten years. San Pablo's density and proximity to large wildlife areas such as Wildcat Canyon, San Pablo Reservoir, Kennedy Grove, Briones Regional Park and Tilden Park make it susceptible to increased wildfire damage.

### **Public Health Risks**

San Pablo's proximity to the I-80 freeway increases the community's vulnerability to poor air quality due to particulate matter and diesel exhaust emissions. Higher temperatures and a greater number of wildfires could worsen these conditions through increased smog, smoke and dust concentrations in the air. These pollutants lead to higher rates of cancer, heart and lung disease, particularly among vulnerable populations. In addition, heat and extreme weather events could cause an increase in heat stroke, dehydration and other illnesses. The stress on water and energy supplies due to drought, increased energy use and population growth will amplify these effects.



*The I-80 Freeway*

## THE MANY CO-BENEFITS OF CLIMATE ACTION

Understanding that the serious risks posed by climate change would affect all facets of life – health, safety, access to clean water and food, energy security, and wildlife vulnerability—climate action offers the extensive co-benefits necessary to maintain a vibrant, sustainable community. This CAP represents an extensive planning effort that not only addresses the City’s GHG emissions, but also its overall sustainability and adaptability in the face of projected changes.

Under a business-as-usual scenario, the City expects an additional 3,100 residents by the year 2020 who will require housing, access to transportation and services, energy, water, and space to walk, bike and play. By anticipating this growth and recognizing the additional pressure it will place on San Pablo’s infrastructure, we can proactively ensure a community that meets the needs of all its residents. Further, this proactive approach will enhance our existing community by providing increased mobility and transportation choices; reduced congestion; greater housing choice; improved public health through better air, water and food quality; natural resource conservation; economic vitality through development and improved infrastructure; reduced dependence on foreign oil; and greater social equity through improved access to jobs, housing, and everyday needs.



*Community members helping to plant native vegetation at the Wanlass Park Volunteer Day*

## I.4 State and Regional Planning Context

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California has established itself as a national climate leader by enacting legislation aimed at reducing statewide GHG emissions. With the passing of the Global Warming Solutions Act of 2006 (AB 32), the State put in place the policy framework to enable local governments to implement important statewide initiatives on a local level. These key pieces of legislation are outlined below:

### **AB 32, NUNEZ AND PAVLEY, 2006**

In September 2006, California passed Assembly Bill (AB) 32, which requires the state to reduce its greenhouse gas emissions to 1990 levels by 2020. Under AB 32, the California Air Resources Board (ARB) developed a statewide plan to reach California's emission reduction goals. In December 2008, CARB approved a Scoping Plan to regulate and report on statewide emissions; this Scoping Plan encourages local jurisdictions to reduce their GHG emissions to 1990 levels or a 15% reduction below "current" or baseline levels by 2020.

Local enforcement of air pollution reductions is carried out by the Bay Area Air Quality Management District (BAAQMD), which has adopted a set of CEQA guidelines relating to greenhouse gas emissions that streamline the required environmental review of major development projects.

### **CEQA**

The California Environmental Quality Act (CEQA) is a statute that requires public agencies to evaluate the environmental impacts of discretionary development plans and projects in their jurisdictions. Many jurisdictions are finding that climate change impacts from local government activities are "significant" under CEQA, and are identifying emissions reductions targets and Climate Action Plans as mitigations measures to reduce climate change impacts to less-than-significant levels. Via Senate Bill 97 (SB 97) the State acknowledges that climate change is a prominent environmental issue that requires such CEQA analysis and directs the Governor's Office of Planning and Research to develop and maintain CEQA guidelines under CEQA for mitigating GHG emissions and their impacts.

### **SB 375, STEINBERG, 2008**

The *Sustainable Communities and Climate Protection Act* calls on the eighteen metropolitan planning organizations throughout California to develop a Sustainable Community Strategy that addresses GHG emissions associated with land use, transportation and housing. In the Bay Area, the Metropolitan Transportation Commission (MTC) has developed *Plan Bay*

*Area* as a sustainable community strategy aimed at developing a regional plan to accommodate population and job growth over the next 25 years. The Plan was developed in collaboration with the Association of Bay Area Governments (ABAG), BAAQMD, and the Bay Conservation and Development Commission (BCDC). The Plan will incentivize growth that is in keeping with its goals by providing transportation funding preference and a streamlined CEQA GHG review. The Plan is slated for adoption in 2013.

## **STATE RENEWABLE ENERGY PROGRAMS**

California has the most aggressive utility renewable portfolio standard (RPS) in the nation, requiring 33% renewable energy procurement by all investor-owned utilities, electric service providers and community choice aggregations by 2020 as mandated under SB 2. Additionally, the state incentivizes solar installation in the private sector through the California Solar Initiative (CSI) rebate program regulated by the California Public Utilities Commission (CPUC).

### **AB 1493, PAVLEY, 2002**

Assembly Bill 1493 requires ARB to regulate the GHG emissions of vehicles primarily used for non-commercial transportation. Beginning in 2009, automobile manufacturers were required to meet fleet-average GHG emission limits for all passenger cars, light-duty trucks, and medium-duty passenger vehicle weight classes. Cars sold in California today are estimated to emit an average of 16% less GHGs than models made the year the bill was passed.

This CAP accounts for the greenhouse gas emissions reductions associated with these bills by incorporating them in the Greenhouse Gas Forecast. The proposed 15% reduction target is in addition to these statewide savings and will be accomplished exclusively through the proposed measures.

## **1.5 San Pablo's Climate Action Planning Process**

While the State has provided the regulatory framework to monitor and begin to address climate change, it is up to local governments to implement, track and expand upon reduction initiatives. While the City has already begun to reduce their greenhouse gas emissions through a variety of energy-efficiency improvements, solid waste initiatives and water conservation practices, this CAP represents an overarching plan to inventory, forecast, and reduce local GHG emissions.

### ICLEI'S CITIES FOR CLIMATE PROTECTION CAMPAIGN

In 2009, the City became a member of International Council for Local Environmental Initiatives-Local Governments for Sustainability (ICLEI) and pledged to implement the five milestones of the Cities for Climate Protection (CCP) campaign. ICLEI provides technical consulting, training and information services to local government members around the world concerned with sustainable development. Their CCP campaign was established in 1993 to aid in local emissions reduction strategies. Currently there are over one thousand local governments who are pursuing or have completed the five milestones, as outlined below:



**Milestone One:** Conduct a baseline emissions inventory and forecast

**Milestone Two:** Adopt an emissions reduction target for the forecast year

**Milestone Three:** Develop a local climate action plan

**Milestone Four:** Implement the climate action plan

**Milestone Five:** Monitor progress and report results

With the adoption of this CAP, the City of San Pablo will have achieved Milestone Three and will have completed the initial steps necessary to efficiently achieve Milestones 4 and 5.

## PUBLIC INPUT

ICLEI strongly encourages public input throughout the climate action planning process to increase legitimacy and encourage community buy-in. From April of 2010 through February of 2012, the City administered a communitywide online survey to garner feedback on sustainability priorities; the link to the survey was distributed at citywide events, on the website, and included in the City's quarterly newsletter and the City Manger's weekly e-newsletter. 63 community members completed the survey, providing their input on the feasibility and impact of various measures ranging from alternative transportation plans to water conservation ordinances. Results are summarized in Appendix A. In addition, Staff surveyed participants at the 2012 Cinco de Mayo parade, hosted by Cycle San Pablo. The survey asked for resident input on bicycling and alternative transportation initiatives within the City. The results will help the City design the Bicycle and Pedestrian Plan and will prioritize specific bicycling infrastructure improvements.

In March 2012 the City held a community workshop to present progress on the CAP. The workshop was an opportunity for residents and business owners to share their questions and concerns, and to provide feedback on implementation strategies and timelines. In addition, the City received feedback from San Pablo residents at the Middle College Earth Day & Family Fun Day in April 2012 at Contra Costa College. The event was an opportunity to learn about the climate action planning process, recent developments, and to weigh in on proposed CAP measures. Twenty-five residents voted on initiatives they hope to see in the new few years. In addition, in April 2012 Staff presented specific elements of the CAP at San Pablo's Senior Center. The forty Center members in attendance provided staff with feedback on implementation strategies and advice.



*Collaboration at the Community Workshop*

On May 21<sup>st</sup>, Staff presented an update to City Council to provide information on the results of outreach efforts, the development of the list of feasible measures, and the quantification process and results. Councilmembers were asked to provide feedback and pose any questions they may have. The results of this presentation have been incorporated into this CAP. On August 21<sup>st</sup>, Staff presented the draft CAP to the Planning Commission. This CAP and the measures outlined within are a result of these collaborative efforts.

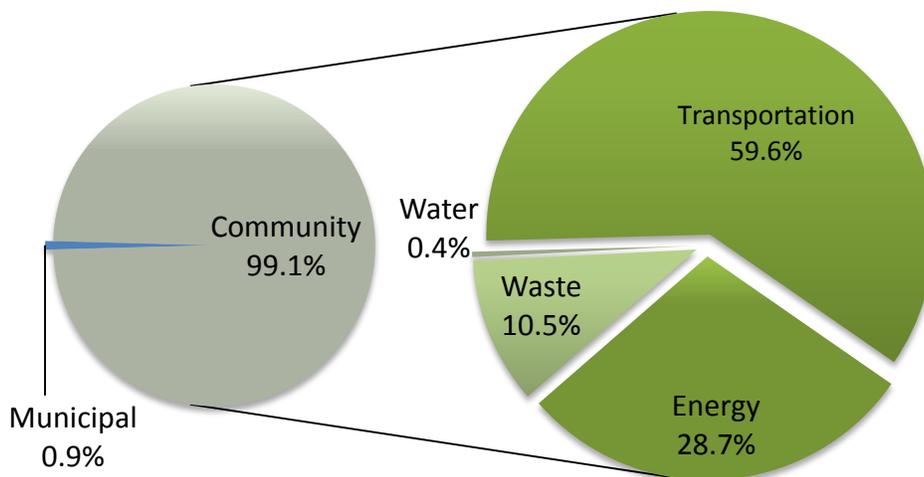
## I.6 San Pablo GHG Emissions and Reduction Target

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### BASELINE AND PROJECTIONS

In order to quantify emission reductions, Staff chose to complete a 2005 GHG Inventory of emission sources in support of ICLEI's countywide initiative to inventory municipal emissions. The inventory found that during this baseline year, San Pablo produced 174,135 metric tons of carbon dioxide equivalent (MTons CO<sub>2</sub>e) communitywide. The transportation sector, which made up 60% of emissions, included traffic on local roads, major thoroughfares such as San Pablo Avenue and the portion of I-80 Freeway which runs through the city. Building energy use data differentiated between residential, commercial and industrial accounts and the aggregate was responsible for 29% of emissions. The remaining 11% were produced by the solid waste and water sectors. 2007 data indicates GHG growth consistent with population and job growth in that year, and a GHG forecast of 2020 emissions indicates that if the City continues a Business-as-Usual trend, it can expect to emit an additional 22,509 MTons CO<sub>2</sub>e by the year 2020. Further information regarding the 2005 GHG Inventory and Forecast can be found in Chapter 2.

Figure I-3: 2005 GHG Emissions Inventory by Source



## GHG REDUCTION TARGET

In keeping with State reduction efforts, San Pablo has set a goal to reduce its emissions to 15% below 2005 GHG levels by 2020. This target requires the City and its community to reduce 26,136 MTons CO<sub>2</sub>e below 2005 levels or a total of 48,645 MTons CO<sub>2</sub>e below the projected 2020 emissions forecast.

## CAP STRATEGIES

In order to streamline implementation of GHG reduction initiatives, the City has designed the prescriptive measures of this CAP to address the four major communitywide emissions sectors and municipal operations.

**Energy:** The Energy measures address building electricity and natural gas use via recommendations for energy-efficiency improvements, new construction and renovation ordinances, promotion of existing energy retrofit programs, and encouragement of renewable energy adoption.

**Transportation and Land Use:** The Transportation and Land Use measures address existing land uses throughout the City with the hope of increasing the availability of services to meet resident's everyday needs. In addition, these measures encourage the use of alternative modes of transportation, walking, biking, and carpools.

**Solid Waste:** The Solid Waste measures address source reduction solutions such as a plastic bag and polystyrene takeout food packaging ban, while also encouraging residents to increase their solid waste diversion rates through City composting and recycling initiatives.

**Water and Wastewater:** The Water and Wastewater measures address water conservation strategies such as drought-tolerant landscaping and a water conservation ordinance. Additionally, this section outlines water recycling opportunities via greywater systems.

**Municipal:** The Municipal measures address all sources of the City government's GHG emissions—Building Energy Use, Streetlight Energy Use, Waste, Municipal Transportation, Purchasing and Municipal Education and Outreach.

Within these chapters there are specific reduction objectives, the measures necessary to achieve them and the action steps required for its full implementation. Staff have quantified the projected emissions reductions of each measure for 2020 and 2035 and have incorporated their percentage contribution to the overall objective in the CAP. Specific reduction goals and targets were developed based on regional trends, case study findings and GHG emission reduction requirements. The City will monitor progress to ensure that the goals of the CAP are being met and will propose any necessary revisions to ensure that the GHG reduction target is achieved.

## **I.7 Implementation**

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The measures outlined in this CAP highlight the strategies which must be put in place in order to meet the City's GHG reduction target; in order to effectively implement these measures, however, given budgetary restrictions the City must prioritize those measures that will meet the City's broader safety, health and sustainability goals. Ease of implementation will depend on active participation from City staff, residents and business owners and may require collaboration with other jurisdictions and regional agencies. In addition, the City will need to identify adequate funding sources and incentivize community buy-in.

# 2 BASELINE, PROJECTIONS, AND TARGETS

The creation of any CAP requires a greenhouse gas (GHG) emissions inventory that establishes a baseline year against which progress towards an established goal can be measured. This chapter presents the City of San Pablo's emissions inventory for 2005, projects 2020 and 2035 emissions based on population and job growth trends, and describes the 15% reduction target set for 2020. The following information is integral in assisting the City in identifying the source types, distribution and magnitude of GHG emissions throughout the City and can be used in support of effective reduction measures and actions.

## 2.1 San Pablo's GHG Emissions Inventory

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The City developed the inventory, in coordination with ICLEI, to better understand the major sources of both municipal and community GHG emissions for the 2005 operational year. This baseline inventory accounts for emissions that occur as a direct result of activities within the community (e.g. local traffic patterns, building natural gas and electricity use, etc), as well as emissions that occur in other places as a result of San Pablo activities such as electricity generation and solid waste disposal in landfills. The inventory highlights those emissions resulting from municipal operations, such as government building energy use, as a subsection of the communitywide baseline.

While the 2005 inventory is a result of rigorous analysis of numerous data sets, there are certain emissions directly associated with community and municipal operations which cannot be accounted for within the scope of this inventory. Indirect emissions, such as air travel by San Pablo residents and the production and transportation of goods consumed within the city, are excluded due to the difficulty of accurate quantification.

This baseline was integral in highlighting the major emissions sectors that must be addressed to achieve a 15% reduction below these 2005 levels by 2020. Once the 2005 baseline inventory was finalized, the City developed 2020 and 2035 forecasts to quantify reduction statistics. The City plans to perform additional inventories on a regular basis to monitor and report progress; these inventories will be used to update implementation strategies as needed.

## 2.2 Methodology

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The inventory was compiled using ICLEI's Clean Air Climate Protection (CACP) Software. CACP is an emissions inventory computer program that uses activity data (e.g., energy consumption, vehicle miles traveled [VMT], etc.) to calculate GHG emissions. San Pablo specific data and emissions factors were used, whenever possible, to generate a more accurate estimation of the community's GHG emissions. The CACP software quantifies overall communitywide emissions sources and then highlights the municipal inventory to allow the City to monitor their GHG emissions on a project-by-project basis. The communitywide sources represent the emissions from residential, commercial, and industrial energy use (both electricity and natural gas); transportation; solid waste; and water and wastewater. As a subset of these sources, municipal emissions include those of City buildings, the vehicle fleet, employee commute, solid waste, streetlights and refrigerants.

To quantify San Pablo's emissions, City staff collected data from PG&E for electricity and natural gas use statistics, the MTC and BAAQMD for transportation information, West Contra Costa Integrated Waste Management Authority (WCCIWMA) for waste data, the East Bay Municipal Utility District (EBMUD) for water, and the West County Sanitary District for wastewater. These numbers were then applied to emissions factors, which represent the amount of Carbon Dioxide Equivalent per Unit that these sources provide in San Pablo. For electricity, these factors take into account the percentage of renewable and fossil fuel generated electricity provided by PG&E. For transportation, MTC provided an estimate of total vehicle miles traveled (VMT) within San Pablo city limits, while BAAQMD provided an estimated breakdown of vehicle type throughout the community. These two data sets were used to determine an emissions factor which represents the CO<sub>2</sub> produced by San Pablo vehicles specifically. Since solid waste is composed of a range of materials and can be disposed of in a number of different ways, the CACP software aggregates material type and applies the landfilled emissions factor to the data provided by WCCIWMA. Water emissions are calculated based on the energy used for transportation and include the same emissions factor as building energy use. The emissions from the treatment of wastewater depend on the amount of energy used at the wastewater treatment facility and the percentage of wastewater associated with San Pablo emissions; the emissions factor is the same as that used for all other energy calculations.

For the complete emissions baseline, please see Appendix B.

## 2.3 Emissions Inventory by Sector

### SAN PABLO COMMUNITY GHG EMISSIONS

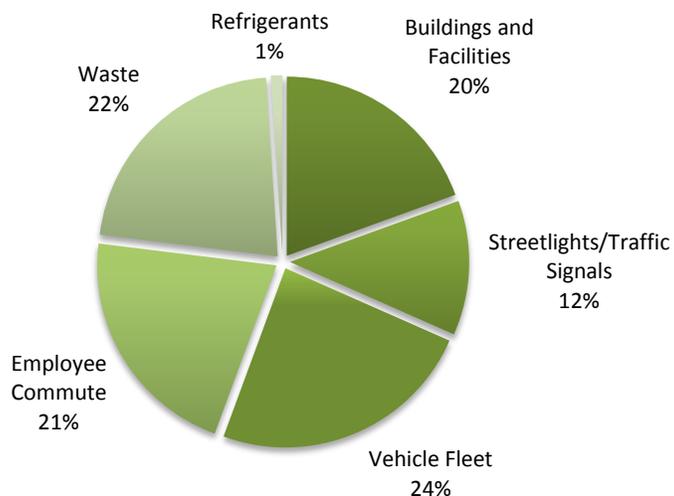
In 2005, the Community emitted 174,134 metric tons of Carbon Dioxide Equivalent (MTons CO<sub>2</sub>e). Transportation was the largest source at 104,623 MTons CO<sub>2</sub>e or 60% of total communitywide emissions. Over half of these emissions were due to the vehicle miles traveled (VMT) by cars passing through San Pablo on the I-80 freeway. Emissions from residential, commercial and industrial building energy use accounted for 29% of the total 2005 community emissions, due in large part to the age of San Pablo's building stock. This sector represents a significant opportunity for emissions reductions through energy efficiency improvements and retrofits. Solid waste sent to the county landfill accounted for most of the remaining 11% of emissions, with the water sector making up less than 1% of communitywide emissions.

### SAN PABLO MUNICIPAL GHG EMISSIONS

Government operations accounted for 1,927 Mtons CO<sub>2</sub>e, or about 1% of the total San Pablo communitywide emissions. These emissions are generated by employee commute, municipal vehicle fleet, City Hall natural gas use, electricity to run City facilities and streetlights, and waste disposed in trash receptacles throughout the city.

As the City continues to implement sustainability initiatives throughout City buildings, this municipal emissions baseline will be a key tool for tracking GHG reductions. While these sources only represent a small portion of total communitywide emissions, the municipal sector will serve as an important example to the community of feasible actions residents and business owners can take to reduce their impacts.

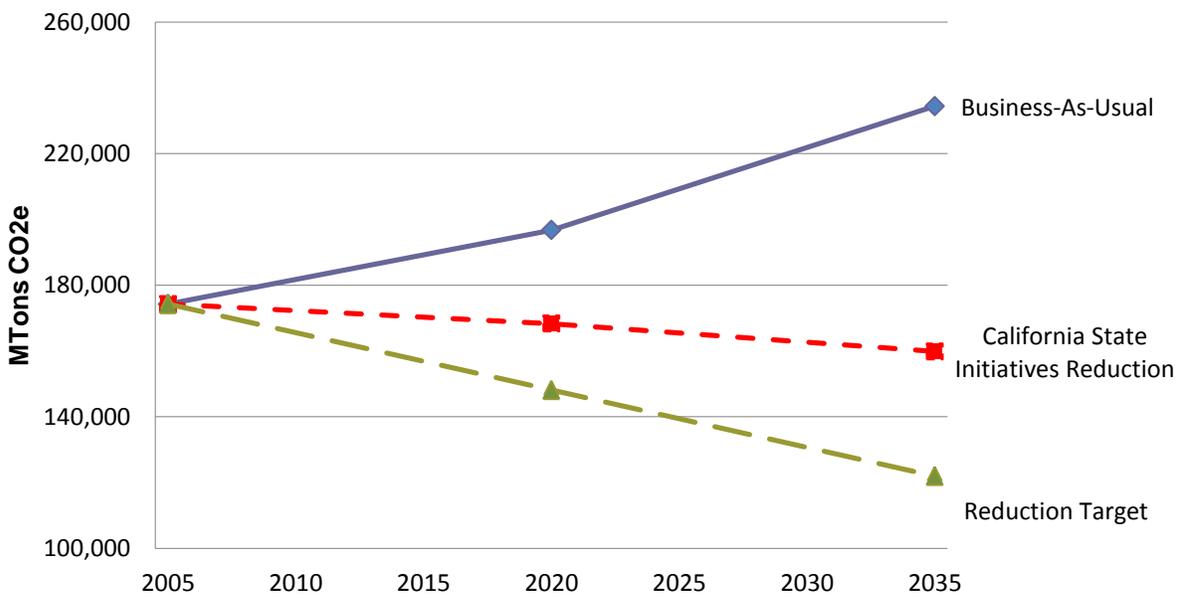
Figure 2-1: 2005 Municipal GHG Emissions Inventory



## 2.4 Baseline and Forecast

In order to develop a more comprehensive emissions baseline for the CAP, the City expanded the Greenhouse Gas Inventory to include emissions from direct access, or renewable energy, consumption, such as electricity produced by photovoltaic panels. Once this 2005 baseline was established, the City developed a GHG emissions forecast for the CAP implementation timeframe (2020) and the AB 32 planning horizon (2035). The forecast was developed using a trend scenario, which applies historical data and growth trends to the baseline emission rates to determine future emission statistics. Staff developed two community scenarios to compare the effects of State reduction efforts on San Pablo’s emissions. A “Business-as-usual” scenario was projected in the absence of any policies or actions that would occur beyond the base year. These projections are based on population, housing, and workforce growth data and do not include any GHG reduction actions. The second emissions scenario quantifies reductions within San Pablo from two major State initiatives: the Renewable Portfolio Standard and Pavley Regulations (AB 1493). While these are not the only State initiatives aimed at reducing GHG emissions, they are both outlined in ARB’s Climate Change Scoping Plan and are projected to account for the majority of Statewide GHG emissions reductions. In order to meet the City’s 2020 reduction goal, San Pablo will have to reduce an additional 26,206 MTons CO<sub>2</sub>e below this State reduction scenario.

Figure 2-2: 2020 and 2035 GHG Emissions Forecast



For the complete emissions Forecast, please see Appendix C.

# 3 TRANSPORTATION AND LAND-USE

## CO-BENEFITS

- Improved air quality
- Improved public health
- Reduced dependency on foreign oil
- Fuel cost savings
- Greater sense of community

Transportation-related emissions account for the majority of San Pablo’s GHG baseline. Cars and trucks on local roads, major thoroughfares and the I-80 freeway release carbon dioxide and nitrous oxide into the air, not only increasing the concentration of GHGs in our atmosphere, but deteriorating local air quality. According to the survey administered by City staff from April 2010 through February 2012, 64% of the community drives to work alone at least half of the time. This leads to rush-hour traffic, excessive vehicle idling and increased GHG emissions. Alternative modes of transportation are available throughout the community, but costs and limited service are prohibitive to many residents. The expansion of these programs and the development of a strong economic base in San Pablo will help reduce the need for residents to commute long-distances to their jobs and encourage the use of public transportation to meet daily needs.

The measures outlined in this section are in keeping with the Land Use & Physical Design, Growth Management and Circulation elements of the City’s 2030 General Plan. These elements were created in conjunction with the planning efforts of the Contra Costa Transportation Authority (CCTA) and the overall goals of the California Department of Transportation (Caltrans). Transit initiatives are currently administered by the West Contra Costa Transportation Advisory Committee (WCCTAC), who coordinate the planning and use of regional and state transportation funding for the region.

TRANSPORTATION AND LAND USE REDUCTION OBJECTIVES	Emissions Reductions (MTons CO <sub>2</sub> e)	
	2020	2035
TLU1. Increase density of mixed-use, infill development along transportation corridors to reduce vehicle miles traveled by 25%.	10,349	23,858
TLU2. Reduce Vehicle Miles Traveled (VMT) by 3% by increasing walking and bicycle ridership.	1,174	2,255
TLU3. Develop car-free outreach and education campaigns specific to San Pablo	212	425

## **Objective TLU I: Increase density of mixed-use, infill development along transportation corridors to reduce vehicle miles traveled by 25%.**

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The CCTA has designated San Pablo Avenue, 23<sup>rd</sup> Street, El Portal Drive, and San Pablo Dam Road as ‘Routes of Regional Significance’, as they connect various County nodes. San Pablo Avenue has been identified as a Bay Area Priority Development Area (PDA) as it is a major transit corridor from Hercules to Oakland and is a parallel route to the I-80 freeway. By allowing increased development along these transportation arteries, the City will expand its housing stock, increase business revenue and encourage transit ridership by providing goods and services around transportation hubs. Combined, these efforts will foster a strong local economy easily accessible by BART, bus, and bicycle networks.

### **Existing Actions**

The City’s 2030 General Plan places particular emphasis on mixed use land development through the designation of Mixed Use Centers along San Pablo Avenue and 23<sup>rd</sup> Street. In re-classifying existing land uses to encourage this increased development, the City has highlighted the importance of locating housing and services along transportation corridors.



*A medium-density multifamily housing complex on San Pablo Avenue*



*Rapid transit has been proven to increase bus ridership; currently the 72R bus route efficiently serves residents and businesses on San Pablo Avenue*

**Strategy TLU 1.1: Transit Oriented Development -**

**60%**  
OF OBJECTIVE  
REDUCTIONS

Increase residential and commercial density and diversity along major transit corridors and encourage Transit Oriented Development along major bus routes to attract new employers and better serve the daily needs of residents and employees.

An emphasis on transit oriented development (TOD) is in keeping with the City’s 2030 General Plan Land Use & Physical Design policies. By increasing density along major transit corridors, residents have access to alternative modes of transportation and goods and services are made available to transit users. Priority should be placed on such developments, not only for the economic vitality of the City, but the overall sustainability of the community.



*The Abella Paseo housing development on Road 20 contributed 130 additional units to the San Pablo housing stock. The complex contains a variety of housing types and is located within walking distance of the San Pablo corridor. Its design combines increased residential density with well-maintained open space close to commercial nodes in San Pablo.*

**Strategy TLU 1.2: Density Standards -**

**10%**  
OF OBJECTIVE  
REDUCTIONS

Implement minimum building heights, density bonuses and parking maximums along major transit corridors to encourage high density, mixed-use and affordable housing development.

In order to generate the demand for public transportation necessary to implement a successful TOD strategy, residential and commercial densities along major transportation corridors must be increased. The City will continue to develop design guidelines that encourage new development, while maintaining the unique characteristics of San Pablo’s neighborhoods. This strategy is in keeping with the Land Use policies outlined in the 2030 General Plan that encourage pedestrian-friendly anchor retail, new residential and commercial development, and the implementation of façade standards that increase the safety and walkability of San Pablo’s streets. In addition, such density and design standards allow for the preservation of more public space. By incorporating a bonus system into

the City’s density standards, developers are encouraged to dedicate portions of their land to parks and open space, in exchange for increased density allowances.

**Strategy TLU 1.3: Parking Management Strategy** – Develop a Parking Management Strategy that both responds to market conditions and encourages high-density development and alternatives to driving.

**10%**  
**OF OBJECTIVE**  
**REDUCTIONS**

The City will develop a Parking Management Strategy that evaluates the overall parking requirements of the City and its community, in order to increase options for consumers, provide residents with parking information, design parking lots and facilities for maximum efficiency, and incorporate pricing models to encourage alternative forms of transportation. Development of an overarching strategy will provide the City with a guide to meeting the needs of the community while avoiding inefficient parking development that discourages pedestrian access and public transportation use are avoided. The 2030 General Plan outlines specific parking strategies for the major corridors in San Pablo – San Pablo Avenue, Rumrill Boulevard, San Pablo Dam Road and 23<sup>rd</sup> Street – but as increases in development take place and the City pursues neighborhood connectivity, a more overarching Parking Management Strategy is required. The General Plan outlines street level design standards for the major street types in San Pablo – auto arterials, urban arterials, mixed-use boulevards, avenues and local streets. The Parking Management Strategy will enhance these standards by addressing the design of parking lots and their effect on pedestrian and bicycle comfort.

**Strategy TLU 1.4: Redevelopment Strategy** – Develop a strategy for redeveloping underutilized areas such as vacant lots and surface parking lots along major transportation corridors.

**10%**  
**OF OBJECTIVE**  
**REDUCTIONS**

Given the limited space for new development within San Pablo, particular emphasis should be placed on redeveloping vacant sites such as parking lots, particularly along transportation corridors. Higher density, mixed use development at these sites will increase residences and businesses located along bus, bicycle and pedestrian routes, leading to improved economic activity and a greater demand for these infrastructure improvements.

**Strategy TLU 1.5: Home-based Business Development** – Develop a strategy to support and encourage home-based businesses that are compatible with residential neighborhoods.

**10%**  
**OF OBJECTIVE**  
**REDUCTIONS**

To encourage small-scale, non-residential uses in neighborhoods to meet the basic, everyday needs of residents, the City will develop a strategy to ease land use restrictions and design criteria that might hinder such

development. Full implementation of this strategy would not only reduce the number of trips to businesses outside of residential neighborhoods, but would also eliminate the commute of employees who could work from home.

## **Objective TLU 2: Reduce Vehicle Miles Traveled (VMT) by 3% by increasing walking and bicycle ridership.**

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Eleven percent of San Pablo’s transportation emissions are a result of circulation within San Pablo. The trips traveled along San Pablo’s local streets are predominantly from residents driving to and from local businesses within San Pablo, such as grocery stores, pharmacies, banks, and restaurants. By actively developing bicycle and pedestrian networks throughout the City, residents will be able to meet their daily needs and access such services on foot or on bike. A well-defined plan could reduce the City’s GHG emissions by over 1,000 MTons of CO<sub>2e</sub> by 2020.

### **Existing Actions**

The 2030 General Plan places particular emphasis on the development of a “Complete Streets” framework to improve circulation within the City. As the Plan outlines, “Complete Streets are designed and operated to enable safe, attractive and comfortable access and travel for all users, including motorists, pedestrians, bicyclists, children, seniors, individuals with disabilities, and users of public transportation.”<sup>vi</sup>

### **Strategy TLU 2.1: Bicycle and Pedestrian Plan – Develop a Bicycle and**

**100%**  
OF OBJECTIVE  
REDUCTIONS

**Pedestrian Plan** to expand and improve the City’s bicycle and pedestrian infrastructure, including addressing current mobility gaps, creating more bike lanes and boulevards, more secure bicycle parking and by developing design standards to enhance the pedestrian environment and increase connectivity.

The City will develop a Bicycle and Pedestrian Plan to enhance bicycle circulation and planning, based on the route network laid out in the General Plan and the Contra Costa Countywide Bicycle and Pedestrian Plan. This Plan will integrate the pedestrian route systems with bike routes and establish linkages to creek areas and other recreation areas. It will identify local and regional routes, route hierarchies and standards, maintenance requirements, safety standards, and signage criteria. In so doing, the City will emphasize the need for safe, accessible bicycle and pedestrian networks throughout the City and will prioritize their development in conjunction with major street renovations or redesigns.

## Objective TLU 3: Develop car-free outreach and education campaigns specific to San Pablo

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One of the greatest hindrances to extensive public transportation ridership is lack of information. BART, AC Transit and WestCAT service information should be easily available in and around San Pablo. In addition, the City should work with businesses to educate employees about the available Contra Costa County public transportation incentive programs. Finally, the City should emphasize the benefits of alternative modes of transportation, including ride-sharing, biking and walking to work, in order to foster a culture of sustainability and transit ridership throughout the Community.

**Strategy TLU 3.1: Commuter Incentive Programs** - Partner with businesses to develop trip reduction outreach programs and alternative transportation incentives for employees.

**82%**  
OF OBJECTIVE  
REDUCTIONS

The City will work with local businesses to incentivize trip reduction and alternative transportation programs that provide employees of San Pablo businesses with safe, accessible, and affordable transit options. These programs may include trip consolidation efforts to reduce business-related trips; car-pool initiatives; public transportation vouchers and discounts; alternative transportation contests and incentive programs; and transit-culture development plans that highlight the importance of trip reductions.

**Strategy TLU 3.2: Public Outreach & Education Campaign** - Develop community education and outreach strategy to promote alternative modes of transportation for daily activities and provide information on incentive programs

**18%**  
OF OBJECTIVE  
REDUCTIONS

Increased awareness about climate change issues and their proposed solutions should be a top priority in the implementation of the CAP. The City will actively foster a culture of sustainability and environmental responsibility by disseminating information about relevant funding opportunities, citywide regulations and environmental initiatives, while also incorporating the sustainability message in newsletters, on the website and at City sponsored events.

# 4 ENERGY

## CO-BENEFITS

Improved air quality

Energy bill savings

Improved building stock and re-sale value

Building energy use is the second largest source of GHG emissions in San Pablo. This sector accounts for emissions associated with the electricity and natural gas used to heat, cool and operate buildings within the community. Given San Pablo’s small size and relatively high density development, there are only 178.7 acres of new development opportunity sites left within the City. Given population and job growth projections, it is clear that new residents and businesses will mostly be housed in the City’s existing building stock. Due to its age, San Pablo’s building stock can be assumed to be operating inefficiently; according to the 2030 General Plan, the estimated median year of construction for structures in San Pablo is 1968. Consequently, the major opportunities to reduce the GHG emissions associated with building energy use will be through energy-efficiency upgrades and retrofits.

According to *Climate Change Impacts, Vulnerabilities, and Adaptation in the San Francisco Bay Area* report prepared for the California Energy Commission (CEC) in July 2012, the Bay Area can anticipate temperature increases over three degrees, five percent less snowmelt and sea level rise of an additional eleven inches<sup>vii</sup>. These changes are likely to increase our energy use with a higher demand for electricity to cool our homes and businesses, and more water needed to pump our water from the mountains. By installing more efficient heating and cooling systems, we can decrease this new demand and offset future GHG emissions.

ENERGY REDUCTION OBJECTIVES	GHG Reductions (MTons CO <sub>2</sub> e)	
	2020	2035
E1. Increase new construction efficiency above Title 24 standards.	746	3,698
E2. Reduce energy use in existing buildings by 20%	3,385	6,870
E3. Increase renewable energy use by 15%	81	366

## Objective EI: Increase new construction efficiency above Title 24 standards.

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**Strategy E 1.1: CalGreen Tier 1 & Tier 2** – Adopt, with local adaptations, the higher tiers of green building performance allowed by the California Green Building Standard (CalGreen), with the possibility of mandatory requirements and higher standards being phased in over time.

**60%**  
OF OBJECTIVE  
REDUCTIONS



CalGreen is the California statewide green building code as outlined under Title 24. Tiers 1 & 2 go above the basic standard to include more stringent requirements related to Planning and Design, Energy Efficiency, Water Efficiency and Conservation, Material Conservation and Resource Efficiency, and Environmental Quality. There are a number of organizations that have developed similar new construction evaluation criteria, such as Build It Green's GreenPoint Rated and Leadership in Energy and Environmental Design (LEED) standards. In developing a San Pablo specific green building standard, the City will incorporate some of the additional criteria outlined by these organizations.

**Strategy E 1.2: Net-Zero New Construction** – Encourage all appropriate new construction to design for net-zero energy.

**40%**  
OF OBJECTIVE  
REDUCTIONS

Net-Zero buildings pair energy-efficient technologies with renewable energy sources to achieve net zero energy usage, which in turn means net zero greenhouse gas emissions. Net-Zero buildings require a rigorous design that evaluates the energy needs of a given building and implements renewable energy standards to meet those needs. At time of construction, the City will provide developers with appropriate educational materials to assist in the process of Net-Zero design.

## Objective E2: Reduce energy use in existing buildings by 20%

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Given the age of the existing building stock in San Pablo, there is a significant opportunity to achieve large-scale emissions reductions through weatherization upgrades, energy efficiency retrofits as well as behavioral change to reduce the demand for electricity and natural gas.



### Existing Actions

The City has implemented a number of outreach programs to promote weatherization and energy-efficiency programs to San Pablo residents. Energy Upgrade California, PG&E's residential rebates and the Contra Costa County Weatherization program have provided San Pablo residents with financial incentives to reduce their energy use.

In addition, the City partnered with East Bay Energy Watch, to offer free lighting audits and rebate incentives to small and medium sized businesses through their Smart Lights program. The City, with funding from an EPA Climate Showcase Communities Grant, covered an additional \$2,000 of retrofit costs per business on a first-come-first-served basis. 24 businesses took advantage of the rebate program, with many more interested in energy-efficiency incentive programs.

### Strategy E 2.1: Residential Energy Conservation Ordinance (RECO)

**65%**  
OF OBJECTIVE  
REDUCTIONS

Require energy-efficiency improvements in existing buildings to be triggered at time-of-sale or with certain types of home improvements, to be phased in over time.

Recognizing the many barriers to energy-efficiency improvements in existing buildings, the City will develop a RECO to require an energy-efficiency analysis and subsequent retrofits or improvements to meet certain, basic standards when a house is sold or goes through a major renovation.

### Strategy E 2.2: Energy-Efficiency Financing – Promote financing

**26%**  
OF OBJECTIVE  
REDUCTIONS

strategies that will encourage property owners to make energy-efficiency investments in their properties.

The City will develop an educational campaign via their website, City newsletters and welcome packages to new residents and businesses to disseminate information about PG&E's on-bill financing; Energy Upgrade California; the Contra Costa County Weatherization Program; PG&E and East Bay Municipal Utility District (EBMUD) rebates; as well as private opportunities energy efficiency loans. The City will, additionally, work with the providers of these financing strategies to streamline the application

process for San Pablo’s community members through increased outreach and application assistance.

**Strategy E 2.3: Public Outreach & Education Campaign** – Develop community education and outreach campaigns to inform residents and business of energy-efficiency funding opportunities, Citywide regulations and to encourage demand reduction behavioral change.

**9%**  
OF OBJECTIVE  
REDUCTIONS

In order to realize the GHG emissions reductions outlined in this CAP, the City will need to actively foster a culture of sustainability and environmental responsibility by disseminating information through newsletters, on the website and at City-sponsored events. In addition, the City should provide residents and business owners with information about relevant funding opportunities, Citywide regulations and environmental initiatives.

## **Objective E3: Increase renewable energy use by 15% by 2020**

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The use of fossil fuels – coal, oil and gas – for energy production is one of the largest sources of GHG emissions globally. While it is critical that we decrease our overall demand for energy through efficiency upgrades and improvements, it is also important to take advantage of alternative, clean sources of energy production. As of 2010, there were only three solar panel arrays installed on residences in San Pablo. Through extensive outreach and the development of renewable energy financing strategies, the City hopes to increase the number of solar installations 15% annually by 2020.

**Strategy E 3.1: Community Solar** – Partner with non-profit organizations and utility providers to develop San Pablo specific Power Purchasing Agreements, joint procurement policies, and financing strategies to enable residents and business owners to adopt solar and other renewable energy technologies.

**100%**  
OF OBJECTIVE  
REDUCTIONS

There are a number of solar and renewable energy non-profit organizations throughout the Bay Area who are actively working to provide low-income residents with alternative, clean energy options. Through partnerships with these organizations and the promotion of regional financing mechanisms, the City can encourage residents and business owners to adopt solar and other renewable energy sources for their homes and businesses. These partnerships can also provide community members with workforce development and green job training.

# 5 SOLID WASTE

## CO-BENEFITS

- Improved air quality
- Compost for community gardens
- Reduced spending
- Reduced litter
- Solid waste regulation compliance

In 2005, San Pablo sent over 25,000 tons of solid waste to landfills in Contra Costa and Sonoma counties. This waste emitted over 18,000 MTons CO<sub>2</sub>e in the form of methane gas, which has a global warming potential 21 times greater than carbon dioxide. The City has since partnered with local organizations and non-profits to develop outreach to reduce the community's overall waste stream. In addition, the City has implemented and expanded recycling and composting initiatives to divert waste from landfills. This CAP calls for continued investment in these and similar programs to reduce and divert waste from regional landfills.

## ADAPTING TO CLIMATE CHANGE

Hotter temperatures increase the speed of decomposition, particularly in oxygen-depleted landfills; therefore, overall reduction of solid waste will have a compounding effect on the reduction of increasing GHG emissions; in addition to the reduce GHGs emitted by transporting waste from residents and businesses to the landfill. Further, as gas prices continue to rise, the cost of transporting solid waste to landfills and recycling centers will become more expensive, so decreasing the number of trips and the weight of loads will save residents, businesses and the waste haulers money.



*Keller Canyon Landfill, where the majority of San Pablo's solid waste is disposed of*

SOLID WASTE REDUCTION OBJECTIVES	Emissions Reductions (MTons CO <sub>2</sub> e)	
	2020	2035
SW1. Reduce the amount of waste being sent to landfills by 50%	1,826	7,058
SW2. Divert 30% of solid waste to composting and recycling facilities	2,747	4,243

## Objective SW 1: Reduce the amount of solid waste being sent to landfills by 50%

While a large portion of the waste produced in any community can be diverted from landfills through recycling and composting initiatives, the most environmentally responsible solid waste management is an overall reduction of the solid waste stream. Recycling and composting can be resource-intensive processes that require energy, water and fuel for transportation. The City will therefore implement a number of waste reduction strategies throughout the community to address the major sources of waste throughout San Pablo.

**Strategy SW 1.1: Commercial Waste Prevention** – Encourage waste prevention in day-to-day operations in businesses through the development of a waste audit program.

**15%**  
OF OBJECTIVE  
REDUCTIONS

The City will partner with businesses throughout the community to perform waste audits and to develop waste prevention strategies with an emphasis on paper waste prevention and responsible purchasing and packaging policies such as two-sided copying, reduced paper requirements, etc.

**Strategy SW 1.2: Single-Use Bag Ban** – Implement a Single-Use Bag Ban to eliminate the distribution of Plastic Bags in the community.

**2%**  
OF OBJECTIVE  
REDUCTIONS

San Pablo will join a number of Bay Area communities implementing bans throughout the community to eliminate the distribution of plastic bags. Community members will be given the option of purchasing paper bags at a low cost or using their own reusable bags. This initiative will not only reduce the City’s GHG emissions, but will also address one of the major sources of litter in San Pablo. The lightweight nature of plastic bags makes them extremely difficult to dispose of properly, so they end up in San Pablo’s creeks and along our roadways. This, in turn, is a drain on City resources, as the Maintenance Division is tasked with collecting and properly disposing of these bags.



*Community members help out at the annual Wildcat Creek Cleanup. In 2011, participants collected 19 bags of trash.*

**Strategy SW 1.3: Polystyrene Takeout Food Packaging Ban** – Implement a Polystyrene Ban in restaurants and business throughout the community.

**4%**  
**OF OBJECTIVE**  
**REDUCTIONS**

San Pablo will partner with a number of other local communities to ban polystyrene. Restaurants and businesses will be mandated with purchasing more sustainable alternatives that can be either recycled or composted. Polystyrene, similar to plastic bags, is a major source of pollution in San Pablo and throughout the Bay Area as it breaks down into smaller pieces, but does not decompose. Small polystyrene fragments easily enter the stormdrain system where it backs up drains and culverts before eventually entering the Bay. By eliminating the dissemination of polystyrene within the community, the City will be able to address the GHG emissions associated with producing, transporting and disposing of polystyrene containers, while also recapturing the costs of pollution prevention.

**Strategy SW 1.4: Food Ware Container Ban** – Implement a Food Ware Container Ban in restaurants and business throughout the community.

**0%**  
**OF OBJECTIVE**  
**REDUCTIONS\***

The City of San Pablo will consider banning food ware containers from restaurants and business throughout San Pablo by 2035. Restaurant and business owners may provide reusable food ware containers to their patrons in order to reduce food ware container waste. In addition, residents and visitors may bring their own reusable food ware container to take leftovers and food to-go. This strategy will require extensive outreach and education to the community, which will be included in development of the ban.

**Strategy SW 1.5: School Waste Reduction Curriculum** – Partner with WCCUSD to develop and implement Waste Reduction Curriculum.

**2%**  
**OF OBJECTIVE**  
**REDUCTIONS**

The City will partner with the West Contra Costa Unified School District (WCCUSD) to develop a waste reduction curriculum throughout San Pablo schools. Currently, San Pablo leads the way in several health and environmental initiatives that promote keeping the City's children healthy, active and engaged. A Waste Reduction Curriculum would further these initiatives by encouraging students to make well-informed decisions about their waste creation and diversion.

*\* The Food Ware Container Ban will not be implemented until after 2020, so it contributes no GHG emissions reductions to the City's 2020 goals. It is included for future solid waste planning purposes.*

The City has already been integral in providing recycling and composting educational workshops and events to San Pablo's schools through its membership in the West Contra Costa Integrated Waste Management Authority (WCCIWMA). This strategy will further those efforts.

**Strategy SW 1.6: Public Outreach and Education Campaign** – Launch an outreach campaign in the community with the goal of reducing solid waste sent to landfills by 10% over ten years.

**78%**  
OF OBJECTIVE  
REDUCTIONS

Increased awareness about climate change issues and proposed solutions should be a top priority in the implementation of the CAP. In order to realize the GHG emissions reductions outlined in this CAP, the City will actively foster a culture of sustainability and environmental responsibility by disseminating information about relevant funding opportunities, Citywide regulations and environmental initiatives, while also incorporating the sustainability message in newsletters, on the website and at City sponsored events.

## **Objective SW 2: Divert 30% of solid waste to composting and recycling facilities**

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Solid waste that must be created by various activities throughout the community should be properly disposed of. The City is pursuing a number of initiatives that will divert solid waste to composting and recycling facilities throughout the County. These programs, including the residential food scrap composting program implemented last year, will reduce more than 50% of the GHG emissions associated with solid waste disposal in San Pablo.

**Strategy SW 2.1: Recycling Expansion Program** – Expand the City's residential and business recycling programs to weekly residential pick-ups and increased commercial recycling.

**86%**  
OF OBJECTIVE  
REDUCTIONS

Currently, curbside recycling is collected on a bi-weekly basis. The City will expand programs to weekly residential recycling and will work with local businesses to increase recycling collection in the commercial sector. According to a waste characterization study completed by the City of Mountain View, these programs have proven to increase solid waste diverted to recycling facilities by up to 20%. In San Pablo, this diversion rate would account for over 2,000 MTons of CO<sub>2</sub>e by 2020.

**Strategy SW 2.2: Composting Expansion Program** – Expand and develop the City’s residential and business compost programs to weekly residential pick-ups and increased commercial composting

**2%  
OF OBJECTIVE  
REDUCTIONS**

The City has implemented curbside composting and in 2011 expanded the program with a pilot program to include food scraps. The organic waste diverted by these programs is taken to a facility where it is turned into compost and sold back to the community for use in gardens. Similar to the expanded recycling program, the City will increase curbside composting pick-ups to weekly collection, increasing the diversion rate by up to 20%. In addition, the City will consider expanding recycling and composting programs to include businesses.



*In 2011, the City expanded its green bin services to include food scrap composting. The City implemented an outreach program to educate residents about this additional service.*

**Strategy SW 2.3: School Waste Diversion Program** – Expand and develop the City’s school recycling and composting programs.

**0.4%**  
OF OBJECTIVE  
REDUCTIONS

Over the past several years the City has partnered with local non-profits and community organizations to educate San Pablo students about the importance of recycling, composting and proper solid waste disposal. The City as a member of WCCIWMA will continue to work on these programs, while partnering with local school administration to evaluate and implement more thorough recycling and composting programs.

**Strategy SW 2.4: Construction & Demolition Waste Management Ordinance** – Expand the City’s Construction & Demolition Waste Ordinances to exceed Cal Green requirements.

**11%**  
OF OBJECTIVE  
REDUCTIONS

In 2004, Contra Costa County implemented a Construction & Demolition Waste Ordinance for its unincorporated districts requiring a 50% waste diversion rate for demolition, construction and renovation projects over 5,000 square feet. In July 2012, the ordinance was expanded to include any non-residential additions over 2,000 square feet or alterations over \$500,000. In July 2013, the program is slated to expand to include additions of 1,000 square feet or greater or alterations over \$200,000. The City will continue to expand the ordinance to exceed Cal Green requirements.

# 6 WATER AND WASTEWATER

## CO-BENEFITS

Water independence and security

Economic benefits from sale of biosolids and/or use as fertilizer on City property

Operating/utility cost

Water accounts for a small fraction of San Pablo’s GHG inventory, but efficient transportation, use, treatment and disposal of the community’s water supply must be addressed to ensure the City’s long-term sustainability. GHG emissions from water and wastewater are the result of the energy needed to transport and treat water from the Hetch Hetchy reservoir in the Sierra Nevadas; the power used to heat water in residences and businesses in San Pablo; and, the energy used to pump, treat and dispose of wastewater. By reducing overall demand and encouraging reuse where applicable, San Pablo can reduce the GHGs associated with water and wastewater.

## ADAPTING TO CLIMATE CHANGE

As annual temperatures continue to rise, the Sierra Nevada snowpack will decrease, putting stress on California’s water supply. Periods of drought and high temperatures will affect local ecosystems, lead to increases in wildfire and threaten at-risk members of the San Pablo community. The City plans to adopt a number of water-efficiency strategies that will make better use of our existing water supply and manage the adverse effects of climate change. These initiatives will reduce costs to residents and businesses by addressing inefficient appliances, landscaping practices and water disposal systems

WATER AND WASTEWATER REDUCTION OBJECTIVES	Emissions Reductions (MTons CO <sub>2</sub> e)	
	2020	2035
W1. Increase water efficiency throughout the community by 50%	192	850
W2. Increase water recycling throughout the community by 1%	4	8

## Objective W 1: Increase water efficiency throughout the community by 50%

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### Strategy W 1.1: Residential Water-Saving Equipment – Partner with

**22%**  
OF OBJECTIVE  
REDUCTIONS

EBMUD to perform audits and provide financing strategies to San Pablo residents needing water-efficiency upgrades to their faucets, sinks, showers and other water equipment

The East Bay Municipal Utility District (EBMUD) has a number of rebate and audit programs available to residents interested in improving water-use efficiency. The City will partner with EBMUD to increase San Pablo's participation in such programs through extensive outreach efforts and increased funding.

### Strategy W 1.2: Commercial Water-Saving Equipment - Partner with

**7%**  
OF OBJECTIVE  
REDUCTIONS

EBMUD to perform audits and provide financing strategies to San Pablo businesses needing water-efficiency upgrades to their faucets, sinks, showers and other water equipment.

Similar to the program developed for residential water conservation equipment, the City will partner with EBMUD to perform audits in businesses throughout San Pablo. The City will then help these businesses reduce their water use through rebate and financing programs to install water-saving equipment.

### Strategy W 1.3: Commercial Education and Outreach – Launch

**11%**  
OF OBJECTIVE  
REDUCTIONS

“sustainability challenge” outreach campaign for local businesses with the goal of reducing water use by 10% over ten years

The City will partner with local businesses to develop a “sustainability challenge” outreach campaign targeted at reducing water consumption by 10% over ten years. The campaign will include water audits, financing strategies to update all water-equipment, and behavioral change education strategies such as water savings competitions between businesses, annual workshops, brown bags, etc.



*The City has already implemented municipal bay-friendly landscaping projects. Continued education and outreach will be necessary to successfully implement the Water Conservation Ordinance*

**Strategy W 1.4: Water Conservation Ordinance –**

**60%  
OF OBJECTIVE  
REDUCTIONS**

Implement a water conservation ordinance to regulate water use during peak temperature hours, expand drought tolerant landscaping and implement water conservation education and outreach.

The City will develop a Water Conservation Ordinance that expands on existing drought tolerant landscaping practices, limits hours of outdoor water use, and encourages resident behavioral change. Currently, the City requires 90% drought tolerant landscaping on resident lawns; the Ordinance will expand this requirement to 95% or more drought tolerant landscaping by 2020. The City will provide educational materials to homeowners to encourage implementation. Drought tolerant landscaping is more resilient, requires less energy, water and fertilizers, and is well suited for San Pablo’s Mediterranean climate. Restrictions on outdoor watering will reduce stress on water infrastructure and the water supply, while also reducing inefficient practices, such as lawn watering during the hottest hours of the day.

**Objective W 2: Increase water recycling throughout the community by 1%**

**Strategy W 2.1: Greywater Systems –** Encourage the use of greywater for irrigation, vehicle cleaning and other outdoor uses.

**100%  
OF OBJECTIVE  
REDUCTIONS**

Greywater systems reduce the energy use needed to pump water for outdoor uses, while also reducing the energy needed to treat wastewater. The City will provide residents with information about existing permit requirements for greywater systems. In addition, the City will consider easing the permitting process to encourage increased use of greywater systems. Additional co-benefits of these systems include reduced chemical use for wastewater treatment and reduced storm water runoff.



# 7 MUNICIPAL MEASURES

## CO-BENEFITS

Reduced City spending on energy, fuel and water

Reduced operational and maintenance cost

Improved indoor and outdoor environmental air quality

Improved staff comfort and health

Increased community interaction

Municipal measures have been developed to address the GHG emissions associated with the City's internal operations. In 2005, the City contributed 1,498 MTons CO<sub>2</sub>e to the overall communitywide baseline emissions inventory. While these emissions include those associated with streetlights, sidewalk garbage disposal, watering parks and community sports fields, municipal operations and other community services, the City is responsible for their efficient operation. The City must, therefore, design and implement municipal programs to help reduce its contribution to the community's GHG emissions and ensure a healthy and sustainable San Pablo.

In addition, measures implemented at the municipal level include extensive co-benefits for City employees, local business-owners and residents. By addressing inefficiencies in energy and water use, fuel consumption, employee behavior, purchasing policies, and waste creation the City will save money, improve employee satisfaction, increase community involvement and interaction, contribute to the overall aesthetics of the San Pablo community, and create a positive example for residents and business-owners.

The following programs have been developed based on their effective reduction of GHG emissions, as well as their extensive co-benefits. Staff have considered the costs to the City of implementation and will actively pursue alternative funding sources when available. The energy, water and fuel savings of many of the proposed programs will allow for reinvestment in other sustainability initiatives and will require rigorous monitoring to ensure effectiveness.

## 7.2 Municipal Building Energy Use Reduction Strategies

The City’s building stock consists of five City Hall buildings, the Police Department, the Corporation Yard, the Church Lane and Davis Park Senior Centers, Davis Park Multipurpose Building and Wanlass Park Environmental Education Center. Combined, their electricity and natural gas use account for 19% of municipal emissions, due in large part to poor weatherization, inefficient HV/AC systems and large IT loads. By developing a whole building approach to energy-efficiency in municipal operations, the City will be able to reduce a significant portion of its greenhouse gas emissions.

### Existing Actions

Beginning in July of 2011 the City adopted a 4 Day Work Week to reduce operational costs and to save energy. In October 2011, the City retrofitted the lighting in all City Hall buildings, the Police Department, and the Church Lane Senior Center with funding from an Energy Efficiency and Conservation Block Grant (EECBG). These programs saved \$12,000, nearly 91,000 kWh and 15,525 therms in the first year.

In 2010, the City was awarded an Environmental Protection Agency (EPA) grant, in collaboration with El Cerrito, Albany and Piedmont, to form the Small Cities Climate Action Partnership (SCCAP). SCCAP put out a joint solar procurement request for proposal and the City is now working to finalize a contract for a 365 kW photovoltaic system to be installed at San Pablo City facilities. In addition, partnership cities have been able to pilot energy-efficiency projects at their various City halls and share the results with the other members. Plug load sensors, wireless thermostat controls and energy management systems have been explored and the City of San Pablo has

MUNICIPAL BUILDING ENERGY USE REDUCTION OBJECTIVES	Emissions Reductions (MTons CO <sub>2</sub> e)	
	2020	2035
B1. Integrate energy efficiency and other green building practices into new City facilities.	17	58
B2. Conduct efficiency audits and implement energy/water efficiency retrofits in existing City facilities.	221.26	289
B3. Establish energy and water management policies and practices for City facilities.	70.6	80.8
B4. Consider clean energy alternatives for City facilities/operations.	131	131

begun to implement a number of these measures.

## **Objective B1: Integrate energy efficiency and other green building practices into new City facilities**

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New City facilities represent a significant opportunity to implement green, energy-efficient technologies and practices. The 2011 Wanlass Park Environmental Education Center was designed to use green building materials, be energy-efficient and run predominantly off solar electricity installed onsite. The new Helms Community Center, slated to open in the spring of 2014 will integrate a number of such sustainable building practices and will pursue Leadership in Energy and Environmental Design (LEED) Silver certification.

**Strategy B1.1: Municipal Green Building Policy** – Develop and implement green building standards for major renovations to existing City buildings and new municipal construction.

**98%**  
OF OBJECTIVE  
REDUCTIONS

The City will incorporate green building standards for all major renovations and new construction. These standards will include energy and water efficiency requirements, sustainable building practices and the proper disposal of any construction materials and hazardous wastes.



*Wanlass Park Environmental Education Center*

**Strategy B1.2: Green Roofs** – Develop a policy to evaluate the feasibility of rooftop gardens and other green roof technologies on all new municipal construction.

**2%**  
OF OBJECTIVE  
REDUCTIONS

Green roofs serve multiple important environmental functions. By increasing the amount of vegetation in a community they help to reduce the urban heat island effect, sequester carbon, provide wildlife habitat for birds, butterflies and other insects, naturally filter toxins out of the air, and provide a storm water management system to filter out pollutants and reduce the amount of runoff. The City will evaluate the feasibility of green roofs on new City construction.

## **Objective B2: Audit, commission and retrofit water and energy systems throughout municipal buildings**

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The City has already begun to address inefficiencies in municipal energy and water use by conducting audits specific to lighting, heating and ventilation and weatherization. As a result of these studies, the City has replaced all inefficient lighting fixtures throughout City Hall, the Police Department, and Senior Center, will undertake weatherization improvements in the summer of 2012, and will further explore the possibility of a heating and ventilation system upgrade.

**Strategy B2.1: Municipal Energy Audits and Upgrades** – Continue to conduct energy audits of all City facilities, identify opportunities for savings, and implement recommended, cost-effective energy-efficiency upgrades.

**9%**  
OF OBJECTIVE  
REDUCTIONS

The City will work with energy-efficiency contractors to audit municipal systems and identify areas for improvement. The City will make upgrades when economically feasible and will pursue funding opportunities to address inefficiencies.

**Strategy B2.3: Retro-commissioning** – Improve energy performance of City buildings by retro-commissioning all electrical and natural gas systems throughout City facilities.

**81%**  
OF OBJECTIVE  
REDUCTIONS

Retro-commissioning is an auditing process in which installed energy systems are evaluated to ensure that they are operating to meet the needs of

the building's current usage. During the retro-commissioning process anomalies may be noted and operational improvements made to increase efficiency. The City will pursue retro-commissioning of all existing systems within municipal facilities, particularly the heating, ventilation & air conditioning (HV/AC) units, to highlight and address any inefficiencies. Retro-commissioning will save the City energy, reduce operation and maintenance costs, and maximize the lifespan of electrical equipment.

## **Objective B3: Establish energy and water management policies and practices for City facilities**

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Water and energy management practices can reduce utility bills, save the City operation and maintenance costs, and significantly impact municipal GHG emissions, without requiring significant upfront capital. The money saved through these policies can be reinvested in energy-efficiency technologies to make them more cost-effective. The City has begun to implement a number and water management systems in City facilities, such as drip irrigation for City landscaping, and will continue to pursue these measures whenever feasible.

**Strategy B3.1: Plug Load Sensor Controls** – Install plug load sensor controls to reduce energy consumption in City facilities.

**9%**  
OF OBJECTIVE  
REDUCTIONS

As a member of the Small Cities Climate Action Partnership (SCCAP), San Pablo received 150 plug load sensor controls through the California Energy Efficient Program (CEEP). These controls were installed at workstations throughout City Hall, the Police Department, the Corporation Yard and numerous community facilities within the City's jurisdiction with the intent of reducing energy consumed by employee computers, printers and other electronic devices by shutting down systems after 30 minutes of inactivity. These sensors will greatly reduce energy use without requiring significant behavioral change on the part of the occupants.

**Strategy B3.2: 4 Day Work Week and Lights-Out Policy** – Reduce energy use by decreasing hours of operation by implementing a 4 Day Work Week and a lights-out policy at night at City facilities.

**89%**  
OF OBJECTIVE  
REDUCTIONS

In July of 2011 the City adopted a 4 Day Work Week policy to reduce operational costs, to reduce employee commutes and to increase access to

services before and after the typical work day. By reducing the number of days City facilities are in operation, the City has been able to reduce natural gas use by 14%. In addition, by lengthening the workday, the City is in operation during fewer peak hours per week, which has saved the City over \$10,000 in operational costs in the first year. The stress on computers and other electronic devices from powering off and powering back on is reduced by 1/5<sup>th</sup> and provides the City with additional energy savings. This program coupled with a lights-out policy, particularly at night, significantly reduces the City's energy use while providing additional financial benefits.

**Strategy B3.3: Expand Tree Cover** – Develop and implement a municipal tree policy that requires the consideration of tree planting during any major landscape developments at City facilities.

**2%**  
OF OBJECTIVE  
REDUCTIONS

Planting trees in close proximity to a building shades the structure from direct sunlight, keeping it cool and reducing the need for air conditioning. Additionally, trees sequester carbon, reducing the ambient air temperature and filtering toxins from the air. The City will take advantage of these benefits by planting trees near City facilities and in City parks and on sidewalks where feasible.

## Objective B4: Pursue clean energy alternatives for City facilities/operations

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**Strategy M-B4.1: Solar PV** – Install a 365 kW-dc photovoltaic array on City facilities in 2012.

**100%**  
OF OBJECTIVE  
REDUCTIONS

In the spring of 2012, the City released a Request for Proposal to eligible solar contractors in the Bay Area as a part of a joint procurement policy with the other three SCCAP member cities and the City of Berkeley. The City intends to install a 365 kW-dc system on a number of City facilities to cover a larger portion of municipal electricity demand. The photovoltaic system will save the City over \$4 million and reduce its greenhouse gas emissions by 3,646 MTons CO<sub>2</sub>e over the next 30 years.

The City will also consider the installation of renewable energy sources during all new construction and major renovations to existing municipal facilities.

## 7.3 Municipal Streetlight Energy Use Reduction Measures



*In 2011 the City retrofitted 82 streetlights to energy-efficient LEDs*

The City owns 234 streetlights in San Pablo and is responsible for their maintenance. The remaining 1292 are owned and maintained by the PG&E, who charge the City a flat maintenance fee and variable electrical rates based on lighting type. Any upgrades or retrofits to PG&E-owned lights must be performed by PG&E approved contractors and follow a specific permitting process. This ownership hinders the City's ability to upgrade lights at will and must be taken into consideration when proposing any streetlight additions or redesigns.

### Existing Actions

In the spring of 2011, the City retrofitted eighty-two of their 234 streetlights from high-pressure sodium to energy-efficient light-emitting diodes (LEDs). These lights were chosen due to their location on major thoroughfares in San Pablo with heavy pedestrian traffic. The retrofit was funded by the EECBG grant and included the replacement of an additional 44 high pressure sodium parking lot lights. This upgrade will save the City money in electricity use, maintenance costs and replacements. LEDs are a significantly more efficient lighting source with a longer lifespan than traditional bulbs. Additionally, they are mercury free and provide a brighter, whiter light that has been proven to increase safety. The City will continue to pursue financing mechanisms to retrofit all City-owned streetlights to LEDs over time. The City will also partner with PG&E to prioritize retrofitting PG&E-owned streetlights, when appropriate.

MUNICIPAL STREETLIGHT ENERGY USE REDUCTION OBJECTIVES	Emissions Reductions (MTons CO <sub>2</sub> e)	
	2020	2035
SI. Implement energy-efficiency standards for City-owned streetlights.	110	140

## Objective S1: Implement energy-efficiency standards for City-owned streetlights

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Major lighting retrofits and installations require photometric studies, which evaluate light levels as perceived by the human eye. This is to ensure that there is adequate illumination and there are not pockets of bright light surrounded by shadows, which can be disruptive to drivers and pedestrians. The safety concerns associated with these lighting conditions often require upgrades and the installation of additional streetlights. The City will require all new streetlights and any retrofitted fixtures to be energy-efficient.

**Strategy S1.1: LED Streetlights** - Replace low-efficiency streetlights with high-efficiency light-emitting diodes (LEDs) fixtures and develop an energy-efficiency standard for all new streetlights.

**100%**  
OF OBJECTIVE  
REDUCTIONS

The City will pursue funding sources to complete the retrofit of all City-owned streetlights to LEDs and will partner with PG&E to begin to retrofit PG&E-owned lights. In addition, the City will develop an energy-efficiency standard for all new streetlights.

## 7.4 Municipal Waste Reduction Measures



*Students from San Pablo designed tiles for the new trash receptacles located throughout the City*

As a commercial space, the City’s solid waste disposal policies are dependent on commercial recycling and composting policies within the City. This presents a unique opportunity for the City to develop and implement waste reduction measures that can be replicated in businesses throughout the city.

### Existing Actions

The City encourages paper and cardboard recycling in offices by placing a blue bin next to each office trash receptacle. In addition, there are bottle and can receptacles located around City Hall. All major copiers and printers default to two-sided, black and white printing. All City Council Meeting agenda packages are now available on-line so paper copies are no longer being printed. Solid waste bins on sidewalks and in parks are dual garbage-recycling receptacles and residents are encouraged to properly dispose of their waste.

MUNICIPAL WASTE REDUCTION OBJECTIVES	Emissions Reductions (MTons CO <sub>2</sub> e)	
	2020	2035
MW1. Implement waste reduction practices in all City facilities.	7	14
MW2. Encourage recycling of used materials whenever feasible at City facilities.	0.93	2.06

## Objective MW1: Implement waste reduction practices in all City facilities

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While the City works to expand its waste diversion efforts, waste reduction measures should be put in place to decrease the overall waste stream of municipal facilities. Policies such as two-sided copying and electronic correspondence will save the City money in paper costs and recycling disposal. Developing waste reduction efforts for City events will also help to promote a culture of sustainability throughout the City.

**Strategy MW1.1: Waste Prevention** – Develop waste prevention policies for municipal operations.

**100%**  
OF OBJECTIVE  
REDUCTIONS

The City will develop and implement waste prevention campaigns and policies throughout municipal facilities. Paper waste reduction will include default two-sided copying and printing, encouragement of electronic correspondence and filing, the dissemination of electronic tablets to City staff when relevant, and the use of an electronic plan room for bids. The City will develop waste prevention campaigns for all City events, which may include the encouragement of reusable food ware, the discouragement of handouts and giveaways where applicable, and an emphasis on products with reduced packaging.

## Objective MW2: Encourage recycling of used materials whenever feasible at City facilities.

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Paper towel and food scrap composting, expanded recycling, maintenance debris recycling and more thorough waste diversion campaigns could greatly reduce municipal solid waste sent to the landfill. Outreach and education campaigns could be used to encourage behavior-change on the part of City staff.

**Strategy MW2.1: Expand Recycling and Composting** – Audit and expand recycling and composting programs into all City facilities.

**100%**  
OF OBJECTIVE  
REDUCTIONS

The City will audit the existing solid waste stream and develop programs to address waste disposal and diversion inefficiencies. Recycling and composting programs will be implemented throughout all City facilities and expanded efforts will be pursued.

## 7.5 Municipal Transportation Measures

Employee commutes and the municipal vehicle fleet are the largest sources of emissions in the City. Improving the fuel-efficiency of City vehicles, addressing work-related driving policies and encouraging alternative commute strategies for City employees will greatly reduce the City’s carbon footprint, while saving the City money in expensive fuel costs.

### Existing Actions

In 2006 the City replaced four old, inefficient City vehicles with four new, Honda Civic Hybrids. In addition, the City’s Environmentally Preferred Purchasing Policy encourages City staff to consider the environmental impact of the vehicles they purchase, such as their fuel efficiency, construction and size.

In 2012, the City adopted a Cycle San Pablo campaign to encourage bicycle ridership in the City. The campaign was kicked off by City staff providing leadership to the community by hosting an annual Bike to Work Day, featuring City staff and councilmembers on bicycles in the Cinco de Mayo parade, hosting a Great Bicycle Bonanza at the new Wanlass Park and encouraging City employees to bike to the annual Public Works Barbeque. The campaign recommends that May be designated ‘Bike Month’ in San Pablo and that the previously mentioned events be held on an annual basis. This initiative will reduce municipal greenhouse gas emissions, encourage community members to cycle in San Pablo, and will support Healthy Eating Active Living campaign strategies. To further these initiatives, the City has installed visible bike racks around City Hall and parks to encourage employees and visitors to travel to work by bike.

MUNICIPAL TRANSPORTATION OBJECTIVES	Emissions Reductions (MTons CO <sub>2</sub> e)	
	2020	2035
T1. Establish energy efficient fleet management and operation practices.	48.19	81.71
T2. Provide for alternative transportation options for all City employees.	41	45

## Objective T1: Establish energy-efficient fleet management and operation practices

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**Strategy T1.1: Fleet Maintenance** – Improve maintenance regime for increased efficiency for City vehicles.

**29%**  
OF OBJECTIVE  
REDUCTIONS

The City will develop maintenance policies to increase overall vehicle efficiency. Checking tire pressure, changing oil and regular vehicle maintenance can greatly reduce the amount of CO<sub>2</sub> being produced by a vehicle. Additionally, alerting drivers to more efficient vehicle use practices, such as lightening truck loads, removing rooftop racks when not in use and tightening fuel caps after refueling can reduce car emissions significantly.

**Strategy T1.2: Scheduling & Routing Efficiency** – Develop a scheduling system to encourage employees to reduce trips and carpool when possible.

**71%**  
OF OBJECTIVE  
REDUCTIONS

Coordinating trips between City facilities, to meetings and conferences, and out in the field can reduce fuel consumption. The City will implement a policy where drivers are encouraged to coordinate with other employees attending the same events, to collaborate on projects and site visits to reduce trips and to consider the most efficient routes when traveling from one place to another.

## Objective T2: Provide for alternative transportation options for all City employees.

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Through organizations such as 511 Contra Costa numerous alternative transportation benefits are available to City employees, which have significant co-benefits felt throughout the community. Carpooling fosters collaboration among employees; public transportation increases staff interaction with community members; bicycling and walking to work promote healthy and sustainable living habits; and combined, these efforts greatly reduce municipal greenhouse gas emissions leading to improved air quality, reduced traffic congestion and a healthier community. The City partners with WCCTAC to provide incentives and information to employees.

**Strategy T2.1: Municipal Commuter Programs** – Partner with public transportation providers to develop and promote employee incentive programs, including developing an online carpool portal to coordinate ridesharing. Continue to install bicycle lockers and changing facilities in City facilities.

**100%**  
**OF OBJECTIVE**  
**REDUCTIONS**

Building on existing countywide incentive programs, the City will implement measures to encourage use of public transportation and carpooling by reducing costs of these options or increasing the cost to employees of driving alone. This initiative will require significant outreach to employees to disseminate information about alternative transportation options and their benefits.

## 7.6 Municipal Purchasing Measures

The City has begun to develop a number of measures to reduce energy, water and resource demand. These waste prevention, energy conservation and water saving initiatives will greatly reduce the emissions associated with electronic equipment, vehicles and supplies already at City facilities. Developing a responsible purchasing plan to reduce the emissions associated with future purchases is necessary to creating sustainable municipal operations.

MUNICIPAL PURCHASING OBJECTIVES	Emissions Reductions (MTons CO <sub>2</sub> e)	
	2020	2035
PI. Implement sustainable purchasing policies for municipal operations.	48	110

### Objective PI: Implement sustainable purchasing policies for municipal operations

In 2007, the City adopted an Environmentally Preferable Purchasing Policy (EPPP) that requires all employees consider the complete environmental impacts of their purchases and choose the environmentally preferable product whenever possible. Such policies increase markets for environmentally preferable products and help to close the recycling loop. The policy applies to all City departments and is included in all janitorial contracts.

**Strategy P1.1: Environmentally Preferable Purchasing Policy** – Update

**100%**  
OF OBJECTIVE  
REDUCTIONS

policy and tools to enable effective procurement of energy efficient equipment and vehicles, recycled-content paper and products, and goods with reduced packaging.

Since its adoption, there has been minimal regulation of the EPPP. Employees are not responsible for submitting their choices for review before purchasing and the policy has not been expanded to incorporate all purchases done on behalf of the City. City staff will work to expand the requirements of the EPPP and to develop a review process to be used prior to purchasing office supplies, appliances, equipment and vehicles. In addition, the policy will be expanded to include recommendations for consolidating orders in order to reduce packaging and delivery trips.

## 7.7 Municipal Education and Outreach Measures

The success of the initiatives outlined above are dependent on employee behavior change. In order to encourage adoption of sustainable initiatives, City staff will work to foster a culture of sustainability through a number of education and outreach campaigns. Disseminating information through department heads, City management and City Council will encourage employees to use less water, turn off the lights, adjust the thermostats for greater efficiency, recycle their paper, think about their purchases, bike to work, walk to lunch and inevitably consider the impacts of their day-to-day decisions.

MUNICIPAL EDUCATION AND OUTREACH OBJECTIVES	Emissions Reductions (MTons CO <sub>2</sub> e)	
	2020	2035
O1. Inform City employees of sustainability initiatives and upgrades to City facilities and engage employees in behavior-based programming to compliment these efforts.	11	63

### Objective O1: Inform City employees of sustainability initiatives and upgrades to City facilities while encouraging behavioral-change to compliment these efforts.

The City will develop a Municipal Green Team responsible for introducing sustainability initiatives and encouraging involvement within City Hall. This Green Team will be comprised of employees from various departments who will design outreach campaigns, develop sustainability initiatives and competitions, work to “green” City events and programs, and implement the strategies outlined in this CAP.

#### Strategy O1.1: City Employee Education – Develop a Municipal Green

**100%**  
OF OBJECTIVE  
REDUCTIONS

Team that will be in charge of education and outreach to other City employees; the Green Team will develop an ongoing “sustainability challenge” between City departments to encourage adoption of municipal sustainability strategies.

The Municipal Green Team will develop a “sustainability challenge” within City Hall to encourage sustainable purchasing, waste disposal, water and

electricity use, and commuting. The challenge will encourage City employees to compete to reduce their greenhouse gas emissions both at work and at home. The challenge will occur annually and may involve a “green” designation for the department which most embodies the culture of sustainability that the City hopes to foster.

# 8 IMPLEMENTATION & MONITORING

The preceding chapters outline the objectives and strategies proposed to meet the 2020 GHG Reduction Target. In order to actually achieve these goals, however, the City must develop an implementation plan based on the following feasibility analysis, funding opportunities, monitoring and reporting actions and proposed plan updates.

Implementation of the measures outlined in this CAP is contingent on available resources and will be updated as new data becomes available.

## 8.1 Feasibility

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In researching and evaluating the measures chosen in this CAP, the City analyzed the effectiveness, co-benefits, cost and urgency of each action to determine its feasibility and impact. Based on these factors, the City has developed a ranking and timeline for both community and municipal measures. Appendix I summarizes the results of this study and details the GHG reductions associated with its full implementation.

The effectiveness rating is based on the GHG emissions reductions achieved through full implementation of the measure and its contribution to the overall emissions objective. Co-benefits were developed based on other environmental, health and safety criteria and measures with high co-benefit scores represent those that contribute significantly to the overall sustainability of San Pablo. The cost analysis was based on both upfront capital investment and the cost of maintenance to both the City and community members; measures with significant associated costs received a low score, placing emphasis on affordable, cost-effective actions. Finally, measures were scored based on their urgency, which depends on the possibility for increased savings over time and the potential for increased emission rates from inaction. Combined, these metrics represent the overall feasibility of the measures outlined in this CAP. With the exception of the Food Ware Container Ban, the City intends to implement all 44 measures by 2020. Below is the resultant ranking of measures based on this feasibility analysis:

## San Pablo Climate Action Plan

### High Priority Community Measures

15-20 Points

SW-1.2	Single-Use Bag Ban	17
TLU-1.2	Density Standards	16
SW-1.3	Polystyrene Ban	16
TLU-1.1	Transit Oriented Development	15
TLU-1.4	Redevelopment Strategy	15
TLU-3.1	Commercial Trip Reduction Programs	15

### Medium Priority Community Measures

10-15 Points

SW-2.4	Construction & Demolition Waste Ordinance	14
W-1.4	Water Conservation Ordinance	14
E-1.1	CalGreen Tier 1 & Tier 2	14
TLU-2.1	Bicycle and Pedestrian Plan	14
SW-1.5	School Waste Reduction Curriculum	14
SW-2.2	Composting Expansion Program	14
W-1.1	Residential-water saving Equipment	13
W-1.2	Commercial water-saving Equipment	13
SW-2.3	School Recycling and Composting Program	13
TLU-1.3	Parking Management Strategy	13
SW-2.1	Recycling Expansion Program	13
SW-1.4	Food Ware Container Ban	13
TLU-3.2	Public Outreach & Education Campaign - <i>Transportation</i>	12
SW-1.1	Commercial Waste Prevention Campaign	12
TLU-1.5	Home-based Business Development	12
E-2.1	Residential Energy Conservation Ordinance	12
E-2.3	Public Outreach & Education Campaign - <i>Energy</i>	11
SW-1.6	Public Outreach & Education Campaign - <i>Solid Waste</i>	11
E-1.2	Net-Zero New Construction	11
E-2.2	Energy Efficiency Financing	11
W-1.3	Commercial Education and Outreach - <i>Water</i>	11

### Low Priority Community Measures

0-10 Points

E-3.1	Community Solar	9
W-2.1	Greywater Systems	8

**High Priority Municipal Measures**  
15-20 Score

B-2.1	Municipal Energy Audits and Upgrades	16
B-3.1	Plug Load Sensor Controls	16
B-4.1	Solar PV	15
P-1.1	Environmentally Preferred Procurement Policy	15
E-1.1	City Employee Education	15

**Medium Priority Municipal Measures**  
10-15 Score

B-2.3	Retrocommissioning	14
B-3.2	4 Day Work Week and Lights-Out Policy	14
W-1.1	Waste Prevention	14
T-1.1	Fleet Maintenance	14
T-1.2	Scheduling & Routing Efficiency	14
T-2.1	Municipal Commuter Programs	14
B-1.1	Municipal Green Building Policy	13
W-2-1	Expand Recycling and Composting Programs	13
B-1.2	Green Roofs	11
S-1.1	LED Streetlights	11

**Low Priority Municipal Measures**  
0-10 Score

B-3.3	Expand Tree Cover	9
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While low priority measures have received the smallest number of cumulative points, they are still important strategies in reducing GHG emissions. Implementation of these measures should be pursued in congruence with higher ranked measures, which may be more cost effective, or when funding becomes available. These rankings should be updated on a regular basis to represent changes in condition that may affect the feasibility of a given strategy.

## 8.2 Funding

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The full implementation of this CAP will save residents, business owners and the City money in energy, water and fuel costs. Most programs, however, will require upfront capital investments. In order to offset these initial costs, the City will investigate all available funding resources and will pursue opportunities wherever feasible. Capital improvement projects, incentive programs, education and outreach campaigns and new regulations will require public funding from City, regional, state and federal agencies. Measures that depend on investments from residents and business owners have been identified and the City will work with private companies to lower upfront costs and incentivize implementation. The following are available funding strategies to be considered when implementing CAP measures:

### GRANT FUNDING

In addition to City grant applications, local and regional agencies are pursuing funding opportunities for the implementation of regional initiatives. The City will work with representatives from these agencies to ensure that San Pablo residents and business owners may benefit from these larger initiatives. The associated greenhouse gas emissions reductions will be monitored and accounted for in CAP reporting.

#### **Energy Efficiency and Conservation Block Grants (EECBG)**

The California Energy Commission (CEC) received \$50 million from the American Recovery and Reinvestment Act to provide grant funding to California communities to perform energy efficiency and conservation projects. In 2010, San Pablo received \$169,886 in funding to retrofit some City-owned streetlights and parking lot lights to LEDs, and to complete an interior lighting retrofit at several City buildings.

In January 2012, the City applied for funding from Phase 2 of the program to retrofit all remaining streetlights on major roads in San Pablo to LEDs. Total funds allocated for Phase 2 are dependent on remaining money from Phase 1; funds will become available as municipalities close out spending for Phase 1. Award of these funds would allow the City to complete *Municipal Measure S1-1: LED Streetlights*.

#### **Transportation Fund for Clean Air (TFCA)**

BAAQMD manages a motor vehicle emissions reduction grant program funded by a \$4 surcharge on vehicles registered in the Bay Area. These funds could be leveraged to cover *Transportation and Land Use Measure 1.1: Transit Oriented Development*, *Measure 2-1: Bicycle and Pedestrian Plan*, *Measure 3.1: Commercial Trip Reductions* and *Measure 3.2: Public Education & Outreach Campaigns*. As the City begins to develop specific implementation strategies for these measures, it will investigate TFCA funding to cover part or all of the associated costs.

### **Safe Routes to Transit**

The Safe Routes to Transit program, managed by TransForm, provides funding for pedestrian and bicycle transit access improvement projects. The program is funded by Regional Measure 2 and provides approximately \$20 million in grants to relevant projects. The program could aid in the implementation of Transportation and Land Use Measure 2.1: Bicycle and Pedestrian Plan in those neighborhoods where implementation would provide access to the City's transportation hubs, such as the bus hub at Contra Costa College.

### **Safe Routes to School**

Safe Routes to School is an international movement focused on increasing the number of children who walk or bike to school. In California, the movement is supported by the State's Safe Routes to School program (SR2S) and the national Safe Routes to School program (SRTS). Both programs support infrastructure improvement projects and education & outreach campaigns aimed at improving walkability and bike-ability for children.

West Contra Costa County manages a Safe Routes to School program for a number of schools in their jurisdictions, including Helms Middle School. The City will continue to pursue these opportunities in order to reduce the vehicle miles traveled by students within San Pablo and to support Transportation and Land Use Measure 2.1: Bicycle and Pedestrian Plan and Measure 3.2: Public Education & Outreach Campaigns.

### **Caltrans Planning Grants**

Community Based Transportation Planning (CBTP) grants fund transportation and land use planning that promotes public engagement, livable communities, and a sustainable transportation system that includes mobility, access, and safety. The maximum award is \$300,000 and a local match of 20 percent of the grant request is required. The City will consider pursuing these planning grants to implement Transportation and Land Use Measure 2.1: Bicycle and Pedestrian Plan, Measure 3.1: Commercial Trip Reduction Programs, Measure 3.2: Public Education & Outreach Campaigns and to support any planning initiatives associated with **Transportation and Land Use Objective 1**.

### **Small Cities Climate Action Partnership (SCCAP)**

In 2010 the City entered into a partnership of small cities in Contra Costa and Alameda Counties. The Partnership provides the City with roughly \$75,000 worth of funding for energy-efficiency financing, municipal energy efficiency retrofits, the design of municipal photovoltaic systems and the development of this Climate Action Plan. The City will leverage the funds to implement Energy Measure 2.2: Energy Efficiency Financing and Municipal Building Energy Use Measure B2.1: Municipal Energy Audits and Upgrades, B3.1: Plug Load Sensor Controls, and B4.1: Solar PV. Partnership also

supports energy management strategies and the monitoring of energy and cost savings from previously implemented measures in order to identify opportunities for reinvestment.

### **PG&E Innovator Pilot (PG&E – IP)**

In 2011, the SCCAP leveraged their existing EPA Grant to receive PG&E Innovator Pilot funding to continue municipal energy management and to expand the partnership to include the cities of Orinda, Moraga and Benicia. Through the Innovator Pilot the City has developed a municipal energy management plan and has begun development of a reinvestment mechanism to leverage energy savings for future implementation of energy-efficiency programs.

## **REBATE AND INCENTIVE PROGRAMS**

### **EBMUD Rebates**

The East Bay Municipal Utilities District provides rebates and incentive programs to residents and businesses interested in increasing their water-efficiency. For residential customers, EBMUD provides free home survey kits designed to evaluate residential water-efficiency; in addition, they provide rebates for high-efficiency toilets, clothes washers, lawn conversions, irrigation control improvements, and multifamily residential sub metering. Commercial customers may receive free on-site water use surveys, rebates for toilets, commercial clothes washers, commercial irrigation, and customizable rebates specific to a business. In addition, EBMUD provides free devices to improve water-efficiency such as showerheads, faucet aerators, toilet low flush bags and hose nozzles. Customers interested in further information should visit <http://www.ebmud.com/environment/conservation-and-recycling/watersmart-center>.

The rebates provided by EBMUD will help residents and businesses implement Water and Wastewater Measure 1.1: Residential Water-Saving Equipment and Measure 1.2: Commercial Water-Saving Equipment; in addition, the rebates and incentive programs provided by EBMUD may be incorporated into Measure 1.4: Water Conservation Ordinance as it helps offset the costs of more efficient irrigation systems.

### **PG&E Rebates**

Pacific Gas & Electric provides its residential and commercial customers with rebates and incentive programs to increase energy-efficiency. These programs range from efficient lighting incentive programs for compact fluorescents and LEDs; rebates for energy-efficient clothes washers, refrigerators, air conditioners, water heaters, fans, furnaces and HVAC motors. These programs are designed to make energy-efficiency more cost effective, while providing their customers with significant energy savings.

PG&E provides financial assistance to income-qualified renters and homeowners interested in pursuing energy efficiency programs through their Energy Savings Assistance Program. In addition, they support larger programs designed to improve efficiency on a whole house scale; these programs include the AC Quality Care Program, SmartAC, and Energy Upgrade California (see below).

PG&E Rebate and Incentive programs should be leveraged for the implementation of Energy Use Measure 1.1: CalGreen Tier 1 and 2, Measure 1.2: Net Zero New Construction, and Measure 2.1: Residential Energy Conservation Ordinance.

### **California Solar Initiative (CSI) Rebates**

The California Solar Initiative program provides cash-back rebates to home and business owners who install solar panels on their buildings. The program is part of larger, statewide initiatives to increase the production of renewable energy in California. All PG&E customers who have roof or ground space that receives unobstructed sunlight from 11am to 6pm year-round is eligible for CSI rebates. The City will develop an outreach campaign to residents and business owners with detailed information and helpful tips for the CSI application process. This initiative is in support of Energy Use Measure 3.1: Community Solar.

### **Energy Upgrade California**

Energy Upgrade California is a temporary statewide energy-efficiency program that provides financing through public utilities, with additional support from local agencies. The program allows residents to improve their energy and water efficiency by providing up to \$4,000 in rebates from PG&E; for the term of their grant, Contra Costa County provided additional monetary support for qualified projects. The City conducted outreach campaigns for the Energy Upgrade program and will continue to inform residents about the savings potential from energy upgrades in their homes. This program is in support of Energy Use Measure 2.2: Energy Efficiency Financing.

### **Contra Costa County Weatherization Program**

The Contra Costa County Weatherization Program provides low and fixed-income residents with energy upgrades for their homes, apartments or condos. The program is available to renters and owners alike who cannot afford weatherization improvements. The program is designed to cover the complete cost of caulking, weather-stripping, the repair or replacement of furnaces, stoves and/or refrigerators. The program is in support of Energy Use Measure 2.2: Energy Efficiency Financing.

## INTERNAL FINANCING

### Reinvestment Mechanism

Municipalities throughout the country face the challenge of financing municipal efficiency projects. Energy and water improvements are often associated with large, one-time, upfront costs that have not been allocated for in the city's budget. With financial constraints and money set aside for other infrastructure maintenance and upgrades, energy efficiency in particular, can often be overlooked. The development of a reinvestment mechanism accounts for these budgetary constraints by developing a steady resource devoted to energy efficiency and other environmental programs. Many cities and counties throughout the country are turning to similar mechanisms to provide for the municipal climate action programs that have been developed. The City of El Cerrito implemented a reinvestment mechanism in 2008 with the intention of improving the resource efficiency of City operations. San Pablo is currently investigating reinvestment mechanisms as a feasible finance stream for the energy and water efficiency improvements outlined in this CAP. The mechanism would rely on careful monitoring of resource savings and would require stringent guidelines for qualified projects. The City will work with the Finance department and consultants from Strategic Energy Innovations to evaluate opportunities for implementation. The City will investigate a number of opportunities to provide for the initial seed money required to get the mechanism underway. This program would predominantly support Building Energy Measure 2.1: Municipal Energy Audits and Upgrades and Building Energy Measure 2.2: Retrocommissioning, with opportunities to support Building Energy Measure 3.3: Expand Tree Cover, Streetlight Measure 1.1: LED Streetlights, and Municipal Education and Outreach Measure 1.1: City Employee Education.

### General Funds

When appropriate, General Funds will be used to cover the costs of municipal and community initiatives. Internal project financing will be evaluated on a project-by-project basis; initiatives financed through general funds will seek to achieve numerous City goals including other health, safety and economic development initiatives. These will be monitored for effectiveness through a number of stringent sustainability metrics. Public education and outreach initiatives, ordinances, zoning updates and internal municipal programs may link to existing City programs to reduce costs and achieve a number of targets congruently.

## 8.3 Community Engagement

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Effective implementation of the CAP is dependent on community engagement. City staff sought community buy-in during plan development through the CAP survey, community workshop and outreach events, but the City will work to continue these engagement efforts throughout the implementation process to ensure community support. The City has incorporated community education and outreach measures within each reduction category to ensure that citizens are not only informed of programs, but are also updated on CAP progress and solicited for input on timelines and project design. Information on rebates and incentive programs, citywide initiatives, ordinance and zoning updates, volunteer opportunities will be provided to community members in a timely and effective manner by developing regular dissemination of environmental information to residents and businesses. In addition, the City will keep community members informed of CAP progress via the City's website, e-newsletters and quarterly newsletters.

## 8.4 Monitoring

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In order to ensure effective implementation of the strategies outlined in this CAP, the City will need to monitor and report on their performance over time. Each measure has been assigned a metric of success to be tracked throughout the full length of implementation in order to ensure that residents, business owners and the City are seeing the expected results. This monitoring process is important for identifying anomalies and inconsistencies, opportunities for improvement, specific sectors to target with outreach initiatives and potential shortfalls to our GHG targets. Additionally, monitoring will prepare the City to meet any future GHG reporting requirement while providing defensible data to community members, City officials, regulating bodies and other jurisdictions that the programs being implemented are thorough and effective. In addition to project-by-project monitoring, the City will perform communitywide GHG inventories on a regular basis to evaluate overall progress towards reduction goals.

### GHG INVENTORIES

City staff will perform GHG inventories on a regular basis that utilize the 2005 GHG Inventory methodology to track overall progress towards the City's reduction goals. Different than project-by-project monitoring, communitywide GHG inventories allow the City to reevaluate the need and intensity of proposed initiatives. Based on findings, the City may choose to intensify, change or remove certain initiatives to reflect the effectiveness of implemented programs and the development of new technologies, funding sources, industry trends or shifts in behavior.

## METRICS

Members of the CAP development team have partnered with staff in other City departments to generate a list of metrics that will be used to track the success of CAP strategies. Members of these departments will be integral to the tracking and reporting on a number of Municipal and Community initiatives, as they pass and enforce ordinances, perform plan reviews, track budgets and pay bills. For the complete list of metrics, please see Appendix I. The City will develop a specific project monitoring strategy at the beginning of each program and will inform relevant parties of their tracking role prior to implementation.

### **Energy Monitoring and Management System**

As a member of the Small Cities Climate Action Partnership (ScCAP) and a participant in the PG&E-Innovator Pilot (PG&E-IP), staff have been developing an energy tracking and monitoring system for municipal electricity and natural gas usage. Members of the PG&E-IP have piloted a number of energy management tools to track reductions from energy-efficiency projects and highlight anomalies in usage/costs on a building-by-building basis. This system is designed to track the City's energy usage and billing data to not only monitor the effectiveness of energy efficiency upgrades, but to also highlight billing errors, anomalies in the performance of the heating and cooling systems, and changes to energy loads. Energy monitoring can save the City money simply by finding such errors and correcting them with little or no cost. For example, heating and cooling units may be reprogrammed to reduce hours of operation and large swings in temperatures. The City should work to implement this energy management system on a regular basis and should pay particular attention before or at the beginning of energy-efficiency improvements so as to ensure thorough tracking. Should the City choose to adopt a reinvestment mechanism, energy management and monitoring will be crucial to verify project savings and track reinvestment. The addition of similar tracking mechanisms could be developed to track water usage.

As was the case with the GHG Inventory, the City will partner with the utilities, regional agencies and other municipalities to track specific metrics. The utilities will be integral to tracking community energy and water usage as residents and business owners implement energy-efficiency programs. Staff will work with MTC and BAAQMD to evaluate the state of VMTs in the City on a semi-regular basis to watch for growth. The implementation of regional plans and policies will be handled by regional agencies, with input and coordination from the City; staff will track progress on these initiatives. Finally, the City will continue its involvement in regional networks such as the ScCAP to share findings and best practices; this collaboration between small cities allows for the piloting of programs, sharing of resources and swapping of information vital to staff with limited time and resources.

## 8.5 Reporting and Promotion

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In order to enhance community engagement, support regional partnerships and inform decision makers, City staff will provide regular reporting on the implementation and progress of CAP measures. The development of climate action education programs will include reporting on City initiatives, progress and opportunities for expansion and will be made readily available to the public. Internally, the City is working to develop a Green Team in charge of disseminating environmental information to all City employees, including interdepartmental contests and competitions related to CAP initiatives. Staff are encouraged to use reporting materials to also promote initiatives, encourage behavior change, and develop and support a culture of sustainability within San Pablo. It is through these efforts that the City will maintain support for the environmental work that they do.

Climate action reports will be used to inform CAP and General Plan updates, as needed.

## 8.6 CEQA

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In July, the City developed an Initial Study to determine if implementation of the CAP would result in significant negative impacts on the environment; upon completion, the City issued a Negative Declaration at Contra Costa County stating that the CAP and the projects within would have no significant impacts and would contribute to communitywide reductions of GHG emissions. The CAP satisfies the General Plan EIR's call for a GHG Emissions Reduction Plan and encourages all new developments to reduce their negative impacts on climate change. In the future, compliance with the measures outlined in the CAP may be used as a tool to evaluate the negative impacts of a development project on the environment. To show compliance, projects should outline how they support applicable CAP strategies, that they accommodate and not exceed ABAG's projected population growth statistics, and that they would not interfere with either CAP or state initiatives. Projects found to be in conflict with the CAP should incorporate specified mitigation measures to minimize GHG emissions and climate change impacts.

## 8.7 Updates

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The CAP is a living document that will be updated on a regular basis or as needed to respond to changing conditions in the City, state or nationwide. Emerging science, technology and information will be incorporated into CAP Updates, while maintaining the City's initial GHG reduction goals.

# GLOSSARY

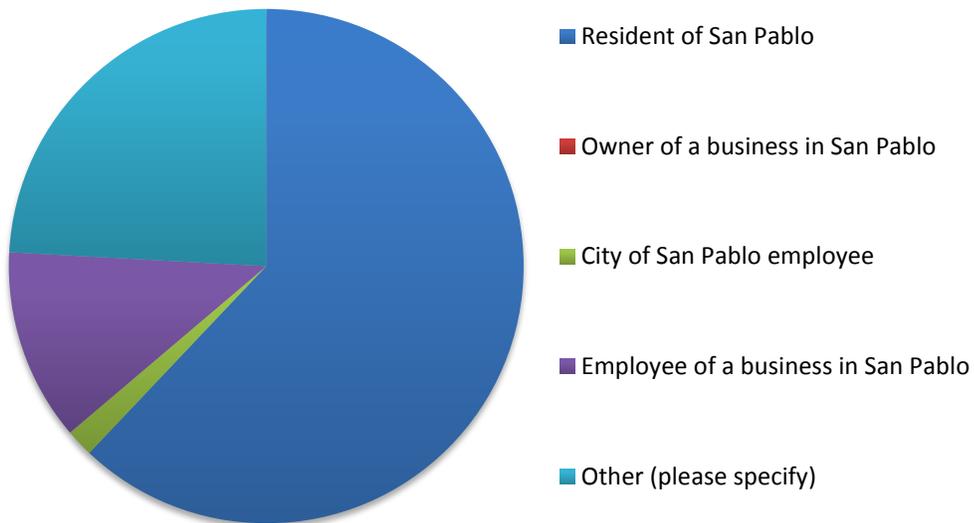
<b>Community Choice Aggregation (CCA)</b>	Community Choice Aggregation refers to city or countywide programs that allow local governments to aggregate the electrical loads of individual customers to facilitate the development of alternative energy contracts.
<b>Emission Factor</b>	An emission factor is a value that correlates the quantity of a pollutant with an associated activity, ie the amount of carbon dioxide emitted with the generation of one kilowatt.
<b>Carbon Dioxide Equivalent (CO<sub>2</sub>e)</b>	Carbon dioxide equivalent is a measure for how much global warming a given greenhouse gas may create compared to an equivalent quantity of carbon dioxide.
<b>Vehicle Miles Traveled (VMT)</b>	Vehicle miles traveled is a unit of measurement to quantify the distance traveled by a private vehicle regardless of the number of passengers.
<b>Global Warming Potential</b>	The ration of the amount of global warming caused by a certain mass of a greenhouse gas compared to the global warming caused by the same mass of carbon dioxide
<b>Leadership in Energy and Environmental Design (LEED)</b>	LEED is a globally-recognized, third party green building rating NGO developed by the US Green Building Council.
<b>Peak Hours</b>	Peak hours occur during time of high electricity demand, usually at the beginning and end of a work day.
<b>Light-Emitting Diodes (LEDs)</b>	LEDs are a highly efficient light source designed to reduce the heat generated by typical light fixtures in order to decrease the electricity required for operation.

# FOOTNOTES

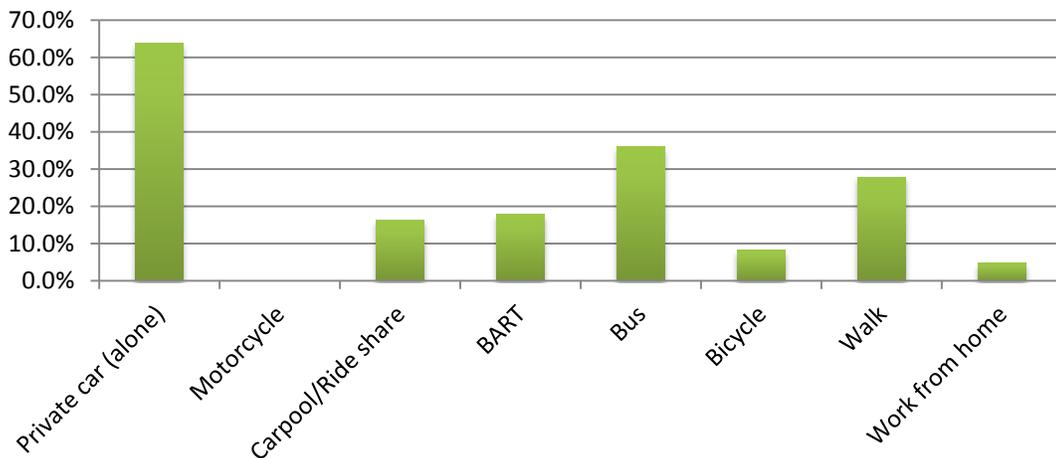
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- <sup>i</sup> "Climate Change: Evidence." *Global Climate Change: Vital Signs of the Planet*. Ed. Amber Jenkins. National Aeronautics and Space Administration, n.d. Web. 25 June 2012. <<http://climate.nasa.gov/evidence/>>.
- <sup>ii</sup> East Bay Municipal Utility District. *Water Supply Management Program 2040*. N.p., n.d. Web. 25 June 2012. <<http://www.ebmud.com/our-water/water-supply/long-term-planning/water-supply-management-program-2040>>.
- <sup>iii</sup> T. Barnett and others, "Human-induced changes in the hydrology of the western United States," *Science Express*, January 31, 2008, 1-4.
- <sup>iv</sup> "U.S. Geological Survey CASCaDE Project." *CASCaDE Project*. Ed. Noah Knowles. U.S. Geological Survey, 26 May 2011. Web. 25 June 2012. <<http://cascade.wr.usgs.gov/data/Task2b-SFBay/>>
- <sup>v</sup> "The 2010 Forest and Range Assessment." *The 2010 Assessment*. Ed. Lisa Hartman. California Department of Forestry and Fire Protection, 18 June 2010. Web. 25 June 2012. <<http://frap.cdf.ca.gov/assessment2010/document.html>>
- <sup>vi</sup> California. City of San Pablo. *2030 General Plan*. N.p.: Dyett & Bhatia, 2011. P. 5-2
- <sup>vii</sup> Ekstrom, PhD, Julia A., and Susanne C. Moser, PhD. *Climate Change Impacts, Vulnerabilities, and Adaptation In The San Francisco Bay Area: A Synthesis of PIER Program Reports and Other Relevant Research*. California Energy Commission, July 2012. Web. 24 Sept. 2012. <<http://www.energy.ca.gov/2012publications/CEC-500-2012-071/CEC-500-2012-071.pdf>>.

# APPENDIX A: CAP SURVEY RESULTS

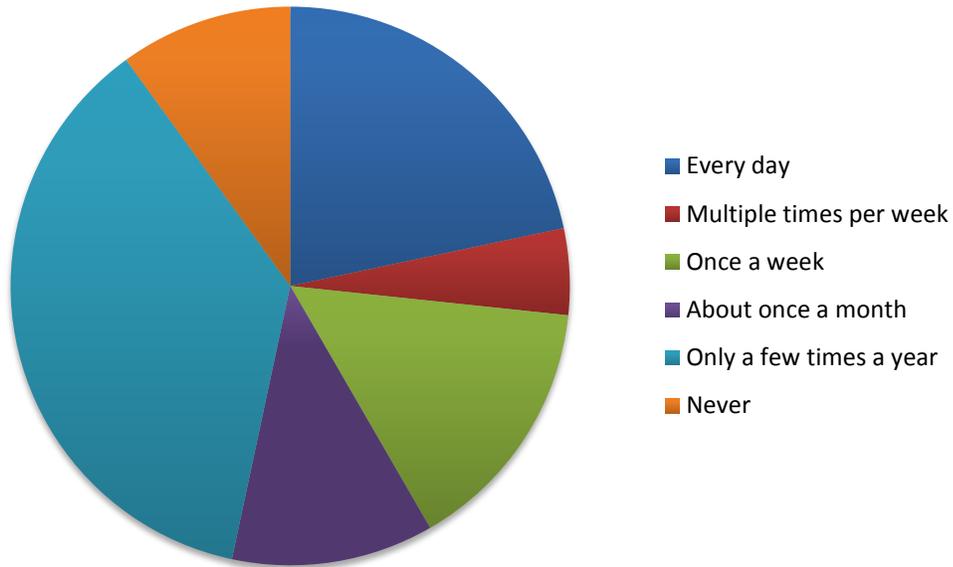
Question 1. Which of the following describes you?



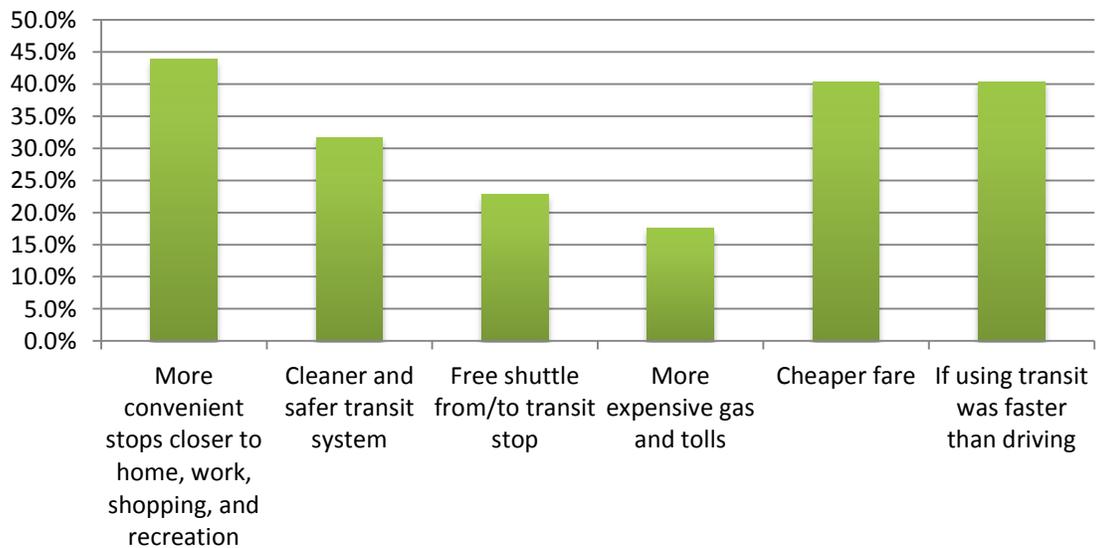
Question 2. How do you typically commute to work?



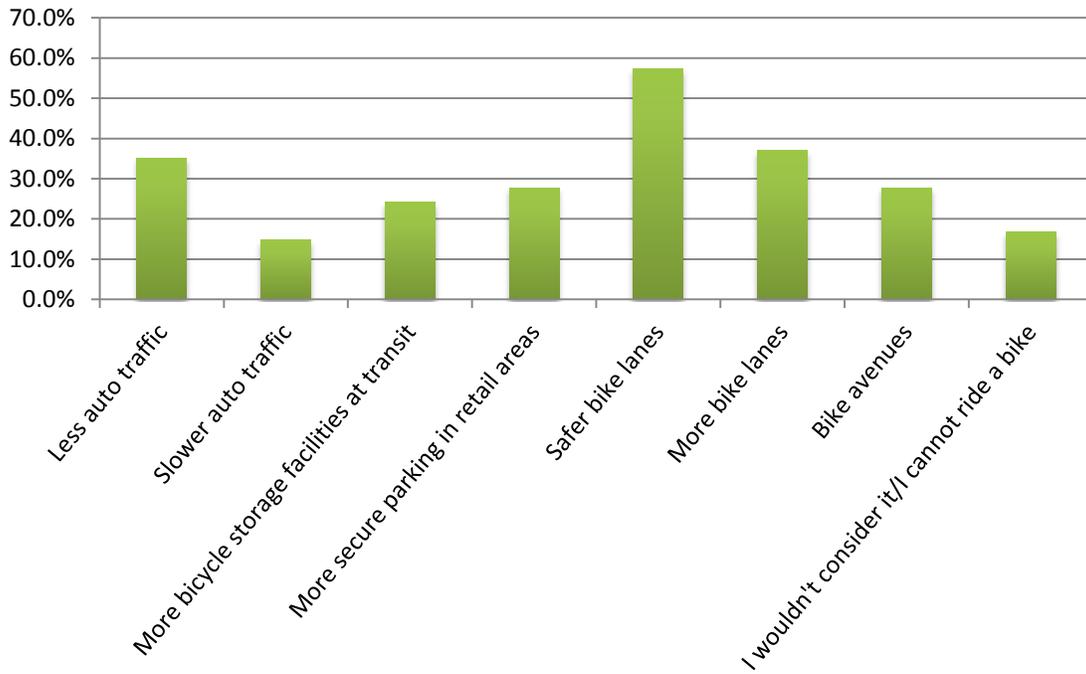
**Question 3. How often do you ride public transit (other than to commute)?**



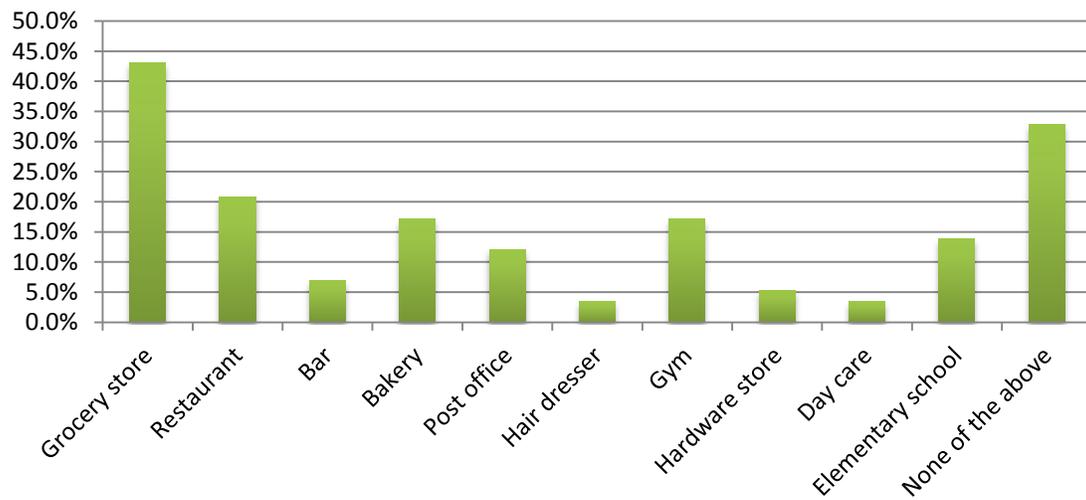
**Question 4. Which of the following would lead you to ride transit (bus, BART) more often?**



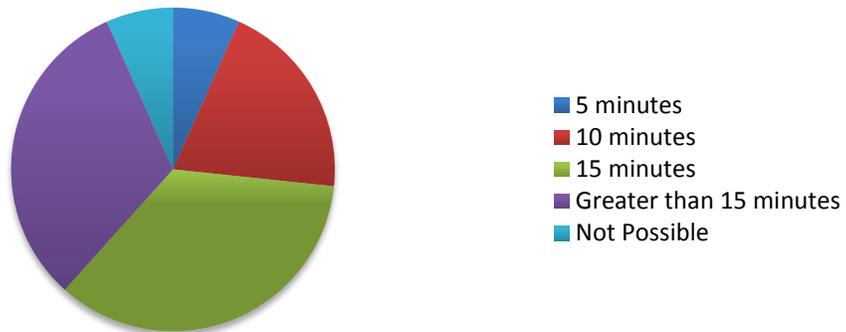
**Question 5. Which of the following would lead you to consider riding a bicycle more often?**



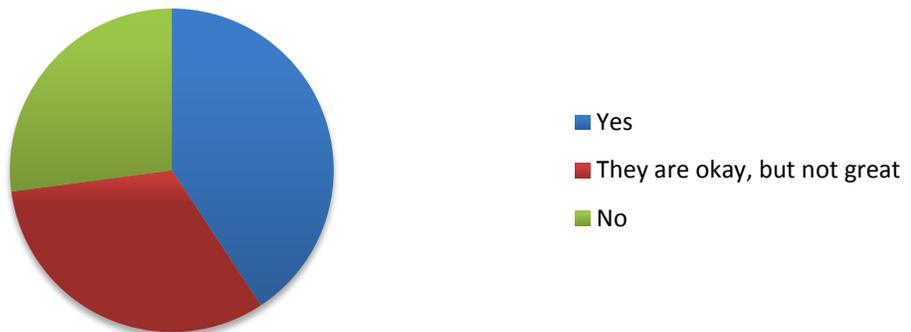
**Question 6. Which of the following stores and services do you regularly walk to rather than drive?**



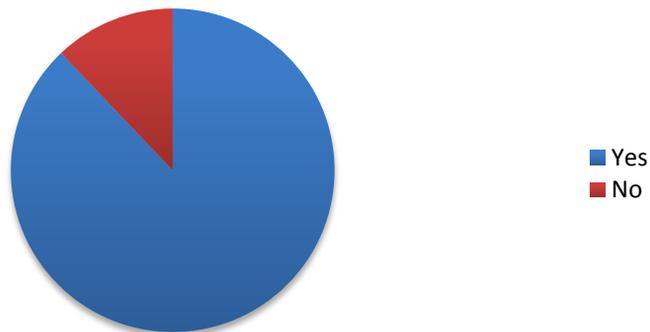
**Question 7. From your home or office, how long would it take to safely walk to purchase daily goods and services (grocery store, café, post office, bakery, gym, restaurants)?**



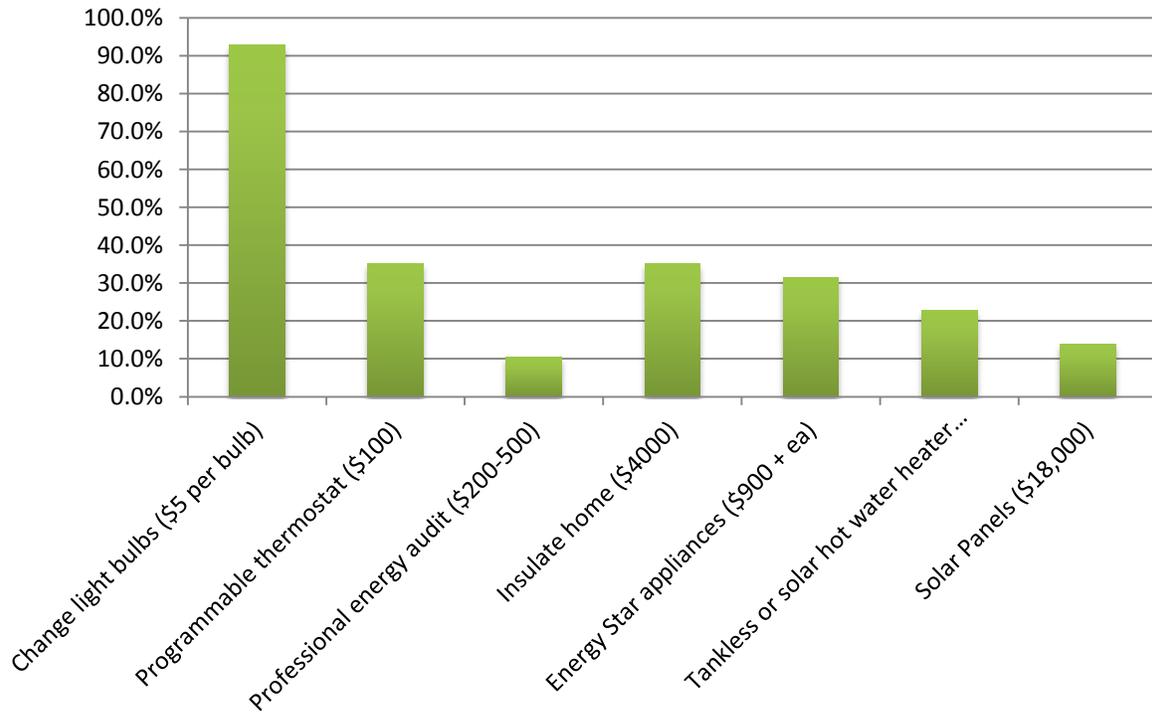
**Question 8. Do safe routes exist for children to walk or bike to school in your neighborhood?**



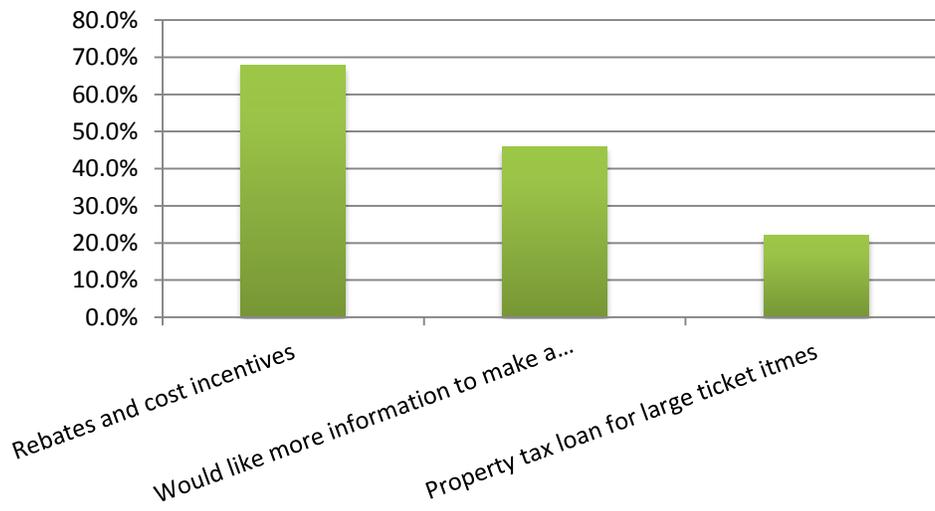
**Question 9. Are you concerned about energy use in your home?**



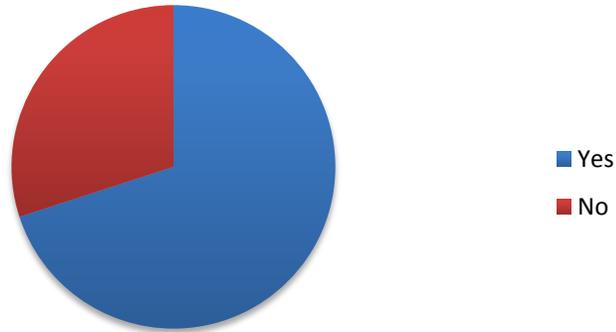
**Question 10. Which of the following energy efficiency improvements would you be willing to do in your home to reduce your energy usage?**



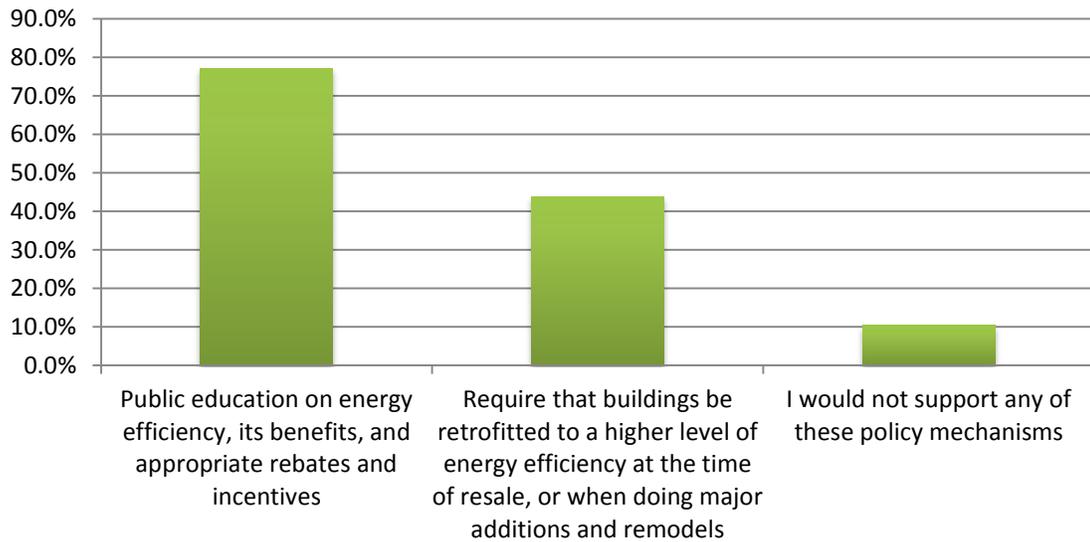
**Question 11. What would help you to make the energy efficient changes you listed above?**



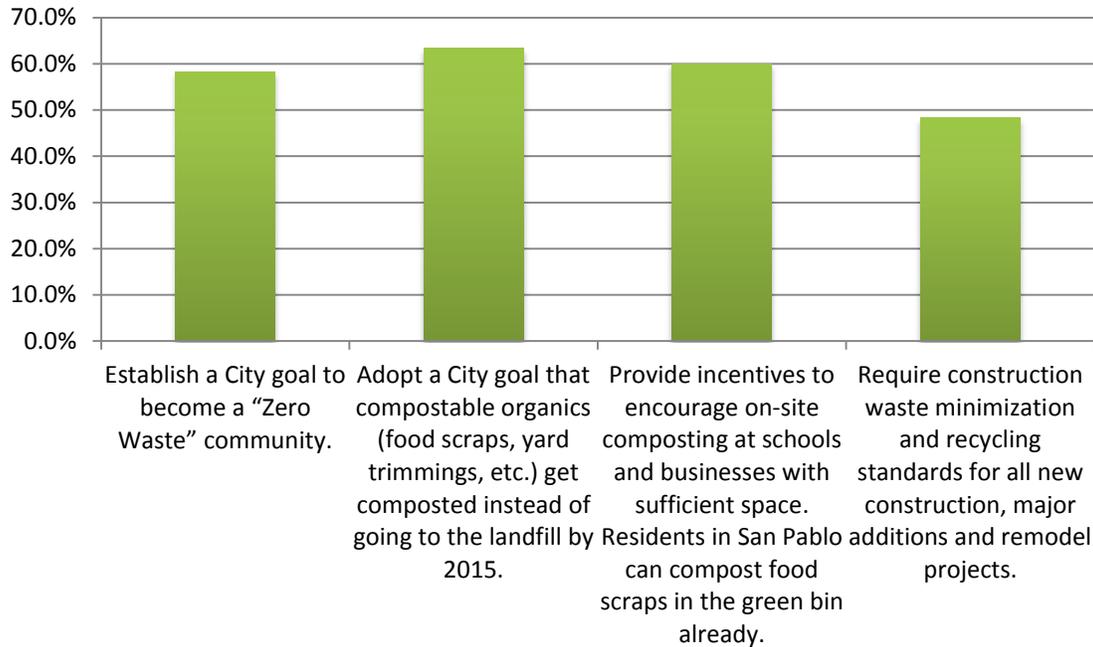
**Question 12. Would you participate in a no-cost home or business energy audit that could demonstrate easy ways to reduce your energy consumption?**



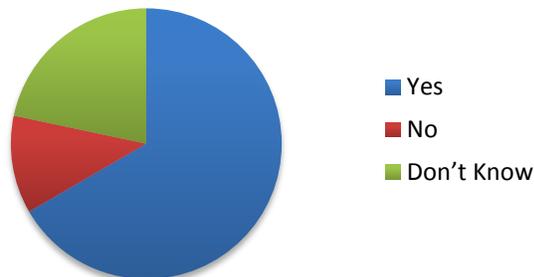
**Question 13. In order to encourage greater adoption of residential energy efficiency and renewable energy generation, which policy mechanisms or programs would you support the City of San Pablo pursuing?**



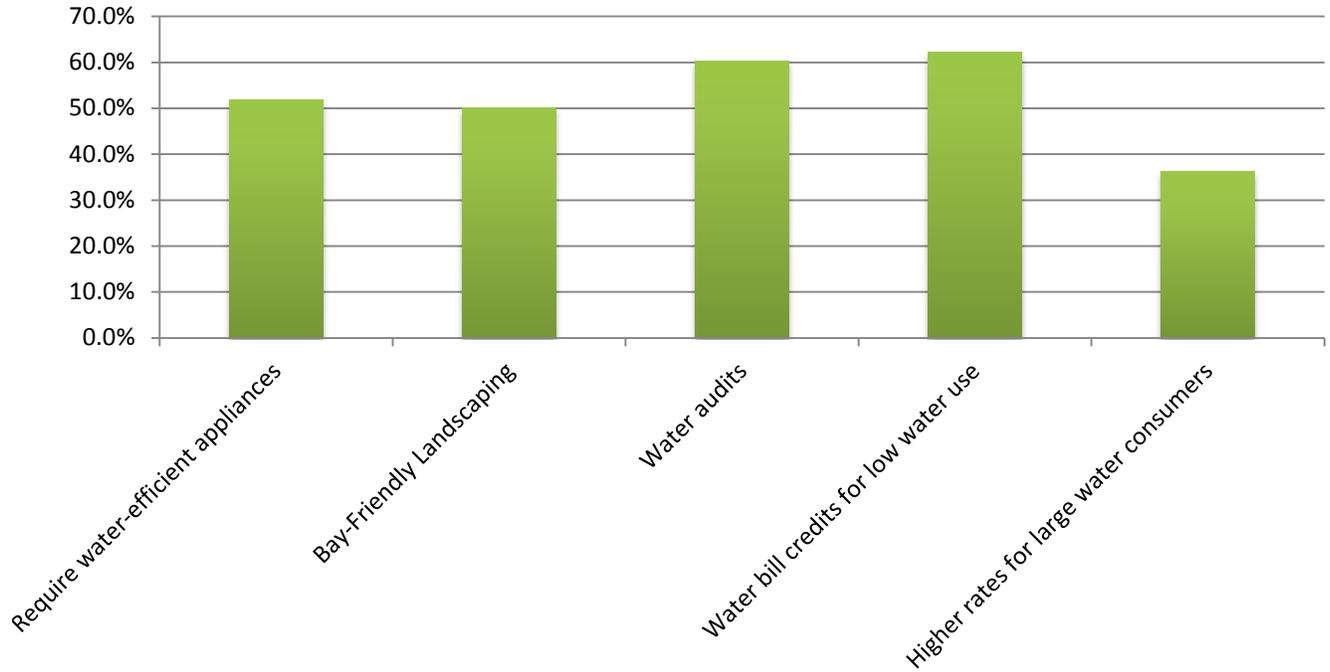
**Question 14. Which of the following waste reduction strategies should the City implement?**



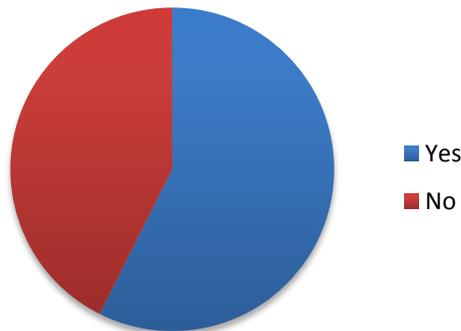
**Question 15. Many cities have instituted bans on certain types of packaging in order to reduce litter and storm drain contamination, such as plastic bags and Styrofoam disposable food service containers. Would you support San Pablo in instituting such a ban?**



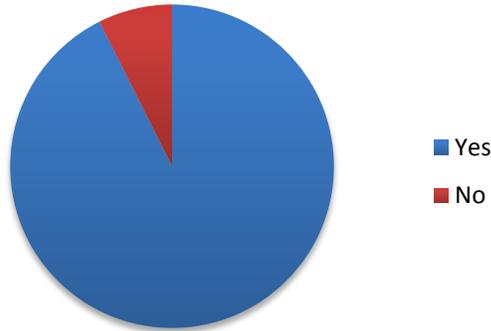
**Question 16. Which of the following water saving strategies should the City and the Utility District implement?**



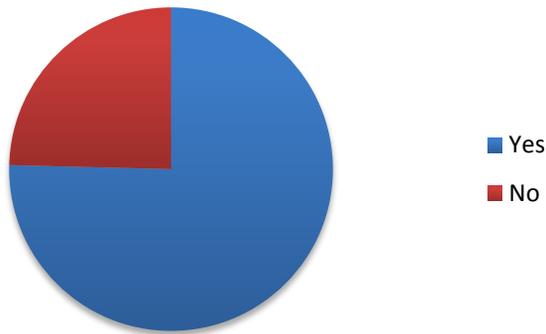
**Question 17. The average Bay Area household spends \$150 a month on home energy bills. Would you be willing to spend an additional \$6 a month on your bill to offset all GHG emissions associated with the energy used in your home?**



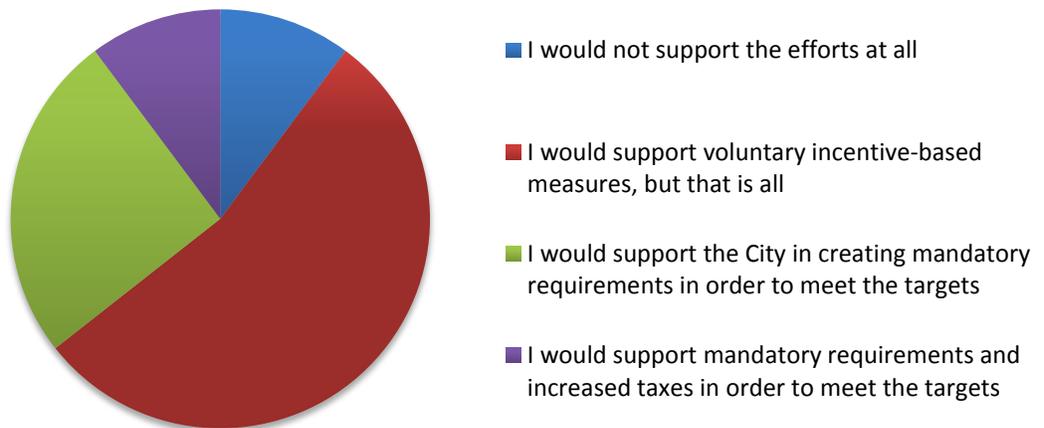
**Question 18. Should the City install photovoltaic panels on City buildings and properties?**



**Question 19. Should the City install wind turbines on City properties?**



**Question 20. To what extent would you support City-led efforts to meet required greenhouse gas emissions targets?**



**Question 21. Any additional comments or concerns related to climate action in the City of San Pablo? Please tell us your thoughts.**

I would like the city to crack down on vehicle emissions if possible. So many people in San Pablo have cars spewing out fumes. Increased ticketing would not only result in reduced emissions (assuming people fixed their cars), but would also boost the city's revenues and reduce noise pollution.

Enforcement of vehicle noise and emission standards to stop residents installing noisy mufflers on their cars, which is BLIGHT and encourages lead-foot driving which wastes gas and pollutes. Enforce vehicle noise laws and hold installers and buyers of noisy mufflers and cars accountable.

Thank you for offering this survey! In particular, I would love to see a more walkable and bikeable city. Currently you can't safely walk off our hill (Hillcrest Road and Morrow) to the local school. Biking around here feels like courting death.

(Re: Q 20 above)

I'm in favor of voluntary incentives for the general population; I'm in favor of mandatory requirements and higher taxes for the corporations that can afford to pay them and that are not currently paying their fair share of the environmental deficits they "socialize" by having the taxpayers clean up after them.

This is so urgent! More power to you (or less?).

We need to start conserving energy and reduce costs on throwing away waste

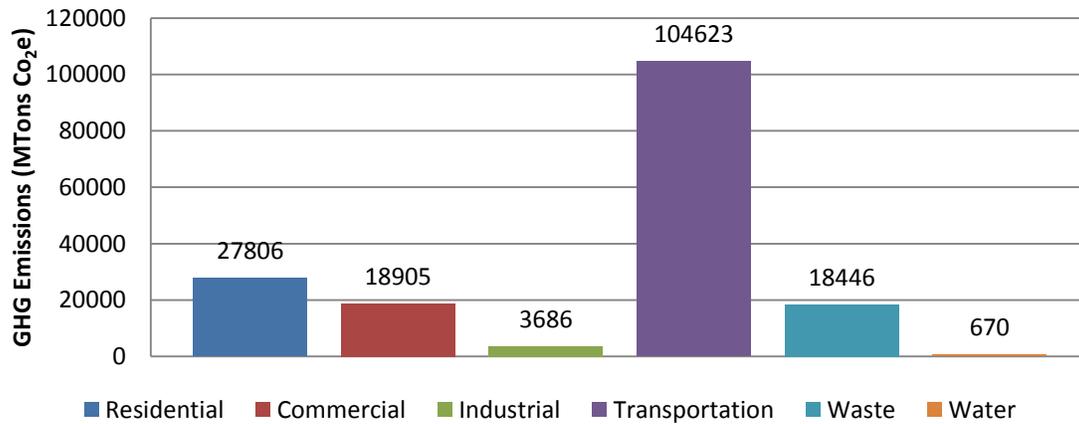
This will create a new standard of living for most residents

It would be awesome if we could have the incentive-based measures or tax deductible measures implemented.

We need more parks/community gardens

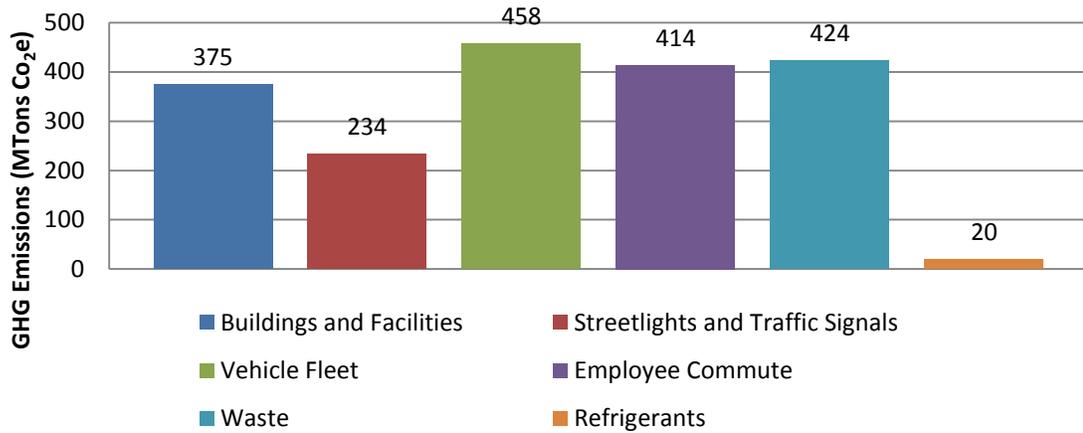
# APPENDIX B: 2005 GHG INVENTORY

## 2005 Community GHG Emissions 174,134 Metric Tons CO<sub>2</sub>e



		MTons CO <sub>2</sub> e	(%)
<b>Residential Sector</b>	Electricity	8,594	4.9
	Natural Gas	19,212	11
	<b>Subtotal</b>	<b>27,806</b>	<b>16</b>
<b>Commercial Sector</b>	Electricity	11,585	6.7
	Natural Gas	7,320	4.2
	<b>Subtotal</b>	<b>18,905</b>	<b>10.9</b>
<b>Industrial Sector</b>	Electricity	1,781	1
	Natural Gas	1,905	1.1
	<b>Subtotal</b>	<b>3,686</b>	<b>2.1</b>
<b>Transportation Sector</b>	Diesel	14,930	8.6
	Gasoline	89,693	51.5
	<b>Subtotal</b>	<b>104,623</b>	<b>60.1</b>
<b>Waste Sector</b>	Food Waste	4,020	2.3
	Paper Products	10,251	5.9
	Plant Debris	1,452	0.8
	Wood or Textiles	2,722	1.6
	<b>Subtotal</b>	<b>18,446</b>	<b>10.6</b>
<b>Other Sector</b>	Wastewater	670	0.4
	<b>Subtotal</b>	<b>670</b>	<b>0.4</b>
<b>Total</b>		<b>174,134</b>	<b>100</b>

## 2005 Municipal GHG Emissions 1,925 Metric Tons CO<sub>2</sub>e



		MTons CO <sub>2</sub> e	(%)
<b>Buildings and Facilities</b>	Electricity	213	11
	Natural Gas	162	8.5
	<b>Subtotal</b>	<b>375</b>	<b>19.5</b>
<b>Streetlights &amp; Traffic Signals</b>		<b>234</b>	<b>12.2</b>
<b>Vehicle Fleet</b>	Gas	440	22.9
	Diesel	18	0.9
	<b>Subtotal</b>	<b>458</b>	<b>23.8</b>
<b>Employee Commute Total</b>		<b>414</b>	<b>21.5</b>
<b>Waste Total</b>		<b>424</b>	<b>22</b>
<b>Refrigerants</b>		<b>20</b>	<b>1</b>
<b>Total</b>		<b>1,925</b>	<b>100</b>

# APPENDIX C: 2020 and 2030 GHG Emissions Forecast

## Community Emissions Growth 2020 and 2035 Forecast by End Use

Last updated: 9/24/2012

End Use	2005 Baseline Year		2020 Emissions Projections						2035 Emissions Projections [2]							
	Total 2005 Emissions (Mtons CO2e)		Business-As-Usual Emissions Projections			Emissions Projections with Select State Measures [1]			Business-As-Usual Emissions Projections			Emissions Projections with Select State Measures [1]				
	Total 2005 Emissions (Mtons CO2e)	Residential Electricity	Total 2020 Emissions (Mtons CO2e)	CO2e Growth from 2005 (Mtons CO2e)	Annual Growth Rate	Percent Change from 2005 to 2020	Emissions Reductions from State Measures (Mtons CO2e)	Adjusted Total 2020 Emissions (Mtons CO2e)	Adjusted Percent Change from 2005 to 2020	Total 2035 Emissions (Mtons CO2e)	CO2e Growth from 2005 (Mtons CO2e)	Annual Growth Rate	Percent Change from 2005 to 2035	Emissions Reductions from State Measures (tons CO2e)	Adjusted Total 2035 Emissions (Mtons CO2e)	Adjusted Percent Change from 2005 to 2035
Residential Electricity	8,594	8,594	9,453	859	0.64%	10.0%	1,684	7,769	-9.6%	10,451	1,857	0.65%	21.6%	3,369	7,083	-18%
Residential Natural Gas	19,212	19,212	21,133	1,921	0.64%	10.0%	0	21,133	10.0%	23,364	4,152	0.65%	21.6%	0	23,364	22%
Commercial Electricity	10,741	10,741	10,903	162	0.10%	1.5%	1,943	8,961	-16.6%	15,940	5,199	1.32%	48.4%	3,886	12,054	12%
Direct Access Electricity	2,625	2,625	2,665	40	0.10%	1.5%	475	2,190	-16.6%	3,896	1,271	1.32%	48.4%	950	2,946	12%
Commercial Natural Gas	9,225	9,225	9,365	140	0.10%	1.5%	0	9,365	1.5%	13,690	4,465	1.32%	48.4%	0	13,690	48%
Water Consumed	469	469	496	27	0.37%	5.7%	88	407	-13.2%	630	161	0.99%	34.4%	177	454	-3%
Wastewater Treated	309	309	327	18	0.37%	5.7%	58	268	-13.2%	415	106	0.99%	34.4%	116	299	-3%
Auto Traffic (local streets)	11,489	11,489	13,498	2,009	1.08%	17.5%	2,659	10,839	-5.7%	15,507	4,018	1.00%	35.0%	7,252	8,255	-28%
Auto Traffic (San Pablo Ave)	37,951	37,951	44,588	6,637	1.08%	17.5%	8,784	35,804	-5.7%	51,224	13,273	1.00%	35.0%	23,956	27,268	-28%
Auto Traffic (% of County Highways)	55,181	55,181	64,831	9,650	1.08%	17.5%	12,772	52,059	-5.7%	74,480	19,299	1.00%	35.0%	34,832	39,648	-28%
Solid Waste to Landfill	18,446	18,446	19,493	1,047	0.37%	5.7%	0	19,493	5.7%	24,785	6,339	0.99%	34.4%	0	24,785	34%
<b>TOTAL</b>	<b>174,242</b>	<b>174,242</b>	<b>196,751</b>	<b>22,509</b>	<b>-</b>	<b>13%</b>	<b>28,463</b>	<b>168,288</b>	<b>-3%</b>	<b>234,383</b>	<b>60,141</b>	<b>--</b>	<b>35%</b>	<b>74,537</b>	<b>159,846</b>	<b>-8%</b>

BAU Indicator
population growth
population growth
job growth
job growth
job growth
population growth + job growth
population growth + job growth
population growth + job growth
DVMT growth
DVMT growth
DVMT growth
population growth + job growth

[1] State initiatives include the Renewable Portfolio Standard and AB 1493 (Pavley)

[2] Assumed the emissions reductions from the 2 state measures from 2020-2035 (first 15 years) are similar to emissions reduction resulting from 2005-2020 (second 15 years). Pavley's 2035 emissions reductions had to be adjusted to account for the fact that they went into effect after 2005 (effective year: 2009).

RPS: RPS: Assume there is a gradual linear ramp from effective date (2003) up to reach 28% by 2020. Although the RPS's goal is 33% by 2020, based on current and historical achievements, it is estimated that by 2020, a more conservative goal of 28% will have been achieved. Source for 28%: Based on method adopted by City of Santa Rosa's CAP via Abby Young, BAAQMD

Pavley: Signed into CA law in 2002, but U.S. EPA didn't approve waiver to CA until 2009. Assume effective year to be 2009 and there is a gradual linear implementation

**I. BAU Indicators**

**VMT Compounded Annual Growth Rate**

2005 DVMT (Contra Costa County)	23,326,718
2020 DVMT (Contra Costa County)	27,405,869
2035 DVMT (Contra Costa County)	31,485,020
Years Compounded (2005-2020)	15
Years Compounded (2005-2035)	30
Cumulative Avg Growth Rate (CAGR) (%) 2005-2020:	1.06%
CAGR (%) 2005-2035:	1.00%

Note: 1) From 2005 inventory. 2) DVMT for 2020 was extrapolated using the 2005 and 2035 values

Year	Contra Costa DVMT*
2005	23,326,718
2035	31,485,020
2020	27,405,869

\* Source: ABAG via City of El Cerrito, Maria Sanders

**Population Growth Projections**

2005 Population	31,000
2020 Population	34,100
2035 Population	37,700
Years Compounded (2005-2020)	15
Years Compounded (2005-2035)	30
CAGR (%) 2005-2020:	0.64%
CAGR (%) 2005-2035:	0.65%

**Job Growth Projections**

2005 New Jobs	5,950
2020 New Jobs	6,040
2035 New Jobs	8,830
Years Compounded (2005-2020)	15
Years Compounded (2005-2035)	30
CAGR (%) 2005-2020:	0.10%
CAGR (%) 2005-2035:	1.32%

**II. State Initiatives Indicators**

California Initiative	% Reduction from 2020 GHG inventory for Entire State [1]
Renewable Portfolio Standard [2-see table to the right]	18%
AB 1493 (Pavley)	19.7%
Low-Carbon-Fuel-Standard- [3]	0.0%

[1] Method adopted from BAAQMD CEQA Guidelines. June 2010. Table D-4. Page D-18 and through personal correspondence with District staff: Sigalle Michaels.

[3] LCFS removed due to uncertainty of implementation: <http://www.nytimes.com/2011/12/30/us/judge-blocks-californias-low-carbon-fuel-standard.html>. Removal recommended by Abby Young, BAAQMD, via phone conversation March 2012

**Renewable Portfolio Standard**

Established in 2002 in Senate Bill 1078, the RPS program requires electricity providers to increase the portion of energy that comes from renewable sources to **20% by 2010 and by 33% by 2020.**

**Note: For this forecast, assume there is a gradual linear ramp from effective date (2003) up to reach 28% by 2020. Although the RPS's goal is 33% by 2020, based on current and historical achievements, it is estimated that by 2020, a more conservative goal of 28% will have been achieved.**

**Pavley Regulations (AB 1493) (Light-Duty Vehicle GHG Standards)**

Adopted in 2004 by the ARB, AB 1493 requires a **gradual reduction of GHG emissions from new passenger cars and light trucks (e.g. sedans, trucks and SUVs) beginning in 2009.** Applying to model years 2009 through 2016, by 2016, this will result in reducing GHG emissions 30% compared to new vehicles in 2002 when fully implemented. The AB32 Scoping Plan assigns an approximate 20% reduction in emissions from passenger vehicles associated with the implementation of AB 1493. To obtain additional reductions from the light duty fleet, ARB plans to adopt a second, more stringent, phase of the Pavley regulations in the near future. California officials are in the midst of developing regulations for the second stage of state's clean car standards for model years 2017 to 2025.

**[2] RPS Conservative Goal Adjustment**

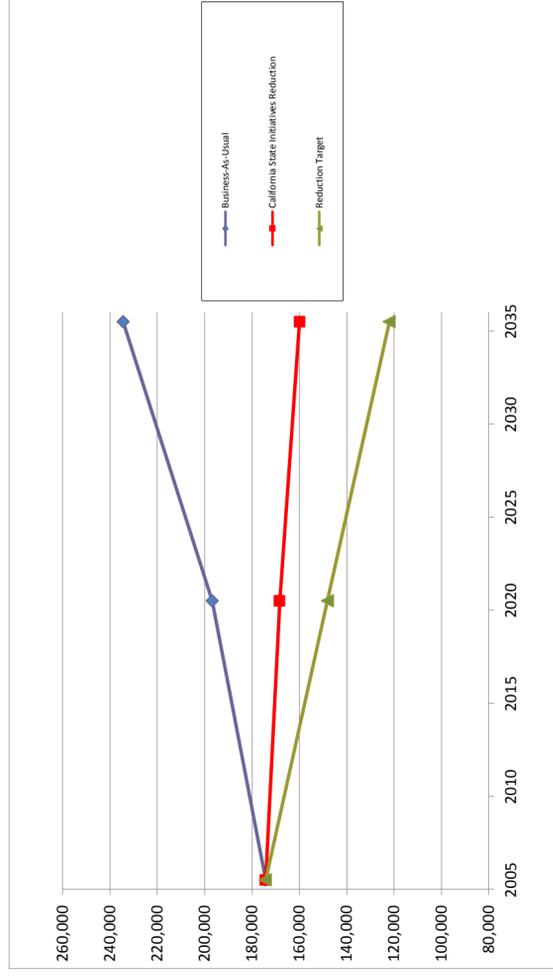
Original goal by 2020:	33%
Assumed achievement by 2020:	28% Source: Based on method adopted by City of Santa Rosa's CAP via Abby Young, BAAQMD
Original % Reduction from 2020 GHG inventory for Entire State	21% Source: Source: BAAQMD CEQA Guidelines. June 2010. Table D-4. Page D-18.
Adjusted % Reduction from 2020 GHG inventory for Entire State	<b>18%</b> Used correlation method

- 1) one depicting the BAU emissions projections and the 15% below 2005 by 2020 reduction target
- 2) the second one depicting the BAU emissions projections, emissions projections with emissions reductions from the state initiatives, and the 15% below 2005 reduction target

Year	BAU	California State Initiatives	Reduction Target
2005	174,242	174,242	174,242
2020	196,751	168,288	148,106
2035	234,383	159,846	121,969

**Reduction Target: 15% below 2005 levels by 2020**

15% below 2005 equates to 148,106 tons CO<sub>2</sub>e



## APPENDIX D: Transportation Land Use Reduction Measures and Quantifications

<b>Transportation/Land Use Reduction Measures (MTons CO<sub>2</sub>e Reduced)</b>			
<b>Strategy</b>		<b>2020</b>	<b>2035</b>
<b>TLU1. Increase density of mixed-use, infill development along transportation corridors to reduce vehicle miles traveled by 25%.</b>			
TLU 1.1	<b>Transit Oriented Development</b> Increase residential and commercial density and diversity along major transit corridors and encourage Transit Oriented Development along major bus routes to attract new employers and better serve the daily needs of residents and employees.	10,349	23,858
TLU 1.2	<b>Density Standards</b> Implement minimum building heights, density bonuses and parking maximums along major transportation corridors to encourage high density, mixed-use and affordable housing development.		
TLU 1.3	<b>Parking Management Strategy</b> Develop a parking management strategy that both responds to market conditions and encourages high density development and alternatives to driving.		
TLU 1.4	<b>Redevelopment Strategy</b> Develop a strategy for redeveloping underutilized areas such as vacant lots and surface parking lots along major transportation corridors.		
TLU 1.5	<b>Home-based Business Development</b> Develop a strategy to support and encourage home-based businesses that are compatible with residential neighborhoods		
<b>TLU2. Reduce Vehicle Miles Travelled by 3% by increasing walking and bicycle ridership.</b>			
TLU 2.1	<b>Bicycle and Pedestrian Plan</b> Update the Bicycle/Pedestrian Plan to expand and improve the City's bicycle and pedestrian infrastructure, including addressing current mobility gaps, creating more bike lanes and boulevards, more secure bicycle parking and by developing design standards to enhance the pedestrian environment and increase connectivity.	1,174	2,255

<b>TLU3. Develop car-free outreach and education campaigns specific</b>			
TLU 3.1	Commercial Trip Reduction Programs Partner with businesses to develop trip reduction outreach programs and alternative transportation incentives for employees	174	384
TLU 3.2	Student Commute Program Partner with WCCUSD to develop student commute programs such as carpool, Safe Routes to School and expanded school bus access	38	42
TLU 3.3	Public Outreach & Education Campaign Develop community education and outreach strategy to promote alternative modes of transportation and provide information on incentive programs	68	116
	<b>Total Reduction (Mtons CO2e)</b>	<b>11,801</b>	<b>26,655</b>
	<b>State Measures CO2e Reductions</b>	<b>24,214</b>	<b>66,039</b>
<b>Goal</b>	<b>At 15% &amp; 30% below 2005 Transportation CO2e</b>	<b>15,693</b>	<b>31,886</b>
	<b>Projected emissions growth (from Baseline)</b>	<b>18,295</b>	<b>36,590</b>
	<b>Shortfall of Goal</b>	<b>2,027</b>	<b>24,218</b>

## TLU1 to TLU 1.5 - Mixed-Use, Infill Development

Increase density of mixed-use, infill development along transportation corridors to reduce vehicle miles traveled by 25%.

### Measure Assumptions

	2020	2035
Total Vehicle Miles Traveled [1]	227,424,841	261,274,837
% reduction in VMT [2]	12.5%	25.0%
% VMT make up of light-duty vehicles and motorcycles (versus medium/heavy duty vehicles) [3]	87%	87%
Average passenger fuel economy- Gasoline [4]	21	21

Source/Methodology/Assumptions:

[1] Source: San Pablo Community Forecast

[2] Source: National Research Council's study states that doubling residential density across a metropolitan area might lower household VMT by about 5 to 12%, and perhaps as much as 25%, if coupled with higher employment concentrations, significant public trans improvements, mixed uses, improved accessibility, good design, higher parking fees, and other supportive demand management measures. Source: National Research Council. Driving and the Built Environment: The Effects of Compact Development on Motorized Travel, Energy Use, and CO2 emissions. Special Report 298. 2009.

Assume 12.5% VMT reduction by 2020 and 25% VMT reduction by 2035 as a result of the implementation of this menu of VMT reduction measures.

[3] Since this measure relates mainly to light-duty vehicles and motorcycles, assume VMT reduction from this measure is mainly from light-duty vehicles and motorcycles only (gasoline use only versus diesel use). These vehicles make up 87% of the VMT in the community, based on Contra Costa County numbers. % estimation is based on EMFAC VMT count for light-duty autos (PC), light-duty trucks (T1), and light-duty trucks (T2). and motorcycles in 2020 and 2035 for Contra Costa County.

[4] Fuel economy source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2006. July 2006 report. Table 2 page 14. Based on 2005 baseline mpg to reflect business as usual scenario.

Since this measure relates mainly to light-duty vehicles, assume VMT reduction from this measure is mainly from light-duty vehicles and motorcycles only (gasoline use only versus diesel use).

### VMT & Fuel Use Impact

	2020	2035
VMT reduced	24,681,174	56,901,350
Gasoline use saved (gallons)	1,175,294	2,709,588

### GHG Emissions Impact

	2020	2035
<b>GHG emissions reduction (Mtons CO2e)</b>	<b>10,349</b>	<b>23,858</b>

### TLU3.4 Bicycle & Pedestrian Plan

Update the Bike/Ped Plan to expand and improve the City's bicycle and pedestrian infrastructure, including addressing current mobility gaps, creating more bike lanes and boulevards, more secure bicycle parking.

#### Program Assumptions [1]

	2020	2035
Total Vehicle Miles Traveled [1]	107,473,164	123,469,283
% reduction in commute VMT [2]	3%	5%
% VMT make up of light-duty vehicles and motorcycles (versus medium/heavy duty vehicles) [3]	87%	87%
Average passenger fuel economy- Gasoline [4]	21	21

Sources/Methodology/Assumptions:

[1] Source: San Pablo Community Forecast

[2] Source: As a rule of thumb, the Center for Clean Air Policy (CCAP) Guidebook attributes a 1% to 5% reduction associated with comprehensive bicycle programs. CCAP includes the following in a comprehensive bicycle program (not limited to just these options below):

- \* bicycle promotion programs
- \* bicycle lanes and bridges
- \* effective bicycle signage and traffic signal improvements
- \* connectivity between transit and bicycling
- \* bicycle parking and storage
- \* facilities for cyclists (i.e. shower and lockers)
- \* bike share options
- \* mapping and educational materials
- \* bike rentals

Assume a conservative 3% reduction in 2020, with full implementation by 2035.

[3] Since this measure relates mainly to light-duty vehicles and motorcycles, assume VMT reduction from this measure is mainly from light-duty vehicles and motorcycles only (gasoline use only versus diesel use). These vehicles make up 87% of the VMT in the community, based on Contra Costa County numbers. % estimation is based on EMFAC VMT count for light-duty autos (PC), light-duty trucks (T1), and light-duty trucks (T2). and motorcycles in 2020 and 2035 for Contra Costa County.

[4] Fuel economy source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2006. July 2006 report.

Table 2 page 14. Based on 2005 baseline mpg to reflect business as usual scenario.

#### VMT & Fuel Use Impact

	2020	2035
VMT reduced	2,799,234	5,377,915
Gasoline use saved (gallons)	133,297	256,091

#### GHG Emissions Impact

	2020	2035
<b>GHG emissions reduction (Mtons CO2e)</b>	<b>1,174</b>	<b>2,255</b>

### TLU3.1 Commercial Trip Reduction Programs

*Partner with businesses to develop trip reduction outreach programs and alternative transportation incentives for employees.*

Source: CAPCOA Quantifying GHG Mitigation Measures. 2010. Pg 218 - Implement Commute Trip Reduction Program - Voluntary. The project will implement a voluntary Commute Trip Reduction (CTR) program with employers to discourage single-occupancy vehicle trips and encourage alternative modes of transportation such as carpooling, taking transit, walking, and biking. The CTR program will provide employees with assistance in using alternative modes of travel, and provide both "carrots" and "sticks" to encourage employees. The CTR program should include all of the following to apply the effectiveness reported by the literature:

- \* Carpooling encouragement
- \* Ride-matching assistance
- \* Preferential carpool parking
- \* Flexible work schedules for carpools
- \* Half time transportation coordinator
- \* Vanpool assistance
- \* Bicycle end-trip facilities (parking, showers and lockers)

Other strategies may also be included as part of a voluntary CTR program, though they are not included in the reductions estimation and thus are not incorporated in the estimated VMT reductions. These include: new employee orientation of trip reduction and alternative mode options, event promotions and publications, flexible work schedule for all employees, transit

#### Measure Assumptions

	2020	2035
Estimated number of total commuters in community [1]	14,056	15,540
% of commuter using public transit [3]	17%	17%
% of employees eligible [2]	15%	30%
% reduction in commute VMT [4]	5.2%	5.2%
Estimated average round-trip commute (miles) [3]	18.2	18.2
Average passenger fuel economy- Gasoline [5]	21	21

Source/Methodology/Assumptions:

[1] Based on number of employed residents in the City. In 2000, 12,778 residents in the community were employed. 2020 and 2035 figures were extrapolated using the 2000 employment figure. Source: 2000 employment figure from 2000 Census data. [http://factfinder.census.gov/servlet/ADPTable?\\_bm=y&-context=adp&-qr\\_name=ACS\\_2009\\_5YR\\_G00\\_DP5YR3&-ds\\_name=ACS\\_2009\\_5YR\\_G00\\_-&-tree\\_id=5309&-redoLog=true&-\\_caller=geoselect&-geo\\_id=16000US0668294&-format=&-\\_lang=en](http://factfinder.census.gov/servlet/ADPTable?_bm=y&-context=adp&-qr_name=ACS_2009_5YR_G00_DP5YR3&-ds_name=ACS_2009_5YR_G00_-&-tree_id=5309&-redoLog=true&-_caller=geoselect&-geo_id=16000US0668294&-format=&-_lang=en)

[2] Assume a 15% of employees are eligible to participate in at least one of the voluntary trip reduction programs in 2020 and 30% in 2035. Assume 100% of eligible employees participate in the program.

[3] Source: Shelly Meron. Contra Costa Times. "El Cerrito top-ranked city in East Bay for commuting by transit". Sun December 21, 2008.

Assume in 2020 and 2035, percentage of residents commuting by public transit stays consistent with 17%. Assume that 80% of workers drive during their commute. El Cerrito = 19miles/30.8 mins, so SP = 18.2/29.5 mins

[4] Source: CAPCOA Quantifying GHG Mitigation Measures. 2010. Pg 218 - Implement Commute Trip Reduction Program - Voluntary. For large metropolitan area (5.2% reduction in commute VMT).

[5] Fuel economy source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2006. July 2006 report. Table 2 page 14. Based on 2005 baseline mpg to reflect business as usual scenario.

#### VMT & Fuel Use Impact

	2020	2035
VMT reduced [1]	414,037	915,496
Gasoline use saved (gallons)	19,716	43,595

[1] Based on average assumed 250 work days/year

[2] Since this measure relates mainly to light-duty vehicles, assume VMT reduction from this measure is mainly from light-duty vehicles and motorcycles only (gasoline use only versus diesel use).

#### GHG Emissions Impact

	2020	2035
<b>GHG emissions reduction (Mtons CO2e)</b>	<b>174</b>	<b>384</b>

### TLU3.2 Student Commute Program

Partner with WCCUSD to develop student commute programs such as carpool, Safe Routes to School and expanded school bus access

#### Program Assumptions [1]

	2020	2035
Estimated % reduction in automobile trips for student commute [2]	10%	10%
Estimated student commute roundtrip (miles) [3]	3	3
Estimated # of students in community [4]	7,480	8,270
Estimated % of students who commute to/from school by car [5]	40%	40%
Assumed # of students in one vehicle if they use vehicles to commute	2	2
Estimated # of annual student round-trip commute trips [6]	299,200	330,787
Estimated annual VMT from student commute (miles)	897,600	992,361
Average passenger fuel economy- Gasoline [7]	21	21

Sources/Methodology/Assumptions:

[1] Based on two community outreach & education campaign targeting two types of automobile use: work commute and school commute.

School commute outreach & education campaign is based on School Transport Management Program (STMP), which can include promotion campaigns, special events, and contests to encourage parents, students and staff to reduce automobile travel to school. Source: School Transport Management. Encouraging Alternatives to Driving to School. TDM Encyclopedia. Victoria Transport Policy Institute. Updated April 15, 2011. <http://www.vtpi.org/tm/tm36.htm>

[2] Travel to school represents 10-15% of peak period motor vehicle trips in typical North American communities, although a smaller portion of total mileage since these trips tend to be shorter than other trip categories. There are currently few detailed studies of the effectiveness of School Transport Management programs, but anecdotal evidence indicates that total reductions in automobile trips of 10-20% or more are possible at a particular school, and much greater reductions are possible when schools are sited and designed for good accessibility. For this modeling, assume a conservative estimate of 10% reduction in automobile trips. Source: School Transport Management. Encouraging Alternatives to Driving to School. TDM Encyclopedia. Victoria Transport Policy Institute. Updated April 15, 2011. <http://www.vtpi.org/tm/tm36.htm>

[3] Based on 130,684 parent questionnaires about their children's travel to school. 44% of students live one mile or less from school, slightly more than 34% of the children live more than two miles from school. For this modeling, assume students live on average 1.5 miles from school. Source: Safe Routes To School Travel Data. A Look at Baseline Results from Parent Surveys and Student Travel Tallies. Prepared by the National Center for Safe Routes to School. [http://www.saferoutesinfo.org/resources/collateral/SRTS\\_baseline\\_data\\_report.pdf](http://www.saferoutesinfo.org/resources/collateral/SRTS_baseline_data_report.pdf)

[4] 2020 and 2035 figures were extrapolated using estimated baseline figure of 6,800 students enrolled in school in the community based on information from American Fact Finder (2005-2009) against population increase. Includes students enrolled in nursery school/preschool, kindergarten, elementary school (grades 1-8), and high school (grades 9-12). Assume # of students in schools increases with population increase. Source: American Fact Finder (2005-2009 Estimates) [http://factfinder.census.gov/servlet/ADPTable?\\_bm=y&-geo\\_id=16000US0668294&-qr\\_name=ACS\\_2009\\_5YR\\_G00\\_DP5YR2&-ds\\_name=&-\\_lang=en&-redoLog=false](http://factfinder.census.gov/servlet/ADPTable?_bm=y&-geo_id=16000US0668294&-qr_name=ACS_2009_5YR_G00_DP5YR2&-ds_name=&-_lang=en&-redoLog=false)

[5] Assume, on average, 45% of students use family vehicles for arrival at school and 35% use family vehicles leaving school in the afternoon. For this modeling, assume 40% of students use family vehicles in general. Source: Safe Routes To School Travel Data. A Look at Baseline Results from Parent Surveys and Student Travel Tallies. Prepared by the National Center for Safe Routes to School. [http://www.saferoutesinfo.org/resources/collateral/SRTS\\_baseline\\_data\\_report.pdf](http://www.saferoutesinfo.org/resources/collateral/SRTS_baseline_data_report.pdf)

[6] Assume student commute = 5 days a week for 40 weeks annually.

[7] Fuel economy source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2006. July 2006 report. Table 2 page 14. Based on 2005 baseline mpg to reflect business as usual scenario.

#### VMT & Fuel Use Impact

	2020	2035
VMT Reduction	89,760	99,236
Gasoline use saved (gallons) (assume for light-duty vehicles and motorcycles only)	4,274	4,726

#### GHG Emissions Impact

	2020	2035
<b>GHG emissions reduction (Mtons CO<sub>2</sub>e)</b>	<b>38</b>	<b>42</b>

## 2.3 Public Education & Outreach

Develop community education and outreach strategy to promote alternative modes of transportation and provide information on incentive programs

### Program Assumptions

	2020	2035
Total Vehicle Miles Traveled [1]	107,473,164	123,469,283
% market penetration [1] per yr	1.5%	1.5%
Project goal: % reduction in VMT [2]	10%	15%
Average passenger fuel economy- Gasoline [4]	21	21

Sources/Methodology/Assumptions:

[1] Based on anecdotal evidence from PG&E's SmartLights program, 3% market penetration was achieved (3% of community conducted energy efficiency retrofits) through aggressive door-to-door outreach and education throughout the community. For this measure's calculation, we assume a more conservative outreach and education strategy for the community by 2020 and 2035 - 50% of effort.

[2] Assume City's goal of achieving 10% reduction in residential energy use by 2020 and 15% by 2035 for those residents

### VMT & Fuel Use Impact

	2020	2035
VMT reduced	161,210	277,806
Gasoline use saved (gallons)	7,676.65	13,228.85

### GHG Emissions Impact

	2020	2035
<b>GHG emissions reduction (Mtons CO<sub>2</sub>e)</b>	<b>68</b>	<b>116</b>

## Data utilized for emissions reduction calculations

### Emissions Factors

<i>Vehicles</i>		
Gasoline	0.008805046 Mtons CO2e/gallon	Source: 2009 CACP software
Diesel	0.101441142 Mtons CO2e/gallon	Source: 2009 CACP software

### Energy Costs

<i>Fuel</i>		
Gasoline	\$3.78 \$/gallon	Source: EIA. San Francisco specific (average 2011). <a href="http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_y05sf_m.htm">http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_y05sf_m.htm</a>
Diesel	\$3.98 \$/gallon	Source: EIA. California specific (average 2011). <a href="http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_sca_m.htm">http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_sca_m.htm</a>

### Snapshot of San Pablo

	2005	2020	2035
Population	31,000	34,100	37,700
Single Family Homes [1]	4,652		
Businesses / institutions [2]	291	295	432
Number of Jobs	5,950	6,040	8,830
Square Miles	2.58	2.58	2.58
Service Population	36,950	40,140	46,530

[1] 2005 Census Data (1-unit, detached)

[2] Total number of active business licenses in SP 2009-3/2011, Assume # of businesses same trend as job increases

### Residential Units

Year	TOTAL housing unit	----- SINGLE -----		---- MULTIPLE ----		MOBILE HOMES	OCCU-PIED	PCT VACANT	PERSONS PER HOUSE-HOLD
		DETACHED	ATTACHED	2 TO 4	5 PLUS				
2000	9,354	4,145	760	1,293	2,361	795	9,065	3.09	3.286
2001	9,358	4,149	760	1,293	2,361	795	9,069	3.09	3.32
2002	9,355	4,143	760	1,293	2,361	798	9,066	3.09	3.324
2003	9,404	4,139	774	1,301	2,383	807	9,113	3.09	3.319
2004	9,532	4,213	824	1,305	2,383	807	9,237	3.09	3.308
2005	9,636	4,217	853	1,362	2,397	807	9,338	3.09	3.282
2006	9,666	4,224	853	1,362	2,420	807	9,367	3.09	3.243
2007	9,706	4,235	852	1,362	2,449	808	9,406	3.09	3.227
2008	9,802	4,243	852	1,366	2,533	808	9,499	3.09	3.235
...									
2020	10,519								
...									
2035	11,441								

Source:

[1] For historical data 2001 - 2008: State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008. [http://www.dof.ca.gov/research/demographic/reports/estimates/e-5\\_2001-06/](http://www.dof.ca.gov/research/demographic/reports/estimates/e-5_2001-06/)

[2] Future projections were extrapolated using 2001-2008 data

# of new residential construction each year [1]	47
# of new non-residential construction each year [2]	3
# of new homes sold on average each year[3]	279

Sources/Methodology:

[1] San Pablo General Plan 2030. A projected 990 new residential units will be built by 2030, at an even rate of construction, this equates to 47.14 residential units/year

[2] San Pablo Community Emissions Forecast Projections methodology applied to San Pablo Businesses. A projected 432 businesses in San Pablo by 2035, which equates to 141 new businesses over 24 years or 5.875 new business per year. Assume 50% require new buildings.

[3] Concord Title Group

**Emissions Projections**

End Use	Emissions (Mtons CO2e)		
	2005	2020	2035
<i>Energy Use</i>			
Residential Electricity	8,594	9,453	10,451
Residential Natural Gas	19,212	21,133	23,364
Commercial Electricity	10,741	10,903	15,940
Direct Access Electricity (2005)	2,625	2,665	3,896
Commercial Natural Gas	9,225	9,365	13,690
Water Consumed	469	496	630
Wastewater Treated	309	327	415
<i>Transportation</i>	<b>104,621</b>		
Auto Traffic (Local Streets)	11,489	13,498	15,507
Auto Traffic (San Pablo Ave)	37,951	44,588	51,224
Auto Traffic (% of County Highways)	55,181	64,831	74,480
<i>Waste</i>			
Solid Waste to Landfill	18,446	19,493	24,785
<b>Totals</b>	<b>174,242</b>	<b>196,752</b>	<b>234,382</b>

Source: GHG emissions inventory and forecast

**Energy Use Projections**

End Use	2005	2020	2035	Unit
	Total Units	Total Units	Total Units	
<i>Energy Use</i>				
Residential Electricity	38,249,236	42,074,160	46,516,006	kWh
Residential Natural Gas	3,610,858	3,971,944	4,391,269	therms
Commercial Electricity	33,672,692	34,182,027	49,971,407	kWh
Direct Access Electricity (2005)	10,119,601	10,272,671	15,017,828	kWh
Commercial Natural Gas	1,105,668	1,122,392	1,640,848	therms
Water Consumed	927,968,800	974,929,929	1,211,699,970	gallons
Wastewater Treated	707,350,214	747,505,088	950,425,133	gallons
<i>Transportation</i>	<b>193,574,100</b>	<b>227,424,841</b>	<b>261,274,837</b>	<b>Total VMT</b>
Auto Traffic (Local + Collector Streets)	21,258,695	24,976,582	28,693,725	VMT
Auto Traffic (Arterials)	70,217,605	82,496,582	94,775,558	VMT
Auto Traffic (% of County Highways)	102,097,800	119,951,677	137,805,554	VMT
<i>Waste</i>				
Solid Waste to Landfill	16,675	17,622	22,405	lbs
<b>Totals</b>				

Source: 2005 from GHG emissions inventory. 2020 and 2035 (w/state initiatives) were derived from same formulas and assumptions utilized for estimating emissions forecast (for details, see community forecast emissions spreadsheet)

**Contra Costa County**

VMT	2020	2035
VMT from light-duty (PC, T1, T2) + motorcycle	25,716,692	30,630,982
Total County VMT	29,620,828	35,162,192
% VMT from light duty + motorcycles	87%	87%

Source: EMFAC2007

# APPENDIX E: Energy Reduction Measures and Quantifications

<b>Energy Reduction Measures (MTons CO2e Reduced)</b>			
<b>Strategy</b>		<b>2020</b>	<b>2035</b>
<b>E1. Increase new construction efficiency above Title-24</b>			
E 1.1	<b>CalGreen Tier 1 &amp; Tier 2</b> Adopt, with local adaptations, the higher tiers of green building performance allowed by the California Green Building Standard (CalGreen), with the possibility of mandatory requirements and higher standards being phased in over time.	1,253	4,345
E 1.2	<b>Net-Zero New Construction</b> Encourage all appropriate new construction to design for net-zero energy through dissemination of education materials.	330	1,523
<b>E2. Reduce energy use in existing buildings by 20%</b>			
E 2.1	<b>RECO</b> Require energy-efficiency improvements in existing buildings to be triggered at time-of-sale or with certain types of home improvements, to be phased in over time.	2,196	4,381
E 2.2	<b>Energy Efficiency Financing</b> Promote financing strategies that will encourage property owners to make energy-efficiency and clean energy investments in their properties.	850	1,879
E 2.3	<b>Public Outreach &amp; Education</b> Develop community education and outreach campaigns to inform residents and business of energy-efficiency funding opportunities, Citywide regulations and to encourage demand reduction behavioral change.	160	266
<b>E3. Increase renewable energy use by 15% by 2020</b>			
E 3.1	<b>Community Solar</b> Partner with non-profit organizations and utility providers to develop San Pablo specific Power Purchasing Agreements, joint procurement policies, and financing strategies to enable residents and business owners to adopt solar and other renewable energy technologies.	81	366
<b>Total</b>	<b>Total Reduction</b>	<b>4,870</b>	<b>12,761</b>
	<b>State Emissions Reductions</b>	<b>4,102</b>	<b>8,204</b>
<b>Goal</b>	<b>At 15% &amp; 30% below 2005 Energy CO2e</b>	<b>7,676</b>	<b>15,352</b>
	<b>Projected emissions growth (from baseline)</b>	<b>3,122</b>	<b>16,944</b>
<b>Delta</b>	<b>Shortfall of Goal</b>	<b>(1,826)</b>	<b>(11,332)</b>

## 1.1 CalGreen Tier 1 & Tier 2

*Adopt, with local adaptations, the higher tiers of green building performance allowed by the California Green Building Standard, with the possibility of mandatory requirements and higher standards being phased in over time.*

This measure only takes into consideration the *Energy Efficiency* measures for meeting CalGreen Tier 1 and 2's requirements.

In order for residential and non-residential new construction to achieve Tier 1 and Tier 2 status (specifically relating to energy efficiency), they must do the following:

### \* Tier 1:

#### Residential sector new construction

- Must meet all of the mandatory measures listed in the CalGreen code.
- Exceed the California Energy Code requirements based on the 2008 Energy Efficiency Standards (Title 24) by 15 percent.
- Comply with at least four voluntary elective energy efficiency measures listed in CalGreen

#### Non-residential sector new construction

- Must meet all of the mandatory measures listed in the CalGreen code.
- Exceed the California Energy Code requirements based on the 2008 Energy Efficiency Standards (Title 24) by 15 percent.

### \* Tier 2:

#### Residential sector new construction

- Must meet all of the mandatory measures listed in the CalGreen code.
- Exceed the California Energy Code requirements based on the 2008 Energy Efficiency Standards (Title 24) by 30 percent.
- Comply with at least six voluntary elective energy efficiency measures listed in CalGreen

#### Non-residential sector new construction

- Must meet all of the mandatory measures listed in the CalGreen code.
- Exceed the California Energy Code requirements based on the 2008 Energy Efficiency Standards (Title 24) by 30 percent.

This measure takes into account the energy savings that results from conducting the performance approach - exceeding 2008 Title 24 by 15 and 30%.

## Program Assumptions

### Title 24 Energy Reductions

Sector and Energy Type	From 2005 T24 to 2008 T24. Energy Use % Reduction from Baseline (2005) Conditions [1]	Tier 1 15% above 2008 Title 24	Tier 2 30% above 2008 Title 24
Residential new construction (electricity)	21%	33.02%	44.84%
Residential new construction (natural gas)	8.5%	22.23%	35.95%
Non-residential new construction (electricity)	4.9%	19.17%	33.43%
Non-residential new construction (natural gas)	9.4%	22.99%	36.58%

[1] 2007 CEC's EIR documentation for 2008 Title 24 Standards was used, which analyzes the savings in electricity and natural gas going from 2005 to 2008 Title 24 Standards. Table 2 (Electricity Savings) and Table 4 (Natural Gas Savings) were used to determine the percent savings in kilowatts or therms associated with implementation of 2008 Title 24 Standards. The Single-family and Multi-family savings were averaged because the mix of SFR and MFR was unknown to create a weighted-average. CalGreen was rolled into this calculation by assuming either 15% above 2008 Title 24 for Tier 1, or 30% above 2008 Title 24 for Tier II standards. This assumption is conservative in that it assumes all homes and nonresidential buildings are at least up to 2005 Title 24 Standards; therefore, there is a smaller reduction than if some of the houses and nonresidential buildings were at 2001 Title 24 Standards or less, which many may be.

Source: California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings. Via correspondence with George C. Lu, Air Quality and GHG Analyst, Design + Planning. Email: George.Lu@aecom.com

		2020	2035
Residential	Number of new single-family housing units [1]	409	859
	Average energy use per single-family home (MMBtu) [2]	111	111
	Number of new multi-family housing units [1]	448	893
	Average energy use per multi-family home (MMBtu)	51	51
	Percentage of home energy use for electricity [3]	36%	36%
	Percentage of home energy use for natural gas [3]	64%	64%
	Electricity Use Reduction Goals [4]	33.02%	44.84%
	Natural Gas Use Reduction Goals [4]	22.23%	35.95%

Source/Methodology:

[1] For historical data 2001 - 2008: State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008. For 2020 and 2035 statistics, extrapolated based on 2001-2008 data.

[http://www.dof.ca.gov/research/demographic/reports/estimates/e-5\\_2001-06/](http://www.dof.ca.gov/research/demographic/reports/estimates/e-5_2001-06/)

[2] From Home Energy Magazine, Rick Diamond, Oct 1995: Patterns of energy use in multifamily buildings are different from those in single-family homes. The average multifamily household uses less than half as much energy as the average single-family household--51 million Btu (MMBtu) per household compared to 111 MMBtu per single-family household (see Table 1).

[3] City of San Pablo 2005 Greenhouse Gas Inventory. 36% of energy consumed in the residential sector in 2005 was in the form of electricity; the remaining 64% was natural gas

		2020	2035
Non-residential	Number of new non-residential construction [1]	21	65
	Average electricity use per non-residential building (kWh) [2]	238,200	238,200
	Average natural gas use per non-residential building (therms) [3]	7.784	7.78
	Electricity Use Reduction Goals [4]	19.17%	33.43%
	Natural Gas Use Reduction Goals [4]	22.99%	36.58%

Source/Methodology:

[1] City of San Pablo Community Emissions Forecast Projections methodology applied to San Pablo Businesses. A projected 432 businesses in San Pablo by 2035, which equates to 141 new businesses over 24 years or 5.875 new business per year. Assume 50% require new buildings. Assume program start date of 2013

[2] U.S. Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey, Electricity Consumption and Expenditures Intensities. Averaged Building Electricity Use for five major non-residential building types in San Pablo - Food Sales, Retail, Office, Service and Other to get an average Electricity Use of 238,200 kWh per year.

[3] U.S. Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey, Natural Gas Consumption and Expenditure Intensities. Averaged Building Natural Gas Use for five major non-residential building types in San Pablo - Food Sales, Retail, Office, Service and Other to get an average Natural Gase Use of 7.784 therms per year.

[4] Program goal: Tier 1 achievement by 2020 in all new construction residential and non-residential sectors. Tier 2 achievement by 2030 in all new construction residential and non-residential sectors.

**Electricity Use Impact**

		2020	2035
Residential	Reduction in single-family electricity use (kWh)	1,589,068	4,529,120
	Reduction in multi-family electricity use (kWh)	798,929	2,164,103
Non-residential	Reduction in new construction electricity use (kWh)	938,699	5,146,106
<b>Total Electricity reduction (kWh)</b>		<b>3,326,696</b>	<b>11,839,328</b>

**Natural Gas Use Impact**

		2020	2035
Residential	Reduction in single-family natural gas use (therms)	64,504	218,990
	Reduction in multi-family natural gas use (therms)	32,430	104,638
Non-residential	Reduction in new construction natural gas use (therms)	36.80	184.01
<b>Total Natural Gas reduction (therms)</b>		<b>96,971</b>	<b>323,812</b>

**GHG Emissions Impact**

		2020	2035
Residential	Electricity GHG emissions reduction (Mtons)	530	1,485
	Natural gas GHG emissions reduction (Mtons)	514	1,717
Non-Residential	Electricity GHG emissions reduction (Mtons)	208.28	1,141.81
	Natural gas GHG emissions reduction (Mtons)	0.20	0.98
<b>GHG emissions reduction (Mtons CO2e)</b>		<b>1,253</b>	<b>4,345</b>

## 1.2 Net-Zero Energy New Construction

Encourage all appropriate new construction to build to design for net-zero energy.

### Program Assumptions

		2020	2035
	Traditional Fossil-Fuel Energy Use Reduction [1]	90%	90%
Residential	Electricity Use Reduction (above Title 24 Reductions)	57%	45%
	Natural Gas Use Reduction (above Title 24 Reductions)	68%	54%
Non-Residential	Electricity Use Reduction (above Title 24 Reductions)	71%	57%
	Natural Gas Use Reduction (above Title 24 Reductions)	67%	53%
	<b>Program goal:</b> Target % of residential net-zero energy new construction [1]	10%	25%
	<b>Program goal:</b> Target % of non-residential net-zero energy new construction [1]	10%	25%

Source/Methodology:

[1] Target % based on 2007 strategic planning process and vision for CA's energy future determined for the commercial sector from various public workshops. Same target % was also adopted for the residential sector. Source: <http://www.californiagreensolutions.com/cgi-bin/gt/tpl.h,content=2782> OR [http://www.californiaenergyefficiency.com/docs/Appendices\\_final-ceesp\\_forserving\\_June.pdf](http://www.californiaenergyefficiency.com/docs/Appendices_final-ceesp_forserving_June.pdf) -- To be conservative, changed 2035 target of 100% buildings being net-zero energy in 2035 to 25%.

		2020	2035
Residential	Number of new single-family housing units [1]	409	859
	Average energy use per single-family home (MMBtu) [2]	111	111
	Number of new multi-family housing units [1]	448	893
	Average energy use per multi-family home (MMBtu)	51	51
	Percentage of home energy use for electricity	36%	36%
	Percentage of home energy use for natural gas	64%	64%

Source/Methodology:

[1] For historical data 2001 - 2008: State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008. For 2020 and 2035 statistics, extrapolated based on 2001-2008 data.  
[http://www.dof.ca.gov/research/demographic/reports/estimates/e-5\\_2001-06/](http://www.dof.ca.gov/research/demographic/reports/estimates/e-5_2001-06/)

[2] From Home Energy Magazine, Rick Diamond, Oct 1995: Patterns of energy use in multifamily buildings are different from those in single-family homes. The average multifamily household uses less than half as much energy as the average single-family household--51 million Btu (MMBtu) per household compared to 111 MMBtu per single-family household (see Table 1).

[3] City of San Pablo 2005 Greenhouse Gas Inventory. 36% of energy consumed in the residential sector in 2005 was in the form of electricity; the remaining 64% was natural gas

		2020	2035
Non-Residential	Number of businesses	21	65
	Average electricity use per non-residential building (kWh) [2]	238,200	238,200
	Average natural gas use per non-residential building (therms) [3]	7.784	7.78

Source/Methodology:

[1] City of San Pablo Community Emissions Forecast Projections methodology applied to San Pablo Businesses. A projected 432 businesses in San Pablo by 2035, which equates to 141 new businesses over 24 years or 5.875 new business per year. Assume 50% require new buildings. Assume program start date of 2013

[2] U.S. Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey, Electricity Consumption and Expenditures Intensities. Averaged Building Electricity Use for five major non-residential building types in San Pablo - Food Sales, Retail, Office, Service and Other to get an average Electricity Use of 238,200 kWh per year.

[3] U.S. Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey, Natural Gas Consumption and Expenditure Intensities. Averaged Building Natural Gas Use for five major non-residential building types in San Pablo - Food Sales, Retail, Office, Service and Other to get an average Natural Gas Use of 7.784 therms per year.

[4] Program goal: Tier 1 achievement by 2020 in all new construction residential and non-residential sectors. Tier 2 achievement by 2030 in all new construction residential and non-residential sectors.

#### Electricity Use Impact

		2020	2035
Residential	Reduction in Single-Family Residential New Construction Electricity Use (kWh)	274,019.29	1,140,308.83
	Reduction in Multi-Family Residential New Construction Electricity Use (kWh)	137,905.96	544,663.13
Non-Residential	Reduction in Non-Residential New Construction Electricity Use (kWh)	346,948.94	2,177,050.49
<b>Total (kWh)</b>		<b>758,874</b>	<b>3,862,022</b>

[1] From Home Energy Magazine, Rick Diamond, Oct 1995: Patterns of energy use in multifamily buildings are different from those in single-family houses. The average multifamily household uses less than half as much energy as the average single-family household--51 million Btu (MMBtu) per household compared to 111 MMBtu per single-family household (see Table 1). When compared on a floor area basis, however, the multifamily units are larger users--62,000 Btu/ft<sup>2</sup> versus 51,000 Btu/ft<sup>2</sup> for the single-family house. One reason for this is that the average floor area of a multifamily apartment (800 ft<sup>2</sup>) is less than half the average floor area of a single-family house (1900 ft<sup>2</sup>).

[2] Assumed that all res new construction will be multifamily

#### Natural Gas Use Impact

		2020	2035
Residential	Reduction in Single-Family Residential New Construction Natural Gas Use (therms)	20,544	86,145
	Reduction in Multi-Family Residential New Construction Natural Gas Use (therms)	9,893	39,314
Non-Residential	Reduction in Non-residential New Construction Natural Gas Use (therms)	11	67
<b>Total (therms)</b>		<b>30,447</b>	<b>125,526</b>

#### GHG Emissions Impact

	2020	2035
Electricity GHG emissions reduction (tons)	168	857
Natural gas GHG emissions reduction (tons)	162	666.04
<b>GHG emissions reduction (Mtons CO<sub>2</sub>e)</b>	<b>330</b>	<b>1,523</b>

## 2.1 Residential Energy Conservation Ordinance (RECO)

Require energy efficiency improvements in existing buildings to be triggered at time-of-sale or with certain types of home improvements, to be phased in over time.

RECO Model is based on recommendations made to City of Hayward by Michael Gabel. The data utilized below is derived from RECO report developed by Michael Gabel dated August 2010 (Research Report on a Hayward Residential Energy Conservation Ordinance (RECO) by Gabel Associates, LLC. <http://www.ci.hayward.ca.us/forums/RECO/documents/2010/FINAL%208-30-10%20RECO%20Report%20by%20Gabel%20Associates.pdf>.)

Below is a summary of the recommendations:

### Mandatory Features

- Low flow toilets, showerheads and faucet aerators
- Hot and cold water pipe insulation at least 5 feet from the water heater
- Exterior door weather-stripping
- Fireplace closures
- Duct repair (if tested duct sealing is not a part of the - selected compliance option)

### Compliance Options

The homeowner chooses any one of the following four retrofit options:

#### Prescriptive Approach

1. **Air sealing + R-30 roof/ceiling insulation ( if < R-13 existing roof/ceiling insulation):** Homes with un-insulated attics are retrofitted with air sealing + R-30 attic insulation.
  2. **Air sealing + duct sealing (if existing forced air heating system):** Homes with some existing attic insulation or with no attics would be required or encouraged to retrofit with air sealing + duct sealing if there is a forced air system.
  3. **Air sealing + R-19 raised floor insulation (if no existing raised floor insulation):** Homes with wall heaters and no attic or existing attic insulation would be required to retrofit with air sealing + R-19 raised floor over an accessible crawl space.
- .. or ..

#### Performance Approach

4. HERS2 audit and rating on the existing house, and any combination of retrofit measures which improve the HERS score > 10% or achieves a

## Mandatory Features Modeling

### Program Assumptions

	2020	2035
% Energy Reduction from Implementation of Mandatory Features [1]	5%	5%
Number of Housing Units [2]	10,519	11,441
Residential Natural Gas Use (therms) [2]	3,971,944	4,391,269
Annual Natural Gas Use per Housing Unit (therms)	378	384

Source/Methodology:

[1] Source: City of Berkeley: The average energy savings associated with RECO measures currently ranges from an estimated 10-20% per building. The savings quoted here refers to original Berkeley RECO, which consisted only of a prescriptive measures list (Berkeley is currently updating their RECO). This prescriptive measures list is very similar to the mandatory list recommended for the City of Hayward. Therefore, it is assumed the energy savings resulting from Berkeley original RECO is equivalent to the energy savings estimates for the mandatory features listed for Hayward. Assume a more conservative energy savings of 5% for this modeling.

Source: Berkeley June 2009 Climate Action Plan [http://www.cityofberkeley.info/uploadedFiles/Planning\\_and\\_Development/Level\\_3\\_-\\_Energy\\_and\\_Sustainable\\_Development/Berkeley%20Climate%20Action%20Plan.pdf](http://www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Berkeley%20Climate%20Action%20Plan.pdf).

[2] Source: City of San Pablo, Forecast

### Time of Sale RECO Trigger

	2020	2035
# of homes sold (from 2005) [1]	4,190	8,380
# of homes that comply [2]	3,771	7,542

Source/Methodology:

[1] On average, 279 homes sold per year. Source: Concord Title Group

[2] Assume 10% do not comply

### Remodel RECO Trigger

	2020	2035
# of major remodeled home (from 2005) [1]	270	270
# of homes that comply [2]	243	243

Source/Methodology:

[1] Assume remodel trigger is for remodels that cost over \$40,000. On average, in San Pablo, 18 homes have remodel cost of \$40,000 or greater each year. Source: Mary Delgado, Senior Permit Technician, City of San Pablo.

[2] Assume 10% do not comply

### Energy Reductions

	2020	2035
Annual natural gas saved (therms)	75,784	149,396
<b>GHG emissions reduction (tons)</b>	<b>402</b>	<b>793</b>

## Compliance Options Modeling

### Program Assumptions

Energy retrofit measures [1]	Annual natural gas saved per dwelling unit (therms)	Annual CO2e savings per dwelling unit (pounds)
Air sealing + duct sealing	71	841
Air sealing + R-30 Attic insulation	81	951
Air sealing + R-19 Raised floor insulation	76	890
<b>Average</b>	<b>76</b>	<b>894</b>

Source/Methodology:

[1] Data is based on study conducted by Gabel Associates, Inc. for developing Hayward's RECO. Source: Research Report on a Hayward Residential Energy Conservation Ordinance (RECO) by Gabel Associates, LLC.  
<http://www.ci.hayward.ca.us/forums/RECO/documents/2010/FINAL%208-30-10%20RECO%20Report%20by%20Gabel%20Associates.pdf>.

TOS RECO Trigger	2020	2035
# of homes sold (from 2005) [1]	4,190	8,380
# of homes that comply [2]	3,771	7,542

[1] On average, 279 homes sold per year. Source: Concord Title Group

[2] Assume 10% do not comply

Remodel RECO Trigger	2020	2035
# of major remodeled home (from 2005) [1]	270	540
# of homes that comply [2]	243	486

[1] Assume remodel trigger is for remodels that cost over \$40,000. On average, in San Pablo, 18 homes have remodel cost of \$40,000 or greater each year. Source: Mary Delgado, City of San Pablo.

[2] Assume 10% do not comply

### Energy Reduction

	2020	2035
Annual natural gas saved (therms)	305,061	610,121
<b>GHG emissions reduction (tons)</b>	<b>1,794</b>	<b>3,588</b>

## Total: Mandatory Features + Compliance Options

### Energy Reduction

	2020	2035
Total annual natural gas saved (therms)	380,845	759,517
<b>GHG emissions reduction (Mtons CO2e)</b>	<b>2,196</b>	<b>4,381</b>

## 2.2 Energy Efficiency/Clean Energy Financing Programs

*Promote financing strategies that will encourage property owners to make energy efficiency and other clean energy investments in their properties.*

Potential Financing Programs:

- Property Accessed Clean Energy (PACE)** programs work by allowing a government entity to provide the upfront capital for a building owner to invest in a retrofit. The government raises the money from the municipal or state bond market. The building owner then pays the government back via an increase to the semiannual property tax assessment. Bond holders invest in the program with the assurance that the financing for the retrofit takes the same priority as a traditional property tax lien and assessment. The advantage for a homeowner is that the payments stay with the property and not with the owner, in the event that the owner sells the property before he or she can pay off the retrofit lien.
- Energy Efficient Mortgages (EEMs)** and rehabilitation mortgages, through the federal Section 203(k) program, 57 allow upfront retrofit costs to become part of the home mortgage. These programs package the financing for the energy efficiency work as part of the single mortgage and allow borrowers to qualify for a larger loan amount to cover the extra costs. The idea is that the energy efficiency work will save the consumer more money in reduced energy costs on a monthly basis than the cost of the additional payment on the mortgage. However, many homebuyers, realtors, and mortgage lenders are unaware of these programs. They therefore have tremendous potential for greater utilization.
- On-bill financing** programs allow electric utility customers to finance energy efficiency measures through their energy bills at low or no interest, with the upfront money provided by the utilities. PG&E is in the process of developing OBF for non-residential customers.

### Program Assumptions

	2020	2035
Number of housing units	10,519	11,441
Participation rate in program [1]	13%	26%
Residential electricity use (kWh)	42,074,160	46,516,006
Residential natural gas use (therms)	3,971,944	4,391,269
Estimated percent reduction per housing unit in energy use from energy efficiency retrofit implementation [2]	22%	22%

Source/Methodology:

[1] Below study states that the most successful energy efficiency financing programs have the following participation rates. Manitoba Hydro had a 1.9%. SMUD reached 0.6% of its customers in 2007, and has reached approximately 26% of its customers since its program inception in 1977. For this modeling, SMUD's numbers were used. Assumed 26% participation rate by 2035, and half of that (13%) by 2020. Source: Enabling Investments in Energy Efficiency. A study of energy efficiency programs that reduce first-cost barriers in the residential sector. Prepared by Merrian Fuller, Energy & Resources Group, UC Berkeley. May 21, 2009. <http://uc-ciee.org/energyeff/documents/resfinancing.pdf>

[2] Assumes 22% reduction in electricity from energy efficiency retrofits in homes. This is based on energy savings estimates from the following data. The average of 10%, 25%, 46%, and 5% (conservative estimates) from the below four sources was utilized:

1) Program staff estimates that on average each household served by existing low-income weatherization programs reduces annual energy consumption by 10-25%. Source: Berkeley June 2009 Climate Action Plan. [http://www.cityofberkeley.info/uploadedFiles/Planning\\_and\\_Development/Level\\_3\\_-\\_Energy\\_and\\_Sustainable\\_Development/Berkeley%20Climate%20Action%20Plan.pdf](http://www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Berkeley%20Climate%20Action%20Plan.pdf)

2) On average, LEED rated buildings' energy consumption is 25-30% lower than the national average. Higher average performance is correlated with the higher LEED levels, however those buildings are more variable in individual performance. Source: ICLEI's CAPP Beta Version 2. Turner and Frankel, Energy Performance of LEED for New Construction Buildings. March 2008. New Buildings Institute. [http://www.newbuildings.org/downloads/Energy\\_Performance\\_of\\_LEED-NC\\_Buildings-Final\\_3-4-08b.pdf](http://www.newbuildings.org/downloads/Energy_Performance_of_LEED-NC_Buildings-Final_3-4-08b.pdf)

3) Weatherization led to natural gas savings of 46% in approximately average size El Cerrito home. Case study by Maria Sanders, City of El Cerrito. Energy efficiency measures included Energy Star furnace, recalibration of programmable thermostat, sealing/repair of leaky furnace duct, sealing of attic leakage, and insulation of attic.

4) Basic weatherization and lighting might save 5 to 15% of energy use. Source: Enabling Investments in Energy Efficiency. A study of energy efficiency programs that reduce first-cost barriers in the residential sector. Prepared by Merrian Fuller, Energy & Resources Group, UC Berkeley. May 21, 2009. <http://uc-ciee.org/energyeff/documents/resfinancing.pdf>

### Electricity Use Impact

	2020	2035
Reduction in electricity use from energy efficiency retrofits (kWh)	1,175,973	2,600,245

### Natural Gas Use Impact

	2020	2035
Reduction in natural gas use from energy efficiency retrofits (therms)	111,016	245,472

### GHG Emissions Impact

	2020	2035
Electricity GHG emissions reduction (Mtons)	260.92	576.94
Natural gas GHG emissions reduction (Mtons)	589	1,302
<b>GHG emissions reduction (Mtons CO<sub>2</sub>e)</b>	<b>850</b>	<b>1,879</b>

## 2.3 Public Education & Outreach

*Pursue opportunities to actively promote energy efficiency education and incentive programs in the community.*

### Program Assumptions

	2020	2035
Population and Jobs	34,100	37,700
% market penetration [1] per yr	1.5%	1.5%
Annual per capita electricity use (kWh) res and biz	6,893	6,893
Annual per capita natural gas use (therms) res & biz	302	302
Project goal: % reduction in energy use by residents who choose to become more energy efficient [2]	10%	15%

[1] Based on anecdotal evidence from PG&E's SmartLights program, 3% market penetration was achieved (3% of community conducted energy efficiency retrofits) through aggressive door-to-door outreach and education throughout the community. For this measure's calculation, we assume a more conservative outreach and education strategy for the community by 2020 and 2035 - 50% of effort.

[2] Assume City's goal of achieving 10% reduction in residential energy use by 2020 and 15% by 2035 for those residents who choose to become more energy efficient as a result of the implementation of this measure.

### Energy Use Impact

	2020	2035
Electricity use reduction (kWh)	352,583	584,709
Natural gas use reduction (therms)	15,463	25,643

### GHG Emissions Impact

	2020	2035
Electricity GHG emissions reduction (Mtons)	78	130
Natural gas GHG emissions reduction (Mtons)	82	136
<b>GHG emissions reduction (Mtons CO<sub>2</sub>e)</b>	<b>160</b>	<b>266</b>

### 3.1 Community Solar PV Installations

Develop and implement a strategy to facilitate greater adoption of renewable energy use in the residential and commercial sectors.

#### Program Assumptions

Table 1

		2020	2035
Residential	Projected # of solar PV systems installed [1]	12	99
	Average capacity of system installed on participating unit (kW) [1]	9.39	9.39
	<b>Total capacity installed (kW)</b>	<b>114</b>	<b>927</b>
Non-Residential	Projected # of solar PV systems installed [2]	10	25
	Average capacity of system installed on participating unit (kW) [2]	20.36	20.36
	<b>Total capacity installed (kW)</b>	<b>204</b>	<b>509</b>

Table 2

Peak sun hours in San Pablo per year [3]	1,716
Solar Derating Factor [4]	33%

[1] Source: GoSolarCalifornia. [http://www.californiasolarstatistics.org/reports/locale\\_stats/](http://www.californiasolarstatistics.org/reports/locale_stats/). Downloaded spreadsheet with San Pablo's solar PV installations. San Pablo had a total of 5 solar installations between 2009 and 2011 (3 years), 1 in 2009, 2 in 2010, and 1 in 2011 (1 installation had no available dates). Figures based on first confirmed reservation dates, and therefore these figures include pending and already installed systems. The average systems size is 9.3892 kW (nameplate rating).

[2] Source: GoSolarCalifornia. [http://www.californiasolarstatistics.org/reports/locale\\_stats/](http://www.californiasolarstatistics.org/reports/locale_stats/). Downloaded spreadsheet with San Pablo's solar PV installations. San Pablo had a total of two non-residential (non-profit) solar installations, 38.88 kW and 1.84 kW, during 2009 and 2011 (first confirmed reservation date), respectively. Based on this information, assume non-residential installations to be one per year.

[3] Based on San Francisco's sun hours = 4.7 average for year. Peak sunhours at 37.62 degrees N. latitude and 0 degree tilt. Source: National Renewable Energy Laboratory. Solar Radiation Data Manual for Flat Plate and Concentrating Collectors. <http://www.nrel.gov/docs/legosti/old/5607.pdf>

[4] Source: California Energy Commission. Guide to Photovoltaic System Design and Installation. June 2001. Derating factor takes into consideration standard test conditions (0.95), temperature (0.89), dirt and dust (0.93), wiring losses and mismatch (0.95), and DC to AC conversion (0.90). In all, equates to 0.67 or 67%. [http://www.energy.ca.gov/reports/2001-09-04\\_500-01-020.PDF](http://www.energy.ca.gov/reports/2001-09-04_500-01-020.PDF)

#### Electricity Use Impact

		2020	2035
Residential	Clean electricity supply added (kWh)	130,977	1,065,765
Non-residential	Clean electricity supply added (kWh)	234,015	585,037
	<b>Total (kWh)</b>	<b>364,991</b>	<b>1,650,802</b>

#### GHG Emissions Impact

		2020	2035
Residential	GHG emissions reduction (tons)	29	236
Non-residential	GHG emissions reduction (tons)	52	130
	<b>Total (Mtons)</b>	<b>81</b>	<b>366</b>

## Data utilized for emissions reduction calculations

### Emissions Factors

<i>Buildings</i>			
Electricity	0.000221879	Mtons CO2e/kWh	Source: ICLEI CACP software 2009 version. Based on PG&E's 2005 portfolio mix
Natural gas	0.005306000	Mtons CO2e/Therm	Source: ICLEI CACP software 2009 version.

### Energy Costs

<i>Residential/Commercial</i>			
Electricity	0.13	\$/kWh	
Natural gas	1.069	\$/therm	Source: For California commercial customers. \$10.69/thousand cubic ft and based on 100 cubic ft = 1 therm. EIA. <a href="http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_SCA_a.htm">http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_SCA_a.htm</a>

### Snapshot of San Pablo

	2005	2020	2035
Population	31,000	34,100	37,700
Single Family Homes [1]	4,652		
Businesses / institutions [2]	291	295	432
Number of Jobs	5,950	6,040	8,830
Square Miles	2.58	2.58	2.58
Service Population	36,950	40,140	46,530

[1] 2005 Census Data (1-unit, detached)

[2] Total number of active business licenses in SP 2009-3/2011, Assume # of businesses same trend as job increases

### Residential Units

Year	TOTAL housing unit	----- SINGLE -----		----- MULTIPLE -----		MOBILE HOMES	OCCU-PIED	PCT VACANT	PERSONS PER HOUSEHOLD
		DETACHED	ATTACHED	2 TO 4	5 PLUS				
2000	9,354	4,145	760	1,293	2,361	795	9,065	3.09	3.286
2001	9,358	4,149	760	1,293	2,361	795	9,069	3.09	3.32
2002	9,355	4,143	760	1,293	2,361	798	9,066	3.09	3.324
2003	9,404	4,139	774	1,301	2,383	807	9,113	3.09	3.319
2004	9,532	4,213	824	1,305	2,383	807	9,237	3.09	3.308
2005	9,636	4,217	853	1,362	2,397	807	9,338	3.09	3.282
2006	9,666	4,224	853	1,362	2,420	807	9,367	3.09	3.243
2007	9,706	4,235	852	1,362	2,449	808	9,406	3.09	3.227
2008	9,802	4,243	852	1,366	2,533	808	9,499	3.09	3.235
...									
2020	10,519	4,427	1,052	1,512	2,694	833	10,193	3.09	3.10
...		210	199	150	297	26			
2035	11,441	4,650	1,279	1,687	2,965	860	11,087	3	#DIV/0!
		433	426	325	568	53			

Source:

[1] For historical data 2001 - 2008: State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008. [http://www.dof.ca.gov/research/demographic/reports/estimates/e-5\\_2001-06/](http://www.dof.ca.gov/research/demographic/reports/estimates/e-5_2001-06/)

[2] Future projections were extrapolated using 2001-2008 data

# of new residential construction each year [1]	47
# of new non-residential construction each year [2]	3
# of new homes sold on average each year[3]	279

Sources/Methodology:

[1] San Pablo General Plan 2030. A projected 990 new residential units will be built by 2030, at an even rate of construction, this equates to 47.14 residential units/year

[2] San Pablo Community Emissions Forecast Projections methodology applied to San Pablo Businesses. A projected 432 businesses in San Pablo by 2035, which equates to 141 new businesses over 24 years or 5.875 new business per year. Assume 50% require new buildings.

[3]Concord Title Group

**Emissions Projections**

End Use	Emissions (Mtons CO2e)		
	2005	2020	2035
<i>Energy Use</i>	<b>51,175</b>	<b>54,342</b>	<b>68,386</b>
Residential Electricity	8,594	9,453	10,451
Residential Natural Gas	19,212	21,133	23,364
Commercial Electricity	10,741	10,903	15,940
Direct Access Electricity (2005)	2,625	2,665	3,896
Commercial Natural Gas	9,225	9,365	13,690
Water Consumed	469	496	630
Wastewater Treated	309	327	415
<i>Transportation</i>	104,621	122,917	141,211
Auto Traffic (Local Streets)	11,489	13,498	15,507
Auto Traffic (San Pablo Ave)	37,951	44,588	51,224
Auto Traffic (% of County Highways)	55,181	64,831	74,480
<i>Waste</i>			
Solid Waste to Landfill	18,446	19,493	24,785
<b>Totals</b>	<b>278,863</b>	<b>319,669</b>	<b>375,593</b>

41829.42467

Source: GHG emissions inventory and forecast

**Energy Use Projections**

End Use	2005	2020 w/state initiatives	2035 w/state initiatives	Unit
	Total Units	Total Units	Total Units	
<i>Energy Use</i>				
Residential Electricity	38,249,236	42,074,160	46,516,006	kWh
Residential Natural Gas	3,610,858	3,971,944	4,391,269	therms
Commercial Electricity	33,672,692	34,182,027	49,971,407	kWh
Direct Access Electricity (2005)	10,119,601	10,272,671	15,017,828	kWh
Commercial Natural Gas	1,105,668	1,122,392	1,640,848	therms
Water Consumed	927,968,800	980,647,756	1,246,857,430	gallons
Wastewater Treated	707,350,214	747,505,088	950,425,133	gallons
<i>Transportation</i>				
Auto Traffic (Local Streets)	21,258,695	24,976,582	28,693,725	VMT
Auto Traffic (San Pablo Ave)	70,217,605	82,496,582	94,775,558	VMT
Auto Traffic (% of County Highways)	102,097,800	119,951,677	137,805,554	VMT
<i>Waste</i>				
Solid Waste to Landfill	16,675	17,622	22,405	lbs
<b>Totals</b>				

2.768825556

1850.352076      1850.391317      1850.372412  
 1850.217517      1850.196959      1850.217828  
**1850.234682      1850.22099      1850.235687**

*Per capita energy use*

End Use	2005	2020 w/state initiatives	2035 w/state initiatives	Unit
	Total Units	Total Units	Total Units	
Residential Electricity	1,234	1,234	1,234	kWh
Residential Natural Gas	116	116	116	therms
Commercial Electricity	5,659	5,659	5,659	kWh
Commercial Natural Gas	186	186	186	therms

Source: 2005 from GHG emissions inventory. 2020 and 2035 (w/state initiatives) were derived from same formula and assumptions utilized for estimating emissions forecast (for details, see community forecast emissions spreadsheet)

# APPENDIX F: Solid Waste Reduction Measures and Quantifications

<b>Solid Waste Reduction Measures (MTons CO2e Reduced)</b>			
<b>Strategy</b>		<b>2020</b>	<b>2035</b>
<b>SW1. Reduce the amount of waste being sent to landfills by 50%</b>			
SW 1.1	<b>Commercial Waste Prevention Campaign</b> Encourage waste prevention in day-to-day operations (e.g. two sided copying, reduced paper requirements, responsible purchasing policies, etc.) in businesses through the development of a waste audit program.	499	1,459
SW 1.2	<b>Single-Use Bag Ban</b> Implement a Single-Use Bag Ban to eliminate the distribution of plastic bags in the community	28	45
SW 1.3	<b>Polystyrene Takeout Food Packaging Ban</b> Implement a Polystyrene Ban in restaurants and businesses throughout the community.	121	196
SW 1.4	<b>Food Ware Container Ban</b> Implement a Food Ware Container Ban in restaurants and businesses throughout the community	-	1,584
SW 1.5	<b>School Waste Reduction Curriculum</b> Partner with WCCUSD to develop and implement a Waste Reduction Curriculum	29	64
SW 1.6	<b>Public Outreach &amp; Education Campaign</b> Launch an outreach campaign in the community with the goal of reducing solid waste sent to landfills by 10% over ten years.	329	1,504
<b>SW2. Divert 30% of solid waste to composting and recycling facilities</b>			
SW 2.1	<b>Recycling Expansion Program</b> Expand the City's residential and business recycling programs to weekly residential pick-ups and increased commercial recycling	811	1,430
SW 2.2	<b>Composting Expansion Program</b> Expand and develop the City's residential and business compost programs.	44	74
SW 2.3	<b>School Waste Diversion Program</b> Expand and develop the City's school recycling and composting programs	1	5
SW 2.4	<b>Construction &amp; Demolition Waste Management Ordinance</b> Expand the City's Construction & Demolition Waste Ordinances to exceed Cal Green requirements	316	474
<b>Total</b>	<b>Total Reduction (Mtons CO2e)</b>	<b>2,178</b>	<b>6,834</b>
	<b>State Measures CO2e Reductions</b>	<b>-</b>	<b>-</b>
<b>Goal</b>	<b>At 15% &amp; 30% below 2005 Solid Waste CO2e</b>	<b>2,767</b>	<b>5,534</b>
	<b>Projected emissions growth (from Baseline)</b>	<b>1,047</b>	<b>6,339</b>
<b>Delta</b>	<b>Shortfall of Goal</b>	<b>(1,636)</b>	<b>(5,039)</b>

### 1.1 Commercial Waste Prevention

Encourage waste prevention in day-to-day operations (e.g. two sided copying, reduced paper requirements, etc.) in businesses through the development of a waste audit program.

#### Measure Assumptions

	2020	2035
Number of Employees (full-time equivalent) [1]	6,040	8,830
Pounds of Waste Created/Employee/Year (lbs)	561	561
Measure Goal: % Reduction in Paper Use with measure implementation [3]	10%	20%

Source/Methodology/Assumptions:

[1] Source: San Pablo Community Forecast

[2] Pounds of Waste Created/Employee/Year (lbs) based on 4.4 pounds of waste created/person/day in America multiplied by an average 255 working days per year and an assumed 50% of waste generated is disposed of in the office. Source: U.S. EPA, <http://www.epa.gov/epawaste/conserves/rrr/reduce.htm>

[3] Assume % reduction in paper use with the implementation of this measure results in 10% reduction in paper use by 2020 and 20% by 2030.

#### Waste Reduction Impact

	2020	2035
Employee Waste Reduced Per Year (tons)	169	495

#### GHG Emissions Impact

	2020	2035
Total GHG Emissions Avoided (Mtons CO <sub>2</sub> e)[1]	498.9	1458.8

Sources/Methodology/Assumptions:

[1] Based on WARM EPA model August 2010. Averaged for various materials source reduction.

## 1.2 Single-Use Bag Ban

Implement a Single-Use Bag Ban to eliminate the distribution of Plastic Bags in the community

### Measure Assumptions

	2020	2035
Total Number of Plastic Bags [1]	3,273,181	4,161,619
Total Number of Plastic Bags (lbs) [2]	50,513	64,224
Estimated % reduction of Plastic Bag use through Single-Use Bag Ban [3]	75%	95%

Source/Methodology/Assumptions:

[1] According to the Green Cities California *Master Environmental Assessment on Single-Use and Reusable Bags* 0.13% of California's Disposed Waste Stream is Single-Use Plastic Grocery Bags. It is, therefore assumed, that of San Pablo's 16,675 Tons of Solid Waste in 2005 there were 21.6775 Tons of Plastic Grocery Bags. To calculate 2020 and 2035 BAU projections, multiplied 2005 # of Plastic Bags by Job Growth+Population Growth compounded over 15 and 30 years.

[2] Additionally, the Report states that on average Plastic Grocery Bags weigh 5-9 grams, so an assumed 7 gram average bag was used to calculate total number of bags. [(Total # of Bags \* 7grams/bag)/453.59237 grams/lb]

[3] Assume 20% reduction in 2012,30% 2013,40%2014,50%2015, 55%2016, 60%2017, 65%2018, 70%2019, 75%2020, 80%2021, 85%2022, 90%2023, 95%2024 = max % [Chris Lehon, RecycleMore]

[4] According to the Green Cities California Master Environmental Assessment on Single-Use and Reusable Bags an average household consumes 500-600 Plastic Bags per year when they could consume 1-3 Reusable Bags per Year. These figures were used to assume that for every 550 Plastic Bags diverted, there would be an increased consumption of 2 Reusable Bags (if 100% Reusable Bag choice as an alternative)

### Waste Reduction Impact

	2020	2035
Estimated number of Plastic Bags avoided through Single-Use Bag Ban	2,454,886	3,953,538
Estimated number of Plastic Bags avoided through Single-Use Bag Ban (lbs)	37,885	61,012
Landfill Waste Reduction (tons)	18.94	30.51

### GHG Emissions Impact

	2020	2035
<b>Total GHG Emissions Avoided (Mtons) [1]</b>	<b>28</b>	<b>45</b>

Sources/Methodology/Assumptions:

[1] Based on WARM EPA model August 2010. For Plastic-HDPE source reduction.

### 1.3 Polystyrene Takeout Food Packaging Ban

Implement a Polystyrene Ban in restaurants and business throughout the community.

#### Measure Assumptions

	2020	2035
Total Number of Polystyrene Containers [1]	2,590,390	3,293,498
Total Number of Polystyrene Containers (lbs) [2]	129,519	164,675
Estimated % reduction of Polystyrene Containers use through Polystyrene Ban [3]	75%	95%

Source/Methodology/Assumptions:

[1] According to *Polystyrene ban: Bill would put California first* published in Capitol Weekly, 1% of the national waste stream is plastic foam, of that about 1/3 (0.33% of the total national waste stream) is food container foam. It is, therefore assumed, that of San Pablo's 16,675 Tons of Solid Waste in 2005 there was 55.583 Tons of Polystyrene Foam Food Containers. To calculate 2020 and 2035 BAU projections, multiplied 2005 # of Polystyrene Foam Food Containers by Job Growth+Population Growth compounded over 15 and 30 years. <http://capitolweekly.net/article.php?xid=zxgh3egjupdzhp>

[2] Average weight of Polystyrene Food Containers is .05lbs, generated by averaging weight of Food Containers for sale on <http://www.foodservicewarehouse.com/genpak/gnp-20310/p337016.aspx>

[3] Assume 20% reduction in 2012,30% 2013,40%2014,50%2015, 55%2016, 60%2017, 65%2018, 70%2019, 75%2020, 80%2021, 85%2022, 90%2023, 95%2024 = max % [Chris Lehon, RecycleMore]

#### Waste Reduction Impact

	2020	2035
Estimated number of Polystyrene Containers avoided through Polystyrene Ban	1,942,792.26	3,128,823.10
Estimated number of Polystyrene Containers avoided through Polystyrene Ban (lbs)	97,139.61	156,441.16
Landfill Waste Reduction (tons) [4]	48.57	78.22

#### GHG Emissions Impact

	2020	2035
<b>Total GHG Emissions Avoided (Mtons CO2e) [1]</b>	<b>121</b>	<b>196</b>

Sources/Methodology/Assumptions:

[1] Based on WARM EPA model August 2010. For Plastic-PS source reduction.

## 1.4 Plastic Food Ware Ban

Implement a Food Ware Container Ban in restaurants and business throughout the community

### Measure Assumptions

		2020	2035
	Total Number of Plastic Food Ware Items (tons) [2]	1,365.71	1,736.39
	Estimated % reduction of Plastic Food Ware Items use through Plastic Food Ware Ban [3]	0%	47.5%

Source/Methodology/Assumptions:

[1] According to the U.S. EPA *Municipal Solid Waste Generation, Recycling, and Disposal in the United States, 2010* 15.5% of the US Municipal Solid Waste Stream is Nondurable Plastics Packaging. We then assumed that 50% of this packaging was generated by restaurants and businesses in San Pablo. It is, therefore assumed, that of San Pablo's 16,675 tons of Solid Waste sent to the landfill in 2005, there were 1292.3125 tons of restaurant and business plastic packaging.

[3] Assume 20% reduction in 2020,30% 2021,40%2022,50%2023, 55%2024, 60%2025, 65%2026, 70%2027, 75%2028, 80%2029, 85%2030, 90%2031, 95%2032 = max % [Chris Lehon, RecycleMore] Given that this measure is in addition to the Polystyrene Food Packaging Ban, assume half the reduction.

### Waste Reduction Impact

	2020	2035
Landfill Waste Reduction (tons) [4]	-	824.78

### Energy Reductions

	2020	2035
<b>TOTAL</b>	<b>0</b>	<b>1,584</b>
<b>Total GHG Emissions Avoided (Mtons) [5]</b>		

Source/Methodology/Assumptions:

[1] Based on WARM EPA model August 2010. Averaged Plastic-HDPE, LDPE and PS source reduction.

## 1.5 School Waste Reduction Curriculum

Partner with WCCUSD to develop and implement Waste Reduction Curriculum

### Measure Assumptions

	2020	2035
Estimated number of Students in Community [1]	7,480	8,270
Pounds of Paper Used/Student/Year (lbs) [2]	10	10
Total Estimated Pounds of Paper Used By All Students Per Year (lbs)	72,243	79,870
Measure Goal: % Reduction in Paper Use with measure implementation [2]	10%	20%

Source/Methodology/Assumptions:

[1] Source: San Pablo Community Forecast

[2] Averaged from various sources:  
[http://www.dandelionsunlimited.org/recycled\\_paper.php](http://www.dandelionsunlimited.org/recycled_paper.php)  
<http://www.edutopia.org/blog/paperless-schools-techology-ben-johnson>

[2] Assume % reduction in paper use with the implementation of this measure results in 10% reduction in paper use by 2020 and 20% by 2035.

### Waste Reduction Impact

	2020	2035
Pounds of Used Paper Reduced Per Year (lbs)	7,224	15,974
Paper Reduced Per Year (tons)	3.61	7.99

### GHG Emissions Impact

	2020	2035
<b>GHG Emissions Avoided (Mtons CO2e) [1]</b>	<b>29</b>	<b>64</b>

Sources/Methodology/Assumptions:

[1] Based on WARM EPA model August 2010. For office paper source reduction.

## 1.6 Public Outreach and Education Campaign

Launch an outreach campaign in the community with the goal of reducing solid waste sent to landfills by 10% over ten years.

### Measure Assumptions

	2020	2035
Number of Residents [1]	34,100	37,700
Solid Waste to Landfills (tons) [1]	17,622	22,405
Measure goal: % Source Reduction of Solid Waste [2,3]	2.5%	5%
Estimated % of commercial sector reached (cumulative) through education programs [4]	50%	90%

Source/Methodology/Assumptions:

[1] Source: San Pablo Community Forecast

[2] Emissions reductions resulting from this measure is additional to the emission reductions impacts from the other measures recommended in the CAP.

[3] Estimated % Savings in Energy, Cost, and GHG Emissions from Measure: 5% Energy and GHG emissions savings were derived by calculating 5% assumed savings of education/awareness from the energy use and GHG emissions emitted from municipal buildings, vehicle fleet, and waste operations under the City's GHG emissions inventory and forecast. 5% is based on an education campaign Awareness for Communities about Energy (ACE) implemented by Strategic Energy Innovations in 200 K-12 schools in California, Maryland, New Jersey, New York, North Carolina, and Pennsylvania. Schools that participated in this program achieved energy reductions of 5 to 15%. In this methodology, a conservative figure of 5% in reductions is applied across the building, vehicle fleet, and waste sectors.

[4] Growth in educational program reach estimated based on 10% municipal staff reached by 2010, 50% reached by 2020, and 90% reached by 2030

### Waste Reduction Impact

	2020	2035
Solid Waste Diverted/Reduced from Landfill	220.28	1,008.23

### GHG Emissions Impact

	2020	2035
<b>Total GHG Emissions Avoided (Mtons CO<sub>2</sub>e) [1]</b>	329	1,504

Source/Methodology/Assumptions:

[1] Emissions reduction for waste prevented from going to the land fill was based on the average of the individual emissions factors of prevention activities, specifically source reduction, recycling and composting. Source: EPA WARM model August 2010 version.

## 2.1 Recycling Expansion Program

Expand the City's residential and business recycling programs to weekly residential pick-ups and increased commercial recycling.

### Measure Assumptions

	2020	2035
Tons of Recycling per Year [1]	2,415	2,553
Measure Goal: Increased % diverted [2]	12%	20%

Source/Methodology:

[1] Source: San Pablo Community Forecast

[2] Based on a waste characterization study completed by the City of Mountain View, switching from bi-weekly to weekly recycling pick-up increases diversion rates from 4-20%. For 2020, assume the average potential increased diversion rate (12%) and by 2035 assume maximum potential increased diversion (20%).

### Waste Reduction Impact

Total Estimated Pounds of Additional Recyclables Generated Per Year (tons)	290	511
----------------------------------------------------------------------------	-----	-----

### GHG Emissions Impact

	2020	2035
<b>GHG Emissions Avoided (Mtons CO2e) [1]</b>	<b>811</b>	<b>1,430</b>

Sources/Methodology:

[1] Based on WARM EPA model August 2010. For mixed recyclables.

## 2.2 Composting Expansion Program

*Expand and develop the City's residential and business compost programs to weekly residential pick-ups and increased commercial composting*

### Measure Assumptions

	2020	2035
Tons of Composting per Year [1]	1,756	1,856
Measure Goal: Increased % diverted [2]	13%	20%

Source/Methodology:

[1] Source: San Pablo Community Forecast

[2] Based on a waste characterization study completed by the City of Mountain View, switching from bi-weekly to weekly recycling pick-up increases diversion rates from 5-20%. For 2020, assume the average potential increased diversion rate (12.5%) and by 2035 assume maximum potential increased diversion (20%).

### Waste Reduction Impact

	2020	2035
Total Estimated Additional Compostables Generated By Residents Per Year (tons)	219	371

### GHG Emissions Impact

	2020	2035
GHG Emissions Avoided (Mtons CO <sub>2</sub> e) [1]	44	74

Sources/Methodology:

[1] Based on WARM EPA model August 2010. For yard trimmings/food scraps.

## 2.3 School Waste Diversion Program

Expand and develop the City's school recycling and composting programs.

### Measure Assumptions

	2020	2035
Estimated number of students in the community [1]	7,480	8,270
Total Estimated Pounds of Recycling Generated by Schools [2]	66,924	73,992
Total Estimated Pounds of Composting Generated by Schools [3]	953	1,429
Measure goal: Estimated % Savings in Waste and GHG Emissions from Measure [4,5]	5%	10%
Estimated % of students reached (cumulative) through education programs [6]	40%	100%

Source/Methodology/Assumptions:

[1] Source: San Pablo Community Forecast

[2] Based on information provided by Claudia Taurean, RecycleMore. Currently there are 81 55-gallon recycling bins and 12 yards of cardboard picked up weekly at San Pablo Schools. Assume that recycling weighs 3.5 lbs/gallon (<http://www.rockvillemd.gov/recycling-refuse/>) and that 1 cubic yard of cardboard weighs 30 lbs (<http://www.recyclecddebris.com/rCDd/Handbook/Chapter06.aspx>). Increases in recycling are based on student population growth.

[3] Assume composting capacity to be half that of recycling in 2020 and 3/4 in 2035. This results in 220 gallons of composting in 2020 and 330 gallons in 2035. 1 gallon=.00495 cubic yards and composting weighs, on average, 874.61 lbs/cubic yard (<http://your.kingcounty.gov/solidwaste/business/documents/Conversions.pdf>).

[4] Emissions reductions resulting from this measure is additional to the emission reductions impacts from the other measures recommended in the CAP.

[5] Estimated % Savings in Energy, Cost, and GHG Emissions from Measure: 5% Energy and GHG emissions savings were derived by calculating 5% assumed savings of education/awareness from the energy use and GHG emissions emitted from school waste operations under the Community's GHG emissions inventory and forecast. 5% is based on an education campaign Awareness for Communities about Energy (ACE) implemented by Strategic Energy Innovations in 200 K-12 schools in California, Maryland, New Jersey, New York, North Carolina, and Pennsylvania. Schools that participated in this program achieved energy reductions of 5 to 15%. In this methodology, a conservative figure of 5% in reductions is applied across the waste sector.

[6] Growth in educational program reach estimated based on 40% reached by 2020, and 100% reached by 2030.

### Waste Reduction Impact

	2020	2035
Total Increase in Lbs Recycling Generated by Schools	1,338	7,399
Total Increase in Lbs Composting Generated by Schools	19.05	142.90
Landfill Waste Reduction due to recycling(tons)	0.67	3.70
Landfill Waste Reduction due to composting(tons)	0.01	0.07

### GHG Emissions Impact

	2020	2035
GHG Emissions Avoided due to Recycling (Mtons CO <sub>2</sub> e) [1]	0.89	4.92
GHG Emissions Avoided due to Composting (Mtons CO <sub>2</sub> e) [2]	0.002	0.01
<b>TOTAL Total GHG Emissions Avoided (Mtons CO<sub>2</sub>e)</b>	<b>0.89</b>	<b>4.93</b>

Source/Methodology/Assumptions:

[1] Emissions reduction for waste prevented from going to the land fill was based on the average of the individual emissions factors of prevention activities, specifically source reduction and recycling, for aluminum, glass, plastic (LDEP and HDEP), and office paper. Source: EPA WARM model August 2010 version.

[2] Based on WARM EPA model August 2010. For yard trimmings/food scraps.

## 2.4 Construction and Demolition Waste Management Ordinance

Expand the City's Construction & Demolition Waste Ordinances to exceed Cal Green requirements.

### Measure Assumptions

	2020	2035
Average number demolitions per year [1]	7.86	7.86
Average square footage per demolition [2]	1,199	1,199
Average waste generated (lbs/sq ft) [4]	50	50
Average number of qualified new construction and additions [1]	12	12
Average square footage per new non-residential construction [3]	5,875	5,875
Average waste generated (lbs/sq ft) [4]	4.02	4.02
Goal: percent waste diverted by recycling	50%	75%

Source/Methodology:

[1] Source: Mary Delgado, City of San Pablo

[2] The majority of San Pablo qualifying demolitions are Single Family Homes, which are an average of 1,199 square feet in San Pablo. Source: Concord Title Group

[3] Average of non-residential and multifamily construction. Source: Mary Delgado, City of San Pablo.

[4] Source: *Estimate 2003 Building-Related Construction & Demolition Material Amounts*, U.S. EPA, <http://www.epa.gov/osw/conservation/rrr/imr/cdm/pubs/cd-meas.pdf>, p. 13

Emissions reductions resulting from this measure is additional to the emission reductions impacts from the other measures recommended in the CAP.

### Waste Reduction Impact

	2020	2035
Total Amount of Waste Diverted (tons)	190.30	285.45

### GHG Emissions Impact

	2020	2035
GHG Emissions Avoided (Mtons CO <sub>2</sub> e)	316	474

## Data utilized for emissions reduction calculations

### Emissions Factors

<i>Buildings</i>			
Electricity	0.000253562 Mtons CO2e/kWh	(Equivalent to 0.559 lbs CO2/kWh)	Source: PG&E (via Maria Sanders, City of El Cerrito)
Natural gas	0.005306089 Mtons CO2e/Therm	(Equivalent to 11.70 lbs CO2/therm)	Source: PG&E (via Maria Sanders)

<i>Transportation</i>			
Gasoline	0.008805195 Mtons CO2e/gallon	Source: ICLEI CACP Default coefficients	
Diesel	0.010144285 Mtons CO2e/gallon	Source: ICLEI CACP Default coefficients	
CNG	0.005305789 Mtons CO2e/therm	Source: ICLEI CACP Default coefficients	
Biodiesel (B100)	0 Mtons CO2e/gallon	Source: ICLEI CACP Default coefficients	

### *Solid Waste*

mixed recyclables	2.8 Mtons CO2e/ton mixed recyclables		
aluminum cans	4.94 Mtons CO2e/ton aluminum cans (source reduction)		
aluminum cans	8.89 Mtons CO2e/ton aluminum cans(recycling)		
glass	0.53 Mtons CO2e/ton glass (source reduction)		
glass	0.28 Mtons CO2e/ton glass (recycling)		
plastic - HDPE	1.47 Mtons CO2e/ton plastic-HDPE (source reduction)		
plastic - HDPE	0.86 Mtons CO2e/ton plastic-HDPE (recycling)		
plastic - PS	2.5 Mtons CO2e/ton plastic - PS (source reduction)		
plastic - LDPE	1.79 Mtons CO2e/ton plastic-LDPE (source reduction)		
office paper	7.99 Mtons CO2e/ton office paper (source reduction)		
office paper	2.85 Mtons CO2e/ton office paper (primarily from office) (re	Source: EPA WARM model February 2012 version. <a href="http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html">http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html</a>	
<b>Average (alum to office paper)</b>	<b>2.945 Mtons CO2e/ton (source reduction)</b>		
<b>Average (alum to office paper)</b>	<b>1.33 Mtons CO2e/ton (recycling)</b>		
<b>Average (plastics)</b>	<b>1.92 Mtons CO2e/ton (source reduction)</b>	MT CO2e converted into tons CO2e by dividing MT CO2e by conversion factor (0.90718474)	
Food Scraps	0.2 Mtons CO2e/ton food scraps (from compost)		
Yard Trimmings	0.2 Mtons CO2e/ton yard trimmings (from compost)		
Glass	0.28 Mtons CO2e/ton glass		
Dimensional Lumber	2.46 Mtons CO2e/ton dimensional lumber		
Medium-density Fiberboard	2.47 Mtons CO2e/ton medium-density fiberboard		
Mixed Metals	3.97 Mtons CO2e/ton mixed metals		
Carpet	2.37 Mtons CO2e/ton carpet		
Concrete	0.01 Mtons CO2e/ton concrete		
Asphalt Shingles	0.07 Mtons Co2e/ton asphalt shingles		
<b>Average (glass to asphalt shingles)</b>	1.661428571 Mtons CO2e/ton C&D waste		

### Energy/Water Costs

<i>Residential/Commercial</i>			
Electricity	0.13 \$/kWh		Source: For California commercial customers. \$10.69/thousand cubic ft and based on 100 cubic ft = 1
Natural gas	1.069 \$/therm		Source: East Bay Municipal District: <a href="https://www.ebmud.com/for-customers/account">https://www.ebmud.com/for-customers/account</a>
Water	0.004157754 \$/gallon		

<i>Transportation</i>			
Gasoline	3.78 \$/gallon	Source: EIA. San Francisco specific (average 2011). <a href="http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_y05sf_m.htm">http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_y05sf_m.htm</a>	
Diesel	3.98 \$/gallon	Source: EIA. California specific (average 2011). <a href="http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_sca_m.htm">http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_sca_m.htm</a>	
CNG	2.71 \$/therm	Source: GNGprices.com (average Bay Area 2011; conversion 1gge=1.14 Therms). <a href="http://www.cngprices.com/">http://www.cngprices.com/</a>	
Biodiesel	4.40 \$/gallon	Source: For B2-B100 fuel. Bay Area average 2011. <a href="http://www.altfuelprices.com/">http://www.altfuelprices.com/</a>	

**Emissions Projections**

End Use	Emissions (Mtons CO2e)		
	2005	2020 BAU	2035 BAU
<i>Energy Use</i>			
Residential Electricity	8,594	9,453	10,451
Residential Natural Gas	19,212	21,133	23,364
Commercial Electricity	10,741	10,903	15,940
Direct Access Electricity (2005)	2,625	2,665	3,896
Commercial Natural Gas	9,225	9,365	13,690
Water Consumed	469	496	630
Wastewater Treated	309	327	415
<i>Transportation</i>			
Auto Traffic (Local Streets)	11,489	13,498	15,507
Auto Traffic (San Pablo Ave)	37,951	44,588	51,224
Auto Traffic (% of County Highways)	55,181	64,831	74,480
<i>Waste</i>			
Solid Waste to Landfill	18,446	19,493	24,785
Recyclables	6,729	7,113	7,518
Compostables	332.20	351.12	371.12
<b>Totals</b>	<b>174,242</b>	<b>196,752</b>	<b>234,382</b>

Source: GHG emissions inventory and forecast

**Energy Use Projections**

End Use	2005	2020 BAU	2035 BAU	Unit
	Total Units	Total Units	Total Units	
<i>Energy Use</i>				
Residential Electricity	38,249,236	42,074,160	46,516,006	kWh
Residential Natural Gas	3,610,858	3,971,944	4,391,269	therms
Commercial Electricity	33,672,692	34,182,027	49,971,407	kWh
Direct Access Electricity (2005)	10,119,601	10,272,671	15,017,828	kWh
Commercial Natural Gas	1,105,668	1,122,392	1,640,848	therms
Water Consumed	714,535,976	980,647,756	1,246,857,430	gallons
Wastewater Treated	707,350,214	704,933,988	865,282,933	gallons
<i>Transportation</i>				
Auto Traffic (Local + Collector Streets)	21,258,695	24,976,582		VMT
Auto Traffic (Arterials)	70,217,605	82,496,582	28,693,725	VMT
Auto Traffic (% of County Highways)	102,097,800	119,951,677	94,775,558	VMT
<i>Waste</i>				
Solid Waste to Landfill	16,675	17,622	22,405	tons
Recyclables	2,285	2,415	2,553	tons
Compostables	1,661	1,756	1,856	tons
Plastic Bags	3,096,786	3,273,181	4,161,619	bags
Polystyrene Food Containers	2,450,791	2,590,390	3,293,498	containers
<b>Totals</b>			137,805,554	

**Community Statistics**

	2005	2020	2035
Employees	5,950	6,040	8,830
Students	6800	7,480	8,270
Residents	31000	34,100	37,700

# of new residential construction each year	47.14	Per San Pablo General Plan 2030 (990 new units by 2030 = 47.14 units/yr)
# of new non-residential construction each year	4.7	432 new business by 2035 = 4.7 new businesses/yr

Schools	55 Gallon Bins (weekly pick-up?)	Yards of Cardboard (weekly pick-up)
Bayview	30	
Dover	11	3
Downer	26	
Helms	-	
Lake	6	4
Riverside	8	5
Total (bins/yards)	8	5
Total (gallons)	440	
Total (lbs)	1540	150

TYPE OF PROJECT	POUNDS PER SQUARE FOOT	POUNDS PER 4000SF PROJECT	TONS
Residential Construction	4.38	17520	8.76
Nonresidential Construction	4.02	16,080	8.04

800 sq ft average multifamily residential  
10950 sq ft average non-res new construction

	NO ORDINANCE			NEW CONSTRUCTION + DEMOLITION					2000 SF NEW NON-RES	
	2005	2006	2007	2008	2009	2010	2011	2012 average	2012 average	
New Construction	15	35	18	9	5	3	1		12.28571429	
Demolition	12	11	7	13	5	6	1		7.857142857	
New Non-Res (additions)	6	21	6	3		2				

# APPENDIX G: Water/Wastewater Reduction Measures and Quantifications

<b>Water/Wastewater Reduction Measures (MTons CO2e Reduced)</b>			
<b>Strategy</b>		<b>2020</b>	<b>2035</b>
<b>W1. Increase water efficiency throughout the community by 50%</b>			
W 1.1	<b>Residential Water-Saving Equipment</b> Partner with EBMUD to perform audits and provide financing strategies to San Pablo residents requiring water-efficiency upgrades to their faucets, sinks, showers and other water equipment	43	272
W1.2	<b>Commercial Water-Saving Equipment</b> Partner with EBMUD to perform audits and provide financing strategies to San Pablo business requiring water-efficiency upgrades to their faucets, sinks, showers, and other wate equipment	13	81
W 1.3	<b>Commercial Education and Outreach</b> Launch “sustainability challenge” outreach campaign for local businesses with the goal of reducing water use by 10% over ten years (e.g. water savings competition between businesses, annual workshops, brown bags, etc.)	21	271
W 1.4	<b>Water Conservation Ordinance</b> Implement a water conservation ordinance to regulate water use during peak hours, expand drought tolerant landscaping and implement water conservation education and outreach.	115	226
<b>W2. Increase water recycling by 1%</b>			
W 2.1	<b>Greywater Systems</b> Encourage the use of greywater for irrigation, vehicle cleaning and other outdoor uses	4	8
	<b>Total Reduction (Mtons CO2e)</b>	<b>196</b>	<b>858</b>
	<b>State Measures CO2e Reductions</b>	<b>146</b>	<b>293</b>
<b>Goal</b>	<b>At 15% &amp; 30% below 2005 Water/Wastewater CO2e</b>	<b>70</b>	<b>141</b>
	<b>Projected emissions growth (from Baseline)</b>	<b>44</b>	<b>267</b>
	<b>Shortfall of Goal</b>	<b>228</b>	<b>743</b>

## 1.1 Residential Water-Saving Equipment

Partner with EBMUD to perform audits and provide financing strategies to San Pablo residents requiring water-efficiency upgrades to their faucets, sinks, showers and other water equipment

### Measure Assumptions

	2020	2035
Total Residential Annual Water Use (gallons) [1]	755,098,772	960,080,221
% market penetration per yr [2]	1.5%	3.0%
Measure goal: % reduction in water use by residents who choose to become more water efficient [3]	10%	25%
% Hot Water [4]	70%	70%

Source/Methodology/Assumptions:

[1] Source: San Pablo Community Forecast

[2] Based on anecdotal evidence from PG&E's SmartLights program, 3% market penetration was achieved (3% of community conducted energy efficiency retrofits) through aggressive door-to-door outreach and education throughout the community. For this measure's calculation, we assume a more conservative outreach and education strategy for the community by 2020 and 2035 - 50% of effort - so penetration rate of 1.5%

[3] Assume City's goal of achieving 10% reduction in residential water use by 2020 and 25% by 2035 for those residents who choose to become more water efficient as a result of the implementation of this measure. (Low flow fixtures (showerheads and faucets) can achieve water savings of 25%-60%. Source: US DOE [http://www.energysavers.gov/your\\_home/water\\_heating/index.cfm/mytopic=13050](http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13050))

[4] Source: ICLEI CAPP Version 1.3.

### Water Reduction Impact

	2020	2035
Total Reduction in Annual Water Use (gallons)	1,132,648	7,200,602
Total Reduction in Annual Hot Water Use (gallons)	792,854	5,040,421

### Energy Reduction Impact

	2020	2035
Total Reduction in Annual Energy Use associated with Water Savings (kWh) [1]	6,116	38,883
Total Reduction in Annual Energy Use associated with Heating Water (therms) [2]	7,770	49,396

Sources/Methodology/Assumptions:

[1] Energy use per gallon of water: 0.0054 kWh (indoor use). Energy use for pumping, treatment, and wastewater treatment. Value is for indoor water use in Northern California (indoor water use requires energy to both supply water and to treat wastewater). Source: California Energy Commission. REFINING ESTIMATES OF WATER RELATED ENERGY USE IN CALIFORNIA. 2006. Table ES-1. [http://www.energy.ca.gov/pier/project\\_reports/CEC-500-2006-118.html](http://www.energy.ca.gov/pier/project_reports/CEC-500-2006-118.html). Cited source in ICLEI CAPP Version 1.3.

[2] Energy use to heat gallon of water: 0.19 kWh. Source: ICLEI's CAPP Version 1.3. Calculated from 8.3 lbs/gallon x 1 Btu/lb\*F x (120 F hot water - 55 F cold water) x 1 therm/100,000 Btu / 0.55 gas water heater energy factor. Hot water temp source: NREL. EERE Clearinghouse: Solar Water Heating. 1996. p. 6 <http://www.nrel.gov/docs/legosti/fy96/17459.pdf>. Cold water temp source: <http://www.noaanews.noaa.gov/stories2007/s2772.htm> US average temperature for 2006. Water supply typically travels through underground pipes where temperature is approximately local annual average temperature. Energy factor source: <http://www.eere.energy.gov/buildings/info/components/waterheating/conventional.html>. Middle of 0.5-0.6 range. Energy factor is a measure of the overall efficiency of water heaters, including energy losses from the tank.

Energy use to heat gallon of water: 0.0098 therms. Source: ICLEI's CAPP Version 1.3. See details of assumptions above under "Energy use (electricity) to heat gallon of water". Assume water is heating 100% by natural gas and 0% by electricity.

### GHG Emissions Impact

	2020	2035
<b>GHG Emissions Reduction (Mtons CO2e)</b>	<b>43</b>	<b>272</b>

## 1.2 Commercial Water-Saving Equipment

Promote EBMUD Commercial Water Conservation Rebate Program (encouraging installation of Water Efficient faucets, toilets, showerheads, appliances, etc.)

### Measure Assumptions

	2020	2035
Total Commercial Annual Water Use [1]	225,548,984	286,777,209
% market penetration per yr [2]	1.5%	3.0%
Measure goal: % reduction in water use by businesses who choose to become more water efficient [3]	10%	25%
% Hot Water [4]	70%	70%

Source/Methodology/Assumptions:

[1] Source: San Pablo Community Forecast

[2] Based on anecdotal evidence from PG&E's SmartLights program, 3% market penetration was achieved (3% of community conducted energy efficiency retrofits) through aggressive door-to-door outreach and education throughout the community. For this measure's calculation, we assume a more conservative outreach and education strategy for the community by 2020 and 2035 - 50% of effort - so penetration rate of 1.5%

[3] Assume City's goal of achieving 10% reduction in residential water use by 2020 and 15% by 2035 for those residents who choose to become more water efficient as a result of the implementation of this measure. (Low flow fixtures (showerheads and faucets) can achieve water savings of 25%-60%. Source: US DOE [http://www.energysavers.gov/your\\_home/water\\_heating/index.cfm/mytopic=13050](http://www.energysavers.gov/your_home/water_heating/index.cfm/mytopic=13050))

[4] ICLEI CAPP Version 1.3

### Water Reduction Impact

	2020	2035
Total Reduction in Annual Water Use (gallons)	338,323	2,150,829
Total Reduction in Annual Hot Water Use (gallons)	236,826	1,505,580

### Energy Reduction Impact

	2020	2035
Total Reduction in Annual Energy Use associated with Water Savings (kWh) [1]	1,827	11,614
Total Reduction in Annual Energy Use associated with Heating Water (therms) [2]	2,321	14,755

Sources/Methodology/Assumptions:

[1] Energy use per gallon of water: 0.0054 kWh (indoor use). Energy use for pumping, treatment, and wastewater treatment. Value is for indoor water use in Northern California (indoor water use requires energy to both supply water and to treat wastewater). Source: California Energy Commission. REFINING ESTIMATES OF WATER RELATED ENERGY USE IN CALIFORNIA. 2006. Table ES-1. [http://www.energy.ca.gov/pier/project\\_reports/CEC-500-2006-118.html](http://www.energy.ca.gov/pier/project_reports/CEC-500-2006-118.html). Cited source in ICLEI CAPP Version 1.3.

[2] Energy use to heat gallon of water: 0.19 kWh. Source: ICLEI's CAPP Version 1.3. Calculated from 8.3 lbs/gallon x 1 Btu/lb\*F x (120 F hot water - 55 F cold water) x 1 therm/100,000 Btu / 0.55 gas water heater energy factor. Hot water temp source: NREL. EERE Clearinghouse: Solar Water Heating. 1996. p. 6 <http://www.nrel.gov/docs/legosti/fy96/17459.pdf>. Cold water temp source: <http://www.noaanews.noaa.gov/stories2007/s2772.htm> US average temperature for 2006. Water supply typically travels through underground pipes where temperature is approximately local annual average temperature. Energy factor source: <http://www.eere.energy.gov/buildings/info/components/waterheating/conventional.html>. Middle of 0.5-0.6 range. Energy factor is a measure of the overall efficiency of water heaters, including energy losses from the tank.

Energy use to heat gallon of water: 0.0098 therms. Source: ICLEI's CAPP Version 1.3. See details of assumptions above under "Energy use (electricity) to heat gallon of water". Assume water is heating 100% by natural gas and 0% by electricity.

### GHG Emission Impact

	2020	2035
GHG Emissions Reduction (Mtons CO <sub>2</sub> e)	13	81

### 1.3 Commercial Education and Outreach Campaign

Launch "sustainability challenge" outreach campaign for local businesses with the goal of reducing water use by 10% over ten years (e.g. water savings competition between businesses, annual workshops, brown bags, etc.)

#### Measure Assumptions

	2020	2035
Annual Commercial Water Use [1]	225,548,984	286,777,209
Measure goal: Estimated % Savings in Water Use from Measure [2,3]	2.5%	5%
Estimated % of business sector reached (cumulative) through education programs [4]	10%	50%
% Hot Water [5]	70%	70%

Source/Methodology/Assumptions:

[1] Source: San Pablo Community Forecast

[2] Emissions reductions resulting from this measure is additional to the emission reductions impacts from the other measures recommended in the CAP.

[3] Estimated % Savings in Energy, Cost, and GHG Emissions from Measure: 5% Energy and GHG emissions savings were derived by calculating 5% assumed savings of education/awareness from the energy use and GHG emissions emitted from businesses. 5% is based on an education campaign Awareness for Communities about Energy (ACE) implemented by Strategic Energy Innovations in 200 K-12 schools in California, Maryland, New Jersey, New York, North Carolina, and Pennsylvania. Schools that participated in this program achieved energy reductions of 5 to 15%. In this methodology, a conservative figure of 5% in reductions is applied across businesses' water use.

[4] Growth in educational program reach estimated based on 10% of businesses reached by 2020, and 50% reached by 2035

[5] ICLEI CAPP Version 1.3.

#### Water Reduction Impact

	2020	2035
Total Reduction in Annual Water Use (gallons)	563,872	7,169,430
Total Reduction in Annual Hot Water Use (gallons)	394,711	5,018,601

#### Energy Reduction Impact [1]

	2020	2035
Total Reduction in Annual Energy Use associated with Water Savings (kWh)	3,045	38,715
Total Reduction in Annual Energy Use associated with Heating Water (therms)	3,868	49,182

Sources/Methodology/Assumptions:

[1] Energy use per gallon of water: 0.0054 kWh (indoor use). Energy use for pumping, treatment, and wastewater treatment. Value is for indoor water use in Northern California (indoor water use requires energy to both supply water and to treat wastewater). Source: California Energy Commission. REFINING ESTIMATES OF WATER RELATED ENERGY USE IN CALIFORNIA. 2006. Table ES-1. [http://www.energy.ca.gov/pier/project\\_reports/CEC-500-2006-118.html](http://www.energy.ca.gov/pier/project_reports/CEC-500-2006-118.html). Cited source in ICLEI CAPP Version 1.3.

[2] Energy use to heat gallon of water: 0.19 kWh. Source: ICLEI's CAPP Version 1.3. Calculated from 8.3 lbs/gallon x 1 Btu/lb\*F x (120 F hot water - 55 F cold water) x 1 therm/100,000 Btu / 0.55 gas water heater energy factor. Hot water temp source: NREL. EERE Clearinghouse: Solar Water Heating. 1996. p. 6 <http://www.nrel.gov/docs/legosti/fy96/17459.pdf>. Cold water temp source: <http://www.noaaneews.noaa.gov/stories2007/s2772.htm> US average temperature for 2006. Water supply typically travels through underground pipes where temperature is approximately local annual average temperature. Energy factor source: <http://www.eere.energy.gov/buildings/info/components/waterheating/conventional.html>. Middle of 0.5-0.6 range. Energy factor is a measure of the overall efficiency of water heaters, including energy losses from the tank.

Energy use to heat gallon of water: 0.0098 therms. Source: ICLEI's CAPP Version 1.3. See details of assumptions above under "Energy use (electricity) to heat gallon of water". Assume water is heating 100% by natural gas and 0% by electricity.

#### GHG Emissions Impact

	2020	2035
GHG Emissions Reduction (Mtons CO <sub>2</sub> e) [2]	21	271

## 1.5 Water Conservation Ordinance

*Implement a water conservation ordinance to regulate water use during peak hours, expand drought tolerant landscaping and implement water conservation education and outreach.*

### Program Assumptions

	2020	2035
Total Annual Water Consumption (gallons) [1]	980,647,756	1,246,857,430
Annual Water Use Percentage for Landscaping [3]	13%	13%
Percent Increase in Drought Tolerant Landscaping [4]	5%	10%
Percent Water Use Savings from Drought Tolerant Landscaping [5]	33%	33%
Percent Water Use Savings from Watering Days Restrictions [2]	13%	20%

Source/Methodology/Assumptions:

[1] Source: San Pablo Community Forecast

[2] An article in the Journal of American Water Resources Association studied mandatory water restriction policies in various cities throughout Colorado that saw net water savings between 13 and 53%. Conservative estimates for water savings from the implementation of specified watering days are assumed to be 13% in 2020 and 20% by 2035.

[http://sciencepolicy.colorado.edu/admin/publication\\_files/resource-296-water\\_restrictions\\_jawra.pdf](http://sciencepolicy.colorado.edu/admin/publication_files/resource-296-water_restrictions_jawra.pdf)

[3] Source: "Urban CII Landscape Water Use and Efficiency in California" (Whitcomb, 2003)

[4] Current City Landscape Ordinance allows maximum of 10% nondrought tolerant landscaping. The City hopes to decrease this number to 5% by 2020 and 0% by 2035.

[5] Source: [http://www.allianceforwaterefficiency.org/Xeriscape\\_Water\\_Savings.aspx](http://www.allianceforwaterefficiency.org/Xeriscape_Water_Savings.aspx)

### Water Reduction Impact

	2020	2035
Total Reduction in Annual Water Use associated with Time of Use Regulations (gallons)	127,484,208	249,371,486
Total Reduction in Annual Water Use associated with Expanded Drought Tolerant Landscaping (gallons)	2,152,032	5,472,457

### Energy Reduction Impact

	2020	2035
Total Reduction in Annual Electricity Use associated with Water Savings(kWh)	453,727	891,954

Sources/Methodology:

[1] Energy use per gallon of water: 0.0035 kWh (for outdoor use only). Energy use for pumping, treatment, and wastewater treatment. Value is for outdoor water use in Northern California (indoor water use requires energy to both supply water and to treat wastewater). Source: California Energy Commission. REFINING ESTIMATES OF WATER RELATED ENERGY USE IN CALIFORNIA. 2006. Table ES-1. [http://www.energy.ca.gov/pier/project\\_reports/CEC-500-2006-118.html](http://www.energy.ca.gov/pier/project_reports/CEC-500-2006-118.html). Source via ICLEI CAPP Version 1.3

<b>GHG Emissions Reduction (Mtons CO2e)</b>	<b>115.0</b>	<b>226.2</b>
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## 1.5 Greywater

Encourage the use of greywater for irrigation, vehicle cleaning and other outdoor uses.

### Measure Assumptions

	2020	2035
Total Number of Residents [4]	34,100	37,700
% market penetration per yr [1]	1.5%	3.0%
Total Annual Water Reduction through use of greywater (gallons/person) [2]	14,144	14,144
Annual Energy Savings of Greywater Systems (kWh/gallon) [3]	0.002	0.002

Source/Methodology/Assumptions:

[1] Based on anecdotal evidence from PG&E's SmartLights program, 3% market penetration was achieved (3% of community conducted energy efficiency retrofits) through aggressive door-to-door outreach and education throughout the community. For this measure's calculation, we assume a more conservative outreach and education strategy for the community by 2020 and 2035 - 50% of effort - so penetration rate of 1.5%

[2] Based on the California Greywater Code, greywater systems range on average load from 60-250 gallons per day for a 4 person household. The average load, then, for a Greywater System is 155 gallons per day or 38.75 gallons per person per day. Multiply this number by 365 days a year to get 14,143.75 gallons per person per year.

[3] According to the San Francisco Graywater Design Manual for Outdoor Irrigation, graywater systems save approximately 2 watts per gallon of water from wastewater treatment. <http://www.sfwater.org/modules/showdocument.aspx?documentid=55>

[4] Source: San Pablo Community Forecast

### Water Reduction Impact

	2020	2035
Total Reduction in Annual Water Use (gallons)	7,234,528	15,996,581

### Energy Reduction Impact

	2020	2035
Total Reduction in Annual Electricity Use associated with Water Savings (kWh)	14,469	31,993
<b>GHG Emissions Reductions (Mtons CO2e)</b>	<b>3.67</b>	<b>8.11</b>

## Data utilized for emissions reduction calculations

### Emissions Factors

<i>Buildings</i>			
Electricity	0.000253558 Mtons CO2e/kWh	(Equivalent to 0.559 lbs CO2/kWh)	Source: PG&E (via Maria Sanders, City of El Cerrito)
Natural gas	0.005306 Mtons CO2e/Therm	(Equivalent to 11.70 lbs CO2/therm)	Source: PG&E (via Maria Sanders, City of El Cerrito)

### Energy/Water Use

Energy use per gallon of water (indoor use)	0.0054 kWh	Energy use for pumping, treatment, and wastewater treatment. Value is for indoor water use in Northern California (indoor water use requires energy to both supply water and to treat wastewater). Source: ICLEI CAPP version 1.3.
Energy use per gallon of water (outdoor use)	0.0035 kWh	Energy use for pumping, treatment, and wastewater treatment. Value is for outdoor water use in Northern California (outdoor water use requires energy to both supply water and to treat wastewater). Source: ICLEI CAPP version 1.3.
Energy use to heat gallon of hot water	0.0098 Therms	Source: ICLEI CAPP version 1.3.

### Energy/Water Costs

<i>Residential/Commercial</i>			
Electricity	0.13 \$/kWh	Source: For California commercial customers. \$10.69/thousand cubic ft and based on 100 cubic ft = 1 therm.	
Natural gas	1.069 \$/therm		
Water	0.004157754 \$/gallon	Source: East Bay Municipal District: <a href="https://www.ebmud.com/for-customers/account-information/water-rates-service-charges">https://www.ebmud.com/for-customers/account-information/water-rates-service-charges</a> . Based on "All Other Accounts" under water billing rate. \$3.11 per 100 cubic ft or 748 gallons.	
<i>Transportation</i>			
Gasoline	3.78 \$/gallon	Source: EIA. San Francisco specific (average 2011). <a href="http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_y05sf_m.htm">http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_y05sf_m.htm</a>	
Diesel	3.98 \$/gallon	Source: EIA. California specific (average 2011). <a href="http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_sca_m.htm">http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_sca_m.htm</a>	
CNG	2.71 \$/therm	Source: GNGprices.com (average Bay Area 2011; conversion 1gge=1.14 Therms). <a href="http://www.cngprices.com/">http://www.cngprices.com/</a>	
Biodiesel	4.40 \$/gallon	Source: For B2-B100 fuel. Bay Area average 2011. <a href="http://www.altfuelprices.com/">http://www.altfuelprices.com/</a>	

### Snapshot of San Pablo

	2005	2020	2035
Population	31,000	34,100	37,700
Single Family Homes [1]	4,652		
Businesses / Institutions [2]	291	295	432
Number of Jobs	5,950	6,040	8,830
Square Miles	2.6	2.6	2.6
Service Population	36,950	40,140	46,530

[1] 2005 Census Data (1-unit, detached)

[2] Total number of active business licenses in SP 2009-3/2011, Assume # of businesses same trend as job increases

2005 # of Jobs	5,950
2020 # of Jobs	6,040
2035 # of Jobs	8,830
Years Compounded (2005-2020)	15
Years Compounded (2005-2035)	30
CAGR (%) 2005-2020:	0.10%
CAGR (%) 2005-2035:	1.32%

### Emissions Projections

End Use	Emissions (Mtons CO2e)		
	2005	2020 w/state initiatives	2035 w/state initiatives
<i>Energy Use</i>			
Residential Electricity	8,594	9,453	10,451
Residential Natural Gas	19,212	21,133	23,364
Commercial Electricity	10,741	10,903	15,940
Direct Access Electricity (2005)	2,625	2,665	3,896
Commercial Natural Gas	9,225	9,365	13,690
Total Water Consumed	469	496	630
Residential Water Consumed	361	372	466
Commercial Water Consumed	108	124	164
Wastewater Treated	309	327	415
<i>Transportation</i>			
Auto Traffic (Local Streets)	11,489	13,498	15,507
Auto Traffic (San Pablo Ave.)	37,951	44,588	51,224
Auto Traffic (% of County Highways)	55,181	64,831	74,480
<i>Waste</i>			
Solid Waste to Landfill	18,446	19,493	24,785
<b>Totals</b>	<b>174,242</b>	<b>196,752</b>	<b>234,382</b>

Source: GHG emissions inventory and fc

**Energy Use Projections**

	2005	2020 w/state initiatives	2035 w/state initiatives	
End Use	Total Units	Total Units	Total Units	Unit
<i>Energy Use</i>				
Residential Electricity	38,249,236	42,074,160	46,516,006	kWh
Residential Natural Gas	3,610,858	3,971,944	4,391,269	therms
Commercial Electricity	33,672,692	34,182,027	49,971,407	kWh
Direct Access Electricity (2005)	10,119,601	10,272,671	15,017,828	kWh
Commercial Natural Gas	1,105,668	1,122,392	1,640,848	therms
Total Water Consumed	927,968,800	980,647,756	1,246,857,430	gallons
Residential Water Consumed	714,535,976	755,098,772	960,080,221	gallons
Commercial Water Consumed	213,432,824	225,548,984	286,777,209	gallons
Wastewater Treated	707,350,214	704,933,988	865,282,933	gallons
<i>Transportation</i>				
Auto Traffic (Local + Collector Streets)	21,258,695	24,976,582	28,693,725	VMT
Auto Traffic (Arterials)	70,217,605	82,496,582	94,775,558	VMT
Auto Traffic (% of County Highways)	102,097,800	119,951,677	137,805,554	VMT
<i>Waste</i>				
Solid Waste to Landfills	16,675	17,622	22,405	tons
<b>Totals</b>				

**City Statistics**

	2005	2020	2035
Employees	5,950	6,040	8,830
Students	6,800	7,480	8,270
Residents	31,000	34,100	37,700

**Residential Units**

# of new homes sold on average each year	279.33	Source: Concord Title Group
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Year	TOTAL housing unit	----- SINGLE -----		----- MULTIPLE -----		MOBILE HOMES	OCCUPIED	PCT VACANT	PERSONS PER HOUSEHOLD
		DETACHED	ATTACHED	2 TO 4	5 PLUS				
2000	9,354	4,145	760	1,293	2,361	795	9,065	3.09	3.286
2001	9,358	4,149	760	1,293	2,361	795	9,069	3.09	3.32
2002	9,355	4,143	760	1,293	2,361	798	9,066	3.09	3.324
2003	9,404	4,139	774	1,301	2,383	807	9,113	3.09	3.319
2004	9,532	4,213	824	1,305	2,383	807	9,237	3.09	3.308
2005	9,636	4,217	853	1,362	2,397	807	9,338	3.09	3.282
2006	9,666	4,224	853	1,362	2,420	807	9,367	3.09	3.243
2007	9,706	4,235	852	1,362	2,449	808	9,406	3.09	3.227
2008	9,802	4,243	852	1,366	2,533	808	9,499	3.09	3.235
...									
2020	10,519	4,432	1,049	1,501	2,624	818	9,568	3	
...									
2035	11,441	4,659	1,273	1,665	2,830	831	9,875	3	

Source: (1) For historical data 2001 - 2008: State of California, Department of Finance, E-5 Population and Housing Estimates for Cities, Counties and the State, 2001-2008, with 2000 Benchmark. Sacramento, California, May 2008. [http://www.dof.ca.gov/research/demographic/reports/estimates/e-5\\_2001-06/](http://www.dof.ca.gov/research/demographic/reports/estimates/e-5_2001-06/)  
 (2) Future projections were extrapolated using 2001-2008 data

# APPENDIX H: Municipal Reduction Measures and Quantifications

Municipal Reduction Measures (MTons CO2e Reduced)			2020	2035
Strategies			2020	2035
<b>I. Buildings Energy Use Reduction Measures</b>				
<b>B1. Integrate energy efficiency and other green building practices into new City facilities.</b>				
B1.1	<b>Municipal Green Building Policy</b> Develop and implement green building standards for major renovations to existing City buildings and new municipal construction		17	57
B1.2	<b>Green Roofs</b> Develop a policy to evaluate the feasibility of rooftop gardens and other green roof technologies on all new municipal construction		0.26	0.85
<b>B2. Conduct efficiency audits and implement energy/water efficiency retrofits in existing City facilities.</b>				
B2.1	<b>Municipal Energy Audits and Upgrades</b> Continue to conduct energy audits of all City facilities, identify opportunities for energy savings, and implement recommended, cost-effective energy efficiency retrofit upgrades.		41	48
B2.3	<b>Retrocommissioning</b> Improve energy performance of City buildings by retro-commissioning all electrical and natural gas systems throughout City facilities		180	241
<b>B3: Establish energy and water management/operations policies and practices for City facilities.</b>				
B3.1	<b>Plug Load Sensor Controls</b> Install (150) plug load sensor controls to reduce energy consumption in City facilities.		6.6	7.4
B3.2	<b>4 Day Work Week and Lights-Out Policy</b> Reduce energy use by decreasing hours of operation by implementing a 4 Day Work Week and a lights-out policy at night at City facilities		63	71
B3.3	<b>Expand Tree Cover</b> Develop and implement a municipal tree policy that requires the consideration of tree planting during any major landscape developments at City facilities		1	2
<b>B4: Consider clean energy alternatives for City facilities/operations</b>				
B4.1	<b>Solar PV</b> Install a 365 kW-dc photovoltaic array on City Facilities in 2012		131	131
<b>II. Streetlights Measures</b>				
<b>S1: Implement energy management/ operations practices for City owned streetlights.</b>				
S1.1	<b>LED Streetlights</b> Replace low-efficiency streetlights with high-efficiency light-emitting diode (LED) fixtures and develop an energy-efficiency standard for all new streetlights.		110	140
<b>III. Waste Reduction Measures</b>				
<b>W1: Implement waste reduction practices in all City facilities</b>				
W1.1	<b>Waste Prevention</b> Encourage waste prevention in day-to-day operations (e.g. two sided copying, reduced paper requirements, etc) in all City facilities.		7	14
<b>W2: Encourage recycling of used materials whenever feasible at City facilities.</b>				
W2.1	<b>Expand Recycling and Composting Programs</b> Audit and expand recycling and composting programs into all City facilities		0.93	2.06
<b>IV. Municipal Transportation Measures</b>				
<b>T1: Establish energy efficient fleet management and operation practices.</b>				
T1.1	<b>Fleet Maintenance</b> Improve maintenance regime for increased efficiency for City vehicles (e.g. regularly check tire pressure.)		14.19	14.71
T1.2	<b>Scheduling &amp; Routing Efficiency</b> Develop a scheduling system to encourage employees to reduce trips and carpool when possible.		34	67
<b>T2: Provide for alternative transportation options for all City employees.</b>				
T2.1	<b>Municipal Commuter Programs</b> Partner with public transportation providers to develop and promote employee incentive programs, including developing an online carpool portal to coordinate ridesharing. Continue to install bicycle lockers and changing facilities throughout City Hall		13	14
<b>V. Purchasing</b>				
<b>P1: Update &amp; Implement the City's Environmentally Preferred Procurement Policy</b>				
P1.1	<b>Environmentally Preferred Procurement Policy</b> Update policy and tools to enable effective procurement of energy efficient equipment and vehicles, recycled-content paper and products, and goods with reduced packaging		48	110
<b>VI. Municipal Education and Outreach</b>				
<b>E1: Inform City employees of sustainability initiatives/upgrades to City facilities and engage employees in behavior-based programming to compliment these efforts.</b>				
E1.1	<b>City Employee Education</b> Launch a "sustainability challenge" outreach campaign for City staff with the goal of reducing natural resource use by 10% over ten years (e.g. energy savings competition between departments, annual workshops, brown bags, etc.)		11	63
<b>Total</b>	<b>Total Reduction</b>		<b>677</b>	<b>984</b>
	<b>State Measure Reductions</b>		<b>175</b>	<b>426</b>
<b>Goal</b>	<b>At 15% and 30% below 2005 Municipal CO2e</b>		<b>225</b>	<b>449</b>
	<b>Projected emissions growth (from Baseline)</b>		<b>104</b>	<b>459</b>
<b>Delta</b>	<b>Shortfall of Goal</b>		<b>523</b>	<b>502</b>

## 1.1 Municipal Green Building Policy

*Institute green building standards for major renovations of existing city buildings and development of new municipal facilities.*

### Measure Assumptions

	2020	2035
Estimated square ft of future remodels and new future development (sq ft) [1]	10,500	35,750
Estimated average commercial annual electricity use (kWh/sq ft) [2]	15.6	15.6
Estimated average commercial annual natural gas use (therms/sq ft) [2]	0.35	0.35
Estimated energy savings from measure implementation [3]	25%	25%

Source/Methodology/Assumptions:

[1] Proposed Helms Community Center = 10,500 sq ft. City of San Pablo Corporation Yard Feasibility Study = 25,250 sq ft enclosed + 6000 sq ft covered + 9100 sq ft parking = 40,350 sq ft TOTAL. For this calculation, only included 25,250 sq ft enclosed portion of the Corporation Yard Development.

[2] Source: ICLEI's CAPP Version 1.3. Calculated from Tables 3.1.4 and 3.1.8, 2008 Building Energy Databook. DOE. March, 2009. Cited source: [http://buildingsdatabook.eren.doe.gov/docs%5CDataBooks%5C2008\\_BEDB\\_Updated.pdf](http://buildingsdatabook.eren.doe.gov/docs%5CDataBooks%5C2008_BEDB_Updated.pdf)

[3] Sources: 1) On average, LEED rated buildings energy consumption is 25-30% lower than the national average. Higher average performance is correlated with the higher LEED levels, however those buildings are more variable in individual performance. Source: ICLEI CAPP Version 1.3. Cited Source: Turner and Frankel, Energy Performance of LEED for New Construction Buildings. March 2008. New Buildings Institute. [http://www.newbuildings.org/downloads/Energy\\_Performance\\_of\\_LEED-NC\\_Buildings-Final\\_3-4-08b.pdf](http://www.newbuildings.org/downloads/Energy_Performance_of_LEED-NC_Buildings-Final_3-4-08b.pdf); 2) In addition to the numerous environmental and health benefits for building occupants, LEED-EB certified buildings also offer energy savings that range from 30%-70% annually, yielding lower building operations costs. Source: <http://www.greatforest.com/leed-eb-consulting.html>.

Based on information from the above two sources, 25% energy saving was used as a conservative estimate in this modeling.

### Energy Use Impact

	2020	2035
Reduction in electricity use (kWh)	40,950	139,425
Reduction in natural gas use (therms)	919	3,128

### GHG Emissions Impact

	2020	2035
<b>GHG emissions reduction (Mtons CO<sub>2</sub>e)</b>	<b>17</b>	<b>57</b>

## 2.1 Municipal Energy Audits and Upgrades

Continue to conduct energy audits of all City facilities, identify opportunities for energy savings, and implement recommended, cost-effective energy efficiency retrofit upgrades.

### Measure Assumptions

	2020	2035
Estimated square ft of retrofit (sq ft) [1]	64,279	74,779
Estimated average commercial annual electricity use (kWh/sq ft) [2]	15.6	15.6
Estimated average commercial annual natural gas use (therms/sq ft) [2]	0.35	0.35
Estimated % energy savings [3]	10%	10%

Source/Methodology

[1] Source: John Medlock, City of San Pablo. New Developments will not be old enough to require retrofits in 2020, but the Helms Community Center will require an audit and potential retrofits by 2035 due to age. The new Corporation Yard is slated to still be in development by 2035, so it has not been included in these calculations.

[2] Source: ICLEI CAPP version 1.3

[3] Assumes 10% reduction in energy use from energy efficiency retrofits. The cost for a simple energy efficiency retrofit, which can result in a 10 percent savings, generally costs \$1 per-square-foot. A retrofitting investment of \$10 to \$30 per-square-foot can result in energy savings of 40 percent. Source: "Private CRE to Spur Energy Retrofit Market Over Next Few Years. Barbra Murry. <http://login.vnuemedia.com/cpn/business-specialties/Private-CRE-to-Spur-Energy-Retrofit-Market-Over-Next-Few-Years-1473.shtml>. Modeling is based on simple energy efficiency retrofit = 10% savings for \$1/sf.

### Energy Use Impacts

	2020	2035
Reduction in electricity use (kWh)	100,275	116,655
Reduction in natural gas use (therms)	2,250	2,617

### GHG Emissions Impact

	2020	2035
<b>GHG emissions reduction (Mtons CO<sub>2</sub>e)</b>	<b>41</b>	<b>48</b>

## 2.2 Green Roofs

*Install rooftop gardens in order to promote cooling in municipal facilities where applicable.*

### Measure Assumptions

	2020	2035
Total municipal rooftop space (sq ft) [1]	44,450	72,400
Program goal: % of existing roof transformed into green roof	3%	6%
Square feet of green roof installed (sq ft) [1]	1,334	4,344
Annual Direct Electricity Savings per Roof Square Foot (kWh) [2]	0.45	0.45
Annual indirect electricity savings per Roof Square Foot (kWh) [3]	0.25	0.25

Source/Methodology

[1] Source: John Medlock, City of San Pablo, Maintenance and Operations Manager. 2035 Projections include flat roof portion of proposed Helms Community Center (2,700 sq ft) and total rooftop square footage of enclosed Corporation Yard development (25,250 sq ft).

[2] Direct savings are from heat flow impact on building envelope. Source: ICLEI CAPP Version 1.3. Cited source: Lawrence Berkeley National Laboratory. [www.toronto.ca/greenroofs/pdf/chapt](http://www.toronto.ca/greenroofs/pdf/chapt).

[3] Indirect savings are from heat island effect. Source: ICLEI CAPP Version 1.3. Cited Source: Lawrence Berkeley National Laboratory. [www.toronto.ca/greenroofs/pdf/chapter4\\_2\\_6.pdf](http://www.toronto.ca/greenroofs/pdf/chapter4_2_6.pdf)

### Energy Use Impacts

	2020	2035
Reduction in electricity use (kWh)	933	3,041

### GHG Emissions Impact

	2020	2035
<b>GHG emissions reduction (Mtons CO2e)</b>	<b>0.3</b>	<b>0.8</b>

## 2.3 Retrocommissioning

Improve energy performance of City buildings by implementing retro-commissioning on City facilities

### Measure Assumptions

	2020	2035
Estimated square footage of municipal space that will need retrocommissioning (sq ft) [2]	74,779	100,029
Estimated electricity savings from retro-commissioning (kWh/sq ft) [1]	1.3	1.3
Estimated natural gas savings from retro-commissioning (therms/sq ft) [1]	0.35	0.35

#### Source/Methodology

[1] Source: ICLEI CAPPA Version 1.3. Cited Source: Options for Energy Efficiency in Existing Buildings. California Energy Commission, CEC-400-2005-039-CMF. Dec, 2005. <http://www.energy.ca.gov/2005publications/CEC-400-2005-039/CEC-400-2005-039-CMF.PDF>

[2] Source: John Medlock, City of San Pablo, Maintenance & Operations Manager. 2020 includes all existing municipal buildings and the new Helms Community Center development (10,500 sq ft). 2035 includes, in addition, all enclosed space of new Corporation Yard development (25,250 sq ft).

### Energy Use Impact

	2020	2035
Reduction in electricity use (kWh)	97,213	130,038
Reduction in natural gas use (therms)	26,173	35,010

### GHG Emissions Imp:

	2020	2035
<b>GHG emissions reduction (Mtons CO<sub>2</sub>e)</b>	<b>180</b>	<b>241</b>

### 3.3 Plug Load Sensor Controls

Install energy saving plug load sensor controls to reduce energy consumption in City facilities

#### Measure Assumptions

	2020	2035
Total # of plug load sensors installed in City facilities [1]	165	186
Estimated energy savings from plug load sensor (kWh/unit) [2]	143.25	143.25

Sources/Methodology:

[1] Source: Larry Johnson, City of San Pablo, IT Manager

[2] Based on average kWh savings rating of 143.25 kWh/year, which is based on ratings provided by PG&E. Source: California Energy Efficient Program.

#### Energy Use Impact

	2020	2035
Reduction in electricity use (kWh)	23,636	26,645

#### GHG Emissions Impact

	2020	2035
<b>GHG emissions reduction (Mtons CO<sub>2</sub>e)</b>	<b>6.6</b>	<b>7.4</b>

### 3.4 Reduced Lighting Use: Lights-Out Policy and Condensed Work Week at City Facilities

Reduce energy use by decreasing hours of operation and by implementing a lights-out policy at night at City facilities

#### Lights-Out Policy Measure Assumptions

	2020	2035
Square Feet w/Lights Out at Night Policy (sq ft) [1]	74,779	104,629
Annual Lighting Energy Use per Square Foot (kWh) [2]	6.85	6.85
% Savings With Policy [3]	5%	5%

Sources/Methodology:

[1] Source: John Medlock, City of San Pablo, Maintenance & Operations Manager.

[2] Annual Lighting Energy Use per Square Foot (kWh): 6.85. kWh/sq ft\*yr calculated from data from US Department of Energy Advanced Sensors and Controls for Building Applications: Market Assessment and Potential R&D Pathways. 2005. [http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/pnnl-15149\\_market\\_assessment.pdf](http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/pnnl-15149_market_assessment.pdf). Table 2.6. 55 Billion Sq ft of lit commercial building space in US uses 3.9 quadrillion BTU/yr primary energy for lighting, which equals 6.85 kWh/sq ft\*yr. Source: ICLEI's CAPP Version 1.3.

[3] Source: ICLEI's CAPP Version 1.3. Cited source: US Department of Energy 2005. [http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/pnnl-15149\\_market\\_assessment.pdf](http://apps1.eere.energy.gov/buildings/publications/pdfs/corporate/pnnl-15149_market_assessment.pdf). Table 2.11. Conservative 5% savings is below value for office buildings (between 30-40%) due to condensed workweek savings and limited nighttime energy use.

#### Lights-Out Policy Energy Use Impact

	2020	2035
Reduction in electricity use (kWh)	25,612	35,835

#### Lights-Out Policy GHG Emissions Impact

	2020	2035
GHG emissions reduction (Mtons CO <sub>2</sub> e)	7.2	10.0

#### Condensed Work Week Measure Assumptions

	2020	2035
Total Municipal Electricity Use	834,210	839,862
Total Municipal Natural Gas Use	33,229	40,280
% Reduction in Energy Use from Condensed Work Week	13%	13%

Sources/Methodology:

[1] <http://www.time.com/time/magazine/article/0,9171,1919162,00.html>

#### Condensed Work Week Energy Use Impact

	2020	2035
Reduction in electricity use (kWh)	108,447	109,182
Reduction in natural gas use (therms)	4,320	5,236

#### Condensed Work Week GHG Emissions Impact

	2020	2035
GHG emissions reduction (Mtons CO <sub>2</sub> e)	55.6	61.1

#### Total GHG Emissions Impact

	2020	2035
Total GHG Emissions Reduction (Mtons CO <sub>2</sub> e)	62.74	71.16

### 3.6 Expand Tree Cover

Reduce energy use and sequester carbon by planting trees to shade City facilities where feasible.

#### Measure Assumptions

		2020	2035
	Measure goal: Number of Trees Planted	10	20
Shading	Annual Energy Savings of one Mature Tree (kWh) [1]	44	44
Carbon Sequestration	Annual CO2 Absorbed by one Mature Tree (tons) [2]	0.11	0.11

Source/Methodology/Assumptions:

[1] Savings per tree from SMUD's Tree Benefit Estimator <https://usage.smud.org/treebenefit/iDefault.aspx>. Inputs 15 yr old Red Maple, 0-15 ft from house. Savings for mature tree on west of house are 45 kWh/yr, on east 42 kWh/yr, 43.5 kWh/yr average (trees on west and east sides give greatest energy savings) .

[2] Source: Tree Benefit Estimator <https://usage.smud.org/treebenefit/iDefault.aspx>. For mature Red Maple.

#### Energy Use Impact

		2020	2035
Shading	Reduction in electricity use from tree planting (kWh)	435	870

#### GHG Emissions Impact

		2020	2035
Shading	GHG emissions reduction from reduction in electricity use (Mtons CO2e)	0.12	0.24
Carbon Sequestration	GHG emissions sequestered in trees (Mtons CO2e)	1.1	2.2
<b>Total</b>	<b>Total GHG emissions reduction (Mtons CO2e)</b>	<b>1.2</b>	<b>2.4</b>

#### 4.1 Solar PV

*Investigate and seek to install solar electric arrays at/on appropriate City facilities.*

##### Measure Assumptions [2]

	2020	2035
Recommended PV System size (kW) [1]	365	365

Source/Methodology/Assumptions:

[1] Source: Solar feasibility assessment report by Optony. Solar PV deployment on five sites: City Hall, Police Department, Church Lane Senior Center, Davis Senior Center, and Multi Purpose Bldg.

[2] Assume no additional solar PV systems are deployed after 2020

##### Energy Production Impact

	2020	2035
Annual PV output (kWh) [1]	467,046	467,046

##### GHG Emissions Impact

	2020	2035
<b>GHG emissions reduction (Mtons CO<sub>2</sub>e)</b>	<b>131</b>	<b>131</b>

Source/Methodology:

[1] Source: Solar feasibility assessment report by Optony

## 1.1 LED Streetlights

Replace low-efficiency streetlights with high-efficiency light-emitting diode (LED) fixtures

### Measure Assumptions

	2020	2035
Estimated annual electricity use per existing non-efficient streetlight [3]	722	722
# of city-operated streetlights that are estimated to be converted to LED [2]	1,365	1,736
Electricity use from existing non-efficient streetlights (kWh)	985,763	1,253,689
% Annual Energy Savings from LED streetlight replacement [1]	40%	40%

Sources/Methodology:

[1] Energy savings from LED streetlights is typically 40-60 % compared to high pressure sodium systems. A more conservative energy savings figure of 40% is utilized in this modeling. Source: "Los Angeles LED Street Light Program Estimated to Save \$10M Annually". <http://www.solidstatelightingdesign.com/documents/articles/gsedoc/118076.html>

[2] Source: John Medlock, City of San Pablo. In 2005, City had a total of 1292 streetlights. In 2020, City is estimated to be responsible for 1365 streetlights and 1736 streetlights in 2035.

[3] Electricity use from streetlights in 2005 was 933,045 kWh (Source: 2005 GHG emissions inventory, PG&E LS2 rates only). In 2005, the City owned a total of 1,292 streetlights (Source: John Medlock, City of San Pablo). This results in an average electricity use of about 722.17105 kWh/streetlight each year.  $833.03 \text{ kWh/streetlights} \times 1292 \text{ streetlights in 2020} = 1,076,275 \text{ kWh}$ .

### Electricity Use Impact

	2020	2035
Reduction in electricity use (kWh)	394,305	501,476

### GHG Emissions Impact

	2020	2035
<b>GHG emissions reduction (Mtons CO2e)</b>	<b>110</b>	<b>140</b>

## 1.1 Waste Prevention

Encourage waste prevention in day-to-day operations (e.g. two sided copying, reduced paper requirements, etc) in all City facilities.

### Measure Assumptions

	2020	2035
Number of City Employees (full-time equivalent) [3]	118	130
Pounds of Paper Used/Employee/Year (lbs) [1]	125	125
Total Estimated Pounds of Paper Used By All City Staff Per Year (lbs)	14,750	16,250
Measure Goal: % Reduction in Paper Use with measure implementation	10%	20%
Pounds of Used Paper Reduced Per Year (lbs) [2]	1,475	3,250

Source/Methodology:

[1] Pounds of paper used/employee/year: 125 pounds. Assume that the average office worker generates between 110-140 pounds of recoverable white office paper a year. Average worker uses about 10,000 sheets of paper a year at .2oz (.0125 lb) per A4 paper. Source: <http://www.epa.gov/osw/conserve/materials/paper/faqs.htm>

[2] Assume % reduction in paper use with the implementation of this measure results in 10% reduction in paper use by 2020 and 20% by 2030.

[3] Total City Staff numbers's source: City of San Pablo

### Solid Waste Reduction Impact

Pounds of Used Paper Reduced Per Year (tons)	0.7	1.6
----------------------------------------------	-----	-----

### GHG Emissions Impact

	2020	2035
<b>GHG Emissions Avoided (Mtons CO2e) [1]</b>	<b>6.5</b>	<b>14.3</b>

Sources/Methodology:

[1] Based on WARM EPA model August 2010. For office paper source reduction.

## 1.2 Expand Recycling

Expand recycling programs into all City facilities.

### Measure Assumptions

	2020	2035
Number of City Employees (full-time equivalent) [1]	118	130
Measure Goal: Additional Pounds of Recyclables/ Employee/ Year (lbs)	5	10
Total Additional Recyclables Generated By All City Staff Per Year (lbs) [2]	590	1,300

Source/Methodology/Assumptions:

[1] Total City Staff numbers's source: City of San Pablo

[2] Assume that through this measure, an average City employee will increase their recycling generation by 5 pounds/year by 2020 and 10 pounds/year by 2030.

### Solid Waste Reduction Impact

	2020	2035
Total Estimated Pounds of Additional Recyclables Generated By City Staff Per Year (tons)	0.3	0.7

### GHG Emissions Impact

	2020	2035
<b>GHG Emissions Avoided (Mtons CO2e) [1]</b>	<b>0.9</b>	<b>2.1</b>

Sources/Methodology:

[1] Based on WARM EPA model August 2010. For mixed recyclables.

## 1.1 Fleet Maintenance

Improve maintenance regime for increased efficiency for City vehicles (e.g. regularly check tire pressure.)

### Measure Assumptions

	2020	2035
Gallons of Gasoline Used/Year by Vehicle Fleet [1]	42,373	44,069
Gallons of Diesel Used/Year by Vehicle Fleet [1]	1,674	1,620
% Potential Savings of Fuel from Maintenance [2]	3.3%	3.3%

Source/Methodology/Assumptions:

[1] Gallons of fuel used by vehicle fleet was derived from the 2005 GHG emissions inventory. The projected use of gallons are assumed to remain constant as there will be significant changes in the vehicle fleet in 2020 and 2035.

[2] % Savings of fuel from maintenance: 3.3%. The United States Department of Energy released a statement that, "proper inflation of your vehicles tires can save you up to 3.3 percent of your fuel usage". Source: <http://nature.berkeley.edu/classes/es196/projects/2007final/Swenson.pdf>

[3] Little to minimal up-front cost is associated with the implementation of this measure.

### Fuel Use Impact

	2020	2035
Gallons of Gasoline Saved/Year through Measure [1]	1,398	1,454
Gallons of Diesel Saved/Year through Measure	55	53

### GHG Emissions Impact

	2020	2035
<b>GHG Emissions Avoided (Mtons CO2e)</b>	<b>14.19</b>	<b>14.71</b>

## 1.2 Scheduling & Routing Efficiency

Improve scheduling and route efficiency for using City vehicles.

### Measure Assumptions

	2020	2035
Total Gallons of Gasoline Used/Year by Vehicle Fleet [2]	42,373	44,069
Total Gallons of Diesel Used/Year by Vehicle Fleet [2]	1,674	1,620
Measure Goal: % of Vehicle Travel Impacted by Measure [1]	50%	100%
% Savings of Fuel from Improvement in Scheduling & Route [3]	15%	15%

Source/Methodology:

[1] Assume City's goal of vehicle impact to be 10% of all vehicle travel in 2020 and 20% by 2035.

[2] Gallons of fuel used by vehicle fleet was derived from the 2005 GHG emissions inventory. The projected use of gallons are assumed to remain constant as there will be significant changes in the vehicle fleet in 2020 and 2035.

[3] % Savings of fuel from improvement of scheduling & route: 15%. Based on two case studies using software for routing optimization. Range 15-20%. Used conservative 15% for non-software use routing and scheduling optimization:

1) American Signature Furniture has reduced its mileage costs by 15-20% using the route optimization system, and overtime expense for the delivery teams by 12 percent. Source: <http://www.intergis.com/fleet-software-success-stories/Reduced-Mileage-Fuel-Costs>

2) Essex Equipment Services have undertaken a 3 month pilot of DPS Logix routing software for its driver fitter team. This implementation has led to a per delivery fuel efficiency improvement of 20%. Source: [http://www.dps-int.com/vehicle\\_routing\\_scheduling\\_news.shtml](http://www.dps-int.com/vehicle_routing_scheduling_news.shtml)

### Fuel Use Impact

	2020	2035
Gallons of Gasoline Saved	3,178	6,610
Gallons of Diesel Saved	251	243

### GHG Emissions Impact

	2020	2035
<b>GHG Emissions Avoided (Mtons CO2e)</b>	<b>33.7</b>	<b>66.9</b>

## 2.1 Municipal Commuter Programs

Implement incentive programs to reduce municipal employee commute (e.g. parking cash-out, telecommute, bike check-out)

### Parking Cashout Measure Assumptions [1]

	2020	2035
Total City Staff (full-time equivalent) [2]	118	130
% of City employees eligible in Parking cashout program [3]	8%	8%
% of City staff participating in Telecommute program [4]	5%	5%
% of City staff participating in Bike Use program [5]	2%	2%
Average One-way Commute Length (miles)	15	15
Average One-way Bicycle Commute Length (miles)	2	2
Estimated fuel economy for passenger cars (mpg)	21	21

Source/Methodology/Assumptions:

[1] Employee Commute Program is a combination of three measures: Parking Cashout Incentive (carpool 1 day/week), Telecommute incentive (1.5 days/week), and Employee bike use Program (4 miles / day). See below for details on each.

[2] Source: San Pablo Municipal Forecast.

[3] % of city employees eligible assumed here to equate close to % of employees participating in Parking cashout program: 8%. Based on a Univ. of California Los Angeles report that assesses the results of eight case studies of employers who participated in the cash out program. Cashing out program reduced 8 cars driven to work per 100 employees (or 8%). Source: <http://www.arb.ca.gov/research/apr/past/93-308a.pdf>. Table 11. Assume 8% participation rate stays constant in 2020 and 2035.

[4] Source: CAPCOA Quantifying GHG Mitigation Measures. August 2010. Pg. 236. % participation range suggestion 1-25%. Assume conservative participation rate here of 5%.

[5] % of Employees Switching to Bicycle Commuting: 2%. Source: "Bike Industry Poised for a Breakthrough". Sarah Mahoney. [http://www.mediapost.com/publications/?fa=Articles.showArticle&art\\_aid=111301](http://www.mediapost.com/publications/?fa=Articles.showArticle&art_aid=111301)

### VMT & Fuel Use Impact

		2020	2035
<i>Parking Cashout</i>	Annual Vehicle Mile Reduction [1]	13,594	14,976
	Annual Gasoline Savings (gallons)	647	713
<i>Telecommute</i>	Annual Vehicle Mile Reduction (miles) [1,2]	12,744	14,040
	Annual Gasoline Savings (gallons)	607	669
<i>Bike Use</i>	Annual Vehicle Mile Reduction (miles) [1]	1,812	1,997
	Annual Gasoline Savings (gallons)	86	95
<b>Total</b>	<b>Annual Vehicle Mile Reduction (miles) [1]</b>	<b>28,150</b>	<b>31,013</b>
	<b>Annual Gasoline Savings (gallons) [2,3,4,5,6]</b>	<b>1,340</b>	<b>1,477</b>

Sources/Methodology/Assumptions:

[1] Annual vehicle mile reduction is based on baseline assumption that employees commute to/from work five times a week for 48 weeks a year.

[2] Annual gasoline saving (gallons) is calculated by dividing the annual vehicle mile reduction by 21 miles/gallon. MPG average for US passenger car in 2010 is 25 and in 2035 is 32. Source: "Change in Motion, Transportation 2035 Plan for the San Francisco Bay Area: Travel Forecasts Data Summary". December 2008. Table B1 p. 49. [http://www.mtc.ca.gov/planning/2035\\_plan/Supplementary/T2035-Travel\\_Forecast\\_Data\\_Summary.pdf](http://www.mtc.ca.gov/planning/2035_plan/Supplementary/T2035-Travel_Forecast_Data_Summary.pdf)

[3] Average One-way Commute Length (miles) for Telecommuting: 15 miles. Source: ICLEI's CAPP Version 1.3. Cited Source: Victoria Transportation Policy Institute. <http://www.vtpi.org/tmd/tmd43.htm>. Study by Nilles 1996 surveyed 400 U.S. teleworkers and found net driving savings of 30 mi/telecommute day. Telecommutes tend to be attractive to workers with longer than average commutes; on the other hand driving for errands may increase and workers may choose to live farther away knowing they can telecommute, leading to longer commutes when they do drive.

[4] Average One-way Commute Length (miles) for Bicycling Program: 2 miles. Source: ICLEI's CAPP Version 1.3.

[5] Average One-way Commute Length (miles) for Parking Cash out: 9.8 miles. Source: ICLEI's CAPP Version 1.3. Cited Source: National Household Travel Survey. 2001. 2,298 Billion miles / 235 Billion trips = 9.8mi/trip. [http://www.bts.gov/publications/highlights\\_of\\_the\\_2001\\_national\\_household\\_travel\\_survey/html/table\\_02.html](http://www.bts.gov/publications/highlights_of_the_2001_national_household_travel_survey/html/table_02.html)

[6] Assume fuel economy of 21 mpg. Fuel economy source: U.S. EPA. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2006. July 2006 report. Table 2 page 14. Based on 2005 baseline mpg to reflect business as usual scenario.

### Energy Use Impact

		2020	2035
<i>Parking Cashout</i>	GHG Emissions Avoided (Mtons CO2e)	6.3	6.9
	GHG Emissions Avoided (Mtons CO2e)	5.9	6.5
<i>Bike Use</i>	GHG Emissions Avoided (Mtons CO2e)	0.8	0.9

### GHG Emissions Impact

	2020	2035
<b>Total GHG Emissions Avoided (Mtons CO2e)</b>	<b>13.0</b>	<b>14.3</b>

## 1.1 Environmentally Preferred Procurement Policy

Update policy and tools to enable effective procurement of energy efficient equipment and vehicles.

### ENERGY STAR Measure

#### Measure Assumption

		2020	2035
Desktop Computer	Estimated # of units [2]	165	186
	Annual Energy Savings of one ENERGY STAR unit (kWh)	133	133
Monitor	Estimated # of units [2]	165	186
	Annual Energy Savings of one ENERGY STAR unit (kWh)	15	15
Laptop	Estimated # of units [2]	26	30
	Annual Energy Savings of one ENERGY STAR unit (kWh)	40	40
Copier	Estimated # of units [2]	12	14
	Assumed % of monochrome (black & white) copiers	50%	50%
	Assumed % of color copiers	50%	50%
	Annual Energy Savings of one ENERGY STAR - monochrome	73	73
	Annual Energy Savings of one ENERGY STAR - color	39	39
Printer	Estimated # of units [2]	16	19
	Assumed % of monochrome (black & white) copiers	33%	33%
	Assumed % of color copiers	34%	34%
	Assumed % of ink jet copiers	33%	33%
	Annual Energy Savings of one ENERGY STAR - monochrome	26	26
	Annual Energy Savings of one ENERGY STAR - color	165	165
	Annual Energy Savings of one ENERGY STAR - ink jet	11	11

Source/Methodology

[1] ENERGY STAR energy savings calculators. Office Products Savings Calculator. 1 unit was inserted into the quantify input section of the spreadsheet. CA, \$0.13, and relevant sector (commercial vs residential) was selected. Results are in annual energy savings between conventional until vs ENERGY STAR unit. [http://www.energystar.gov/index.cfm?c=bulk\\_purchasing.bus\\_purchasing](http://www.energystar.gov/index.cfm?c=bulk_purchasing.bus_purchasing)

[2] Source: Larry Johnson, City of San Pablo, IT Manager

#### Measure Impacts

		2020	2035
Electricity Use	Reduction in electricity use (kWh)	27,225	30,810
<b>GHG Emissions</b>	<b>GHG emissions reduction (tons)</b>	<b>8</b>	<b>9</b>

## Energy Efficient/Alternative Energy Vehicles

### Measure Assumptions [2,3]

		2020	2035
Electric	# of new vehicles [2]	3	3
Hybrid Electric	# of new vehicles [2]	23	29
CNG	# of new vehicles [2]	0	0
Biodiesel	# of new vehicles [2]	7	20

Source/Methodology:

[1] This measure pertains only to on-road/highway vehicles.

[2] Number of vehicles available was estimated from information provided by John Medlock, Public Works Operation and Maintenance Manager, City of San Pablo.

### Energy Use Impact [1,4]

		2020	2035
Electric	# of new vehicles	3	3
	Miles per Gallon of Vehicle Replaced (miles/gallon of gasoline) [2]	25	32
	Average Annual Miles Per Vehicle [2]	2,813	3,406
	Annual Gasoline Savings (gallons) (fuel being replaced by electricity)	338	319
	Annual Electricity Use (kWh) [6]	3,379	4,091
	<b>GHG Emissions Saved (tons) [5]</b>	<b>2.33</b>	<b>1.96</b>
Hybrid Electric	# of new vehicles	23	29
	Hybrid Vehicle Fuel Economy (miles/gallon) [7]	46	46
	Miles per Gallon of Vehicle Replaced (miles/gallon of gasoline) [2]	25	32
	Average Annual Miles Per Vehicle [2]	2,813	3,406
	Annual Gasoline Savings (gallons) [8]	1,181	939
	<b>GHG Emissions Saved (tons) [12]</b>	<b>11.47</b>	<b>9.12</b>
CNG [11]	# of new vehicles	-	-
	Average Annual Miles Per Vehicle [2]	2,813	3,406
	Miles per Gallon of Conventional vehicle (miles/gallon of gasoline) [5]	25	32
	Annual Gasoline Savings (gallons) (fuel being replaced by CNG)	0	0
	Annual CNG Use (cubic ft) [10]	0	0
	Annual CNG Use (therm) [18]	0	0
	<b>GHG Emissions Saved (tons) [3,13]</b>	<b>0.00</b>	<b>0.00</b>
Biodiesel	# of new vehicles	7	20
	Average Annual Miles Per Vehicle [2]	2,548	3,085
	Miles per Gallon of Conventional Truck (miles/gallon of diesel) [14]	7.6	7.6
	Miles per Gallon of Biodiesel Truck (miles/gallon of biodiesel) [17]	14	14
	Annual Diesel Use (gallons) (fuel being replaced by biodiesel)	2,347	8,118
	Annual Biodiesel Use (gallons)	1,274	4,407
	<b>GHG Emissions Saved (tons) [15,16]</b>	<b>26</b>	<b>91</b>
<b>Total</b>	<b>Annual Gasoline Savings (gallons)</b>	<b>1,519</b>	<b>1,259</b>
	<b>Annual Diesel Savings (gallons)</b>	<b>2,347</b>	<b>8,118</b>
	<b>Annual CNG Use (therm)</b>	<b>0</b>	<b>0</b>
	<b>Annual Biodiesel Use (gallons)</b>	<b>1,274</b>	<b>4,407</b>
	<b>Annual Electricity Use (kWh)</b>	<b>3,379</b>	<b>4,091</b>
	<b>GHG Emissions Saved (tons) [3]</b>	<b>40.04</b>	<b>101.85</b>

Source/Methodology:

[1] Average Annual Miles Per Vehicle for all vehicle categories are based on City's 2005 GHG emissions inventory. Total gallons of gasoline and diesel consumed in 2005 were divided by average MPG of passenger/light duty vehicles and heavy duty vehicles, respectively. MPG for passenger/light duty vehicles was based on 25 MPG. (Source: "Change in Motion, Transportation 2035 Plan for the San Francisco Bay Area: Travel Forecasts Data Summary". December 2008. Table B1 p. 49. [http://www.mtc.ca.gov/planning/2035\\_plan/](http://www.mtc.ca.gov/planning/2035_plan/).) Heavy-duty vehicles' MPG was based on 7.6 MPG average. (Source: Fuel Economy of Heavy-Duty Trucks in the USA: Historical trends and Forecasts. K.G. Duleep Energy & Environmental Analysis, Inc., [http://www.iea.org/work/workshopdetail.asp?WS\\_ID=306](http://www.iea.org/work/workshopdetail.asp?WS_ID=306)).

[2] Fuel economy changes from 25mpg in 2020 to 32mpg in 2035. Source: "Change in Motion, Transportation 2035 Plan for the San Francisco Bay Area: Travel Forecasts Data Summary". December 2008. Table B1 p. 49. [http://www.mtc.ca.gov/planning/2035\\_plan/](http://www.mtc.ca.gov/planning/2035_plan/)

[4] Forecast of number of alternative vehicle fleet. Source: , City of XXXX.

[5] GHG emissions takes into considerations emissions from electricity use.

[6] Annual Electricity Use. Source: ICLEI CAPP Version 1.3. Calculated as the equivalent amount of energy that would be consumed by an electric vehicle assuming a gallon of gasoline equivalent efficiency of 83.25 mpg. .03 kWh/gallon gasoline equivalent energy from DOE Alternative Fuels and Advanced Vehicles Data Center. Source: <https://www.afdc.energy.gov/afdc/prepare/methodology.html>

[7] Hybrid Miles per Gallon: 50 mpg. Combined city/hwy mileage for 2011 Toyota Prius. <http://www.fueleconomy.gov/feg/noframes/30919.shtml>

[8] Miles per Gallon of Vehicle Replaced: 25 & 32. MPG average for US passenger car 2020: 25 mpg, 2035: 32 mpg. Source: [http://www.bts.gov/publications/national\\_transportation\\_statistics/html/table\\_04\\_23.html](http://www.bts.gov/publications/national_transportation_statistics/html/table_04_23.html)

[10] Source: ICLEI CAPP Version 1.3. Calculated as the equivalent amount of fuel that would be consumed by a CNG vehicle assuming a 5% loss in efficiency with a dedicated CNG engine. 120.971 Standard Cubic Feet of Natural Gas / Gallon Gasoline derived from The Local Government Operations Protocol Table G.9

[11] CNG Conversions:

- One equivalent gallon is equal to 121.5 cubic feet of CNG. Source: <http://www.fueleconomy.gov/feg/feg2011.pdf>
- 100 cubic feet of CNG equates to 100,000 Btu, or 1 Therm.

[12] Total GHG emissions (tons) takes into account emissions from CNG.

[13] Emissions calculation for CNG represents the emissions that are offset by using less carbon-intense fuel replacements. The conventional more carbon-intense fuel that CNG is compared to here is gasoline.

[14] Miles per Gallon of Conventional and Biodiesel Truck (miles/gallon): 7.6. Based on medium heavy-duty vehicles. Source: Fuel Economy of Heavy-Duty Trucks in the USA: K.G. Duleep Energy & Environmental Analysis, Inc., <http://www.iea.org/work/2007/vehicle/Duleep.pdf>

[15] GHG emissions (metric tons) takes into account emissions from biodiesel use.

[16] Emissions calculations for biodiesel represent the emissions that are offset by using less carbon-intense fuel replacements. The conventional more carbon-intense fuel that biodiesel is compared to here is biodiesel.

[17] Miles per gallon of biodiesel truck: 14. Source: ICLEI CAPP Version 1.3.

1197 100 cubic feet = 1 therm. So, 1 cubic feet = 0.01 therm.

**TOTAL GHG EMISSIONS IMPACT**

	2020	2035
<b>Total GHG Emissions Reduction (tons)</b>	<b>47.65</b>	<b>110.47</b>

## 1.1 City Employee Education

Launch "sustainability challenge" outreach campaign for City staff with the goal of reducing natural resource use by 10% over ten years (e.g. energy savings competition between departments, annual workshops, brown bags, etc.)

### Measures Assumptions

	2020	2035
Estimated % of employees reached through education programs [3]	40%	100%
Measure goal: Estimated % Reduction in GHG Emissions from Measure [1,2]	5%	10%
Number of City Employees (full-time equivalent) [4]	118	130

Source/Methodology/Assumptions:

[1] Emissions reductions resulting from this measure is additional to the emission reductions impacts from the other measures recommended in the CAP.

[2] Estimated % Savings in Energy, Cost, and GHG Emissions from Measure: 5% Energy and GHG emissions savings were derived by calculating 5% assumed savings of education/awareness from the energy use and GHG emissions emitted from municipal buildings and vehicle fleet under the City's GHG emissions inventory and forecast. 5% is based on an education campaign Awareness for Communities about Energy (ACE) implemented by Strategic Energy Innovations in 200 K-12 schools in California, Maryland, New Jersey, New York, North Carolina, and Pennsylvania. Schools that participated in this program achieved energy reductions of 5 to 15%. In this methodology, a conservative figure of 5% in reductions is applied across the building, vehicle fleet, and waste sectors.

[3] Growth in educational program reach estimated based on 10% municipal staff reached by 2010, 40% reached by 2020, and 100% reached by 2030

[4] Source: San Pablo Municipal Forecast

### GHG Reductions

		2020	2035
Buildings	Annual Energy Use Savings (kWh)	16,684	83,986
	Annual Energy Use Savings (therms)	665	4,028
<b>TOTAL</b>	<b>Total GHG Emissions Avoided (Mtons CO2e)</b>	<b>11.11</b>	<b>62.57</b>

Source/Methodology/Assumptions:

[1] Emissions reductions resulting from this measure is additional to the emission reductions impacts from the other measures recommended in the CAP.

[2] Estimated % Savings in Energy, Cost, and GHG Emissions from Measure: 5% Energy and GHG emissions savings were derived by calculating 5% assumed savings of education/awareness from the energy use and GHG emissions emitted from municipal buildings, vehicle fleet, and waste operations under the City's GHG emissions inventory and forecast. 5% is based on an education campaign Awareness for Communities about Energy (ACE) implemented by Strategic Energy Innovations in 200 K-12 schools in California, Maryland, New Jersey, New York, North Carolina, and Pennsylvania. Schools that participated in this program achieved energy reductions of 5 to 15%. In this methodology, a conservative figure of 5% in reductions is applied.

[3] Growth in educational program reach estimated based on 10% municipal staff reached by 2010, 40% reached by 2020, and 100% reached by 2030

## Data utilized for emissions reduction calculations

### Emissions Factors

<i>Buildings</i>			
Electricity	0.0002795 tons CO2e/kWh	(Equivalent to 0.559 lbs CO2/kWh)	Source: PG&E (via Maria Sanders, City of El Cerrito)
Natural gas	0.005848864 tons CO2e/Therm	(Equivalent to 11.70 lbs CO2/therm)	Source: PG&E (via Maria Sanc
<i>Transportation</i>			
Gasoline	0.009705902 tons CO2e/gallon	Source: ICLEI CACP Default coefficients	
Diesel	0.011181972 tons CO2e/gallon	Source: ICLEI CACP Default coefficients	
CNG	0.005848533 tons CO2e/therm	Source: ICLEI CACP Default coefficients	
Biodiesel (B100)	0 tons CO2e/gallon	Source: ICLEI CACP Default coefficients	
<i>Solid Waste</i>			
mixed recyclables	3.163633462 tons CO2e/ton mixed recyclables		
aluminum cans	9.105091428 tons CO2e/ton aluminum cans (source reduction)		
aluminum cans	15.00245694 tons CO2e/ton aluminum cans(recycling)		
glass	0.584224995 tons CO2e/ton glass (source reduction)		
glass	0.308647167 tons CO2e/ton glass (recycling)	Source: EPA WARM model August 2010 version. <a href="http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html">http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html</a>	
plastic - HDPE	1.95109102 tons CO2e/ton plastic-HDPE (source reduction)		
plastic - HDPE	1.521189609 tons CO2e/ton plastic-HDPE (recycling)	MT CO2e converted into tons CO2e by dividing MT CO2e by conversion factor (0.90718474)	
plastic - LDPE	2.48020045 tons CO2e/ton plastic-LDPE (source reduction)		
plastic - LDPE	1.840859889 tons CO2e/ton plastic-LDPE (recycling)		
office paper	8.818490487 tons CO2e/ton office paper (source reduction)		
office paper	3.141587236 tons CO2e/ton office paper (primarily from office) (recycling)		
Average (alum to office paper)	3.960971977 tons CO2e/ton		

### Energy/Water Costs

<i>Residential/Commercial</i>			
Electricity	0.13 \$/kWh		
Natural gas	1.069 \$/therm	Source: For California commercial customers. \$10.69/thousand cubic ft and based on 100 cubic ft = 1 therm. EIA. <a href="http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_sca_a.htm">http://tonto.eia.doe.gov/dnav/ng/ng_pri_sum_dcu_sca_a.htm</a>	
Water	0.0039 \$/gallon	Water cost savings are based on \$0.0039/gallon. Source: Alameda County Water District: <a href="http://www.acwd.org/dms_docs/c8aab9e137a6ebace2933971c95431d0.pdf">http://www.acwd.org/dms_docs/c8aab9e137a6ebace2933971c95431d0.pdf</a>	
<i>Transportation</i>			
Gasoline	3.78 \$/gallon	Source: EIA. San Francisco specific (average 2011). <a href="http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_y05sf_m.htm">http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_y05sf_m.htm</a>	
Diesel	3.98 \$/gallon	Source: EIA. California specific (average 2011). <a href="http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_sca_m.htm">http://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_sca_m.htm</a>	
CNG	2.71 \$/therm	Source: GNGprices.com (average Bay Area 2011; conversion 1gge=1.14 Therms). <a href="http://www.cngprices.com/">http://www.cngprices.com/</a>	
Biodiesel	4.40 \$/gallon	Source: For B2-B100 fuel. Bay Area average 2011. <a href="http://www.altfuelprices.com/">http://www.altfuelprices.com/</a>	

### Emissions Projections

End Use	Emissions (tons CO2e)		
	2005	2020 w/state initiatives	2035 w/state initiatives
Buildings and Facilities-Natural Gas	162	174	210
Buildings and Facilities - Electricity	214	209	238
Vehicle Fleet - Fuel Purchased - Gasoline Total	425	411	428
Vehicle Fleet - Fuel Purchased - Diesel Total	18	19	18
Vehicle Fleet-Mileage-Gasoline vehicles Total	1	1	1
Streetlights & Traffic Signals-Electricity Total	234	226	271
Refrigerants All Sectors Total	20	21	26
Solid Waste to Landfill	424	454	551
<b>Totals</b>	<b>1,498</b>	<b>1,515</b>	<b>1,744</b>

Source: GHG emissions inventory and fore

**Energy Use Projections**

End Use	2005	2020 w/state initiatives	2035 w/state initiatives	Unit
	Total Units	Total Units	Total Units	
Buildings and Facilities- Natural Gas	31,000	33,229	40,280	therms
Buildings and Facilities - Electricity	981,155	834,210	839,862	kWh
Vehicle Fleet - Fuel Purchased - Gasoline Total	1,160,940	1,123,370	1,192,893	VMT
Vehicle Fleet - Fuel Purchased - Gasoline Total	43,787.79	42,373.19	44,069.06	gallons
Vehicle Fleet - Fuel Purchased - Diesel Total	14,318	14,950	14,896	VMT
Vehicle Fleet - Fuel Purchased - Diesel Total	1,610	1,674.12	1,620.47	gallons
Streetlights & Traffic Signals-Electricity Total	1,046,817	960,326	1,114,713	kWh
Refrigerants All Sectors Total	33	36	43	lbs
Solid Waste to Landfill	418	448	543	tons
<b>Totals</b>				

**City Statistics**

	2020	2035	
Number of City Employees	118	130	
Avg annual miles driven by one passenger/light duty vehicle	2,813	3,406	except PD
Avg annual miles driven by one heavy-duty vehicle	2,548	3,085	except PD

**Size of Vehicle Fleet**

	2020	2035
Electric	3	3
Hybrid	23	29
CNG	-	-
Biodiesel	7	20

**Vehicle Fuel Use**

2005 (from CACP)		CNG (therms)	2020 (from CACP)		
gasoline use (gallons)	diesel use gallons)		gasoline use (gallons)	diesel use gallons)	CNG
25		618			
103	660	508			
527	418				
489	47				
1677	3674				
402	7422				
2454	80				
402	155				
822					
835					
163					
5128					
16160					
505					
948					
408					
383					
4555					
82					
59					
248					
127					
3015					
339					
3711					
2331					
4069					
793					
275					
46					
4896					
312					
1701					
363					
558					
1494					
390					
117					
28					
48150					
698					
29					
1692					
1619					
1557					
858					
204					
142					
94					
168					
<b>116,151</b>	<b>12,456</b>	<b>1126</b>			
116151	12456	1126			

**Buildings and Facilities (kWh and therms)**

Facility	2005 (from CACP)	
	Electricity (kWh)	Gas (therms)
Aquatics	409,378	109,102
Arts Education	302,459	16,713
City Hall	1,552,200	18,554
City Manager	95,760	157
Civic Park Cont	220,160	2,740
Corporation Ya	266,840	9,212
Golf Course	17,568	0
Heather Farm	337,924	2,721
Leshner Center	1,031,363	13,871
Model Railroad	15,520	407
Parking Garage	1,063,200	0
Parks & Open	408,662	1,939
Police Field Fa	37,183	0
Teen Sports	309,520	3,107
<b>TOTAL</b>	<b>6,067,737</b>	<b>178,523</b>
<b>GHG (metric tons)</b>		

Total average miles traveled per year	2,439,171
Average VMT per vehicle	

# APPENDIX I: Measure Feasibility and Implementation

Measure				Feasibility							Implementation				
Number	Strategy	% Reduction		Effective-ness	Co-Benefits	Name of Benefits	Cost	Urgency	Priority Score	Current Policy	Required Resources	Lead Agency	Timeline	Metric of Success	
		in 2020	in 2035												in 2020
<i>From CAP</i>															
<b>Transportation and Landuse</b>															
Target Reductions (MTons CO2e)		33,988	68,477												
Total Reductions Identified from CAP Measures (MTons CO2e)		3,405	4,715												
Total Reductions Identified from State Measures (Mtons CO2e)		24,214	66,039												
Shortfall		6,369	(2,278)												
TLU-1	<b>Increase density of mixed-use, infill development along transportation corridors to reduce vehicle miles traveled by 25%.</b>														
TLU-1.1	Transit Oriented Development Increase residential and commercial density and diversity along major transit corridors and encourage Transit Oriented Development along major bus routes to attract new employers and better serve the daily needs of residents and employees.	2,020	2,035	6%	3%	Outdoor air quality, cost savings, public health, energy security, greater sense of community, economic development	5	3	15	Yes	Staff time; funding; consultant resources	Planning	2015	number of new developments; public transportation ridership statistics	
TLU-1.2	Density Standards Implement minimum building heights, density bonuses and parking maximums along major transit corridors to encourage high density, mixed-use and affordable housing development.					4	4	5	3	16	Yes	Staff time; funding; consultant resources	Planning	2015	number and characteristics of new developments; public transportation ridership statistics
TLU-1.3	Parking Management Strategy Develop a parking management strategy that both responds to market conditions and encourages high density development and alternatives to driving.					3	3	5	2	13	Yes	Staff time; funding; consultant resources	Planning; Public Works	2020	parking revenue
TLU-1.4	Redevelopment Strategy Develop a strategy for redeveloping underutilized areas such as vacant lots and surface parking lots along major transportation corridors.					3	4	5	3	15	Yes	Staff time; funding; consultant resources	Planning	2015	number of redeveloped sites; public transportation ridership statistics
TLU-1.5	Home-based Business Development Develop a strategy to support and encourage home-based businesses that are compatible with residential neighborhoods					2	3	5	2	12	Yes	Staff time; funding; consultant resources	Planning	2020	number of home-based business permits
TLU-2	<b>Reduce Vehicle Miles Traveled (VMT) by 3% by increasing walking and bicycle ridership</b>														
TLU-2.1	Bicycle and Pedestrian Plan Develop a Bicycle/Pedestrian Plan to expand and improve the City's bicycle and pedestrian infrastructure, including addressing current mobility gaps, creating more bike lands and boulevards, more secure bicycle parking and by developing design standards to enhance the pedestrian environment and increase connectivity.	1,174	2,255	3%	3%	Outdoor air quality, cost savings, public health, increased safety, energy security, greater sense of community	2	4	14	Yes	staff time; funding; consultant resources	Planning; Public Works	2020	Extent of Bike/Ped Plan implementation; number of bike lanes, parking spaces; bicyclist and pedestrian statistics	
TLU-3	<b>Develop car-free outreach and education campaigns specific to San Pablo</b>														
TLU-3.1	Commuter Incentive Programs Partner with businesses to develop trip reduction outreach programs and alternative transportation incentives for employees.	174	384	1%	1%	Outdoor air quality, cost savings	5	4	15	Yes	staff time; funding; consultant resources	Public Works	2015	Enrollment in trip reduction programs	
TLU-3.2	Public Outreach & Education Campaign Develop a community outreach strategy to promote alternative modes of transportation and provide information on incentive programs.	38	42	0.11%	0.06%	Outdoor air quality, cost savings, public health, increased safety, energy security, greater sense of community	5	3	12	Yes	staff time; funding for outreach materials	Public Works	2015	Community survey results; outreach statistics	

Measure				Feasibility							Implementation					
Number	Strategy	% Reduction		Effective-ness	Co-Benefits	Name of Benefits	Cost	Urgency	Priority Score	Current Policy	Required Resources	Lead Agency	Timeline	Metric of Success		
		in 2020	in 2035												in 2020	in 2035
From CAP													2015, 2020, 2030, 2035			
<b>Energy</b>																
	Target Reductions (MTons CO2e)	10,799	32,297													
	Total Reductions Identified from CAP Measures (MTons CO2e)	4,212	10,935													
	Total Reductions Identified from State Measures (MTons CO2e)	4,102	8,204													
	Shortfall	2,484	13,158													
E-1	<b>Increase new construction efficiency above Title-24</b>															
E-1.1	CalGreen Tier 1 & Tier 2 Adopt, with local adaptations, the higher tiers of green building performance allowed by the California Green Building Standard (CalGreen), with the possibility of mandatory requirements and higher standards being phased in over time.	444	2,882	4%	9%	3	4	Indoor air quality, cost savings, energy security, water conservation	3	4	14	No	Staff time; minimal funding	Building	2015	Residential and commercial energy use
E-1.2	Net-Zero New Construction Encourage all appropriate new construction to design for net-zero energy	302	816	3%	3%	2	4	Indoor air quality, cost savings, energy security, water conservation	3	2	11	No	Staff time; funding for outreach/ed materials	Building	2020	Residential and commercial energy use
E-2	<b>Reduce energy use in existing buildings by 20%</b>															
E-2.1	RECO Require energy-efficiency improvements in existing buildings to be triggered at time-of-sale or with certain types of home improvements, to be phased in over time.	2,196	4,381	20%	14%	4	3	Indoor air quality, cost savings, energy security, water conservation	2	3	12	No	Staff time; funding for inspections	Building	2020	Part of the RH&S program? Energy-efficiency improvement permits (?)
E-2.2	Energy Efficiency Financing Promote financing strategies that will encourage property owners to make energy-efficiency and clean energy investments in their properties.	869	1,957	8%	6%	3	3	Cost savings, energy security	2	3	11	Yes (County or PG&E)	Staff time; potential grant funding	Public Works	2020	Enrollment in EE Financing programs
E-2.3	Public Outreach & Education Develop community education and outreach campaigns to inform residents and business of energy-efficiency funding opportunities, Citywide regulations and to encourage demand reduction behavioral change.	321	532	3%	2%	2	2	Cost savings, energy security	4	3	11	Yes	Staff time; funding for outreach/ed materials	Public Works	2015	Community surveys; outreach statistics
E-3	<b>Increase renewable energy use by 15% by 2020</b>															
E-3.1	Community Solar Partner with non-profit organizations and utility providers to develop San Pablo specific Power Purchasing Agreements, joint procurement policies, and financing strategies to enable residents and business owners to adopt solar and other renewable energy technologies.	81	366	1%	1%	1	4	outdoor air quality, cost savings, public health, energy security, economic development	1	3	9	Yes	Staff time; funding for outreach; potential grant funding to aid in installation	Public Works; Building (for permits)	2020	Number of Solar Installations

Measure				Feasibility							Implementation				
Number	Strategy	% Reduction		Effective-ness	Co-Benefits	Name of Benefits	Cost	Urgency	Priority Score	Current Policy	Required Resources	Lead Agency	Timeline	Metric of Success	
		in 2020	in 2035												in 2020
<i>From CAP</i>													2015, 2020, 2030, 2035		
<b>Waste Reduction</b>															
Target Reductions (MTons CO2e)		3,814	11,873												
Total Reductions Identified from CAP Measures(MTons CO2e)		4,573	11,301												
Total Reductions Identified from State Measures (MTons CO2e)		-	-												
Extra		(759)	572												
<b>SW-1</b>	<b>Reduce the amount of waste being sent to landfills by 50%</b>														
SW-1.1	Commercial Waste Prevention Campaign Encourage waste prevention in day-to-day operations in businesses through the development of a waste audit program.	265	776	7%	7%	outdoor air quality, cost savings, closed recycling loop	5	3	12	No	staff time; funding for outreach materials	Public Works	2015	Tons of waste landfilled	
SW-1.2	Single-Use Bag Ban Implement a Single-Use Bag Ban to eliminate the distribution of plastic bags in the community.	28	45	0.73%	0.38%	outdoor air quality, litter, cost savings, reduced risk to wildlife	4	5	17	No	staff time; funding for outreach materials	Public Works	2015	Businesses outreached; tons of waste landfilled, recycled	
SW-1.3	Polystyrene Ban Implement a Polystyrene Ban in restaurants and businesses throughout the community.	71	115	27%	15%	outdoor air quality, litter, cost savings, reduced risk to wildlife	4	4	16	No	staff time; funding for outreach materials	Public Works	2015	Businesses outreached; tons of waste landfilled, recycled	
SW-1.4	Food Ware Container Ban Implement a Food Ware Container Ban in restaurants and businesses throughout the community	-	115		0.97%	outdoor air quality, cost savings	4	3	13	No	staff time; funding for outreach materials	Public Works	2030	Businesses outreached; tons of waste landfilled, recycled	
SW-1.5	School Waste Reduction Curriculum Partner with WCCUSD to develop and implement a Waste Reduction Curriculum	29	64	0.76%	0.54%	outdoor air quality, cost savings, student development	5	3	14	Yes	staff time	Public Works	2020	Waste Reduction Curriculum; waste reduction programs	
SW-1.6	Public Outreach and Education Campaign Launch an outreach campaign in the community with the goal of reducing solid waste sent to landfills by 10% over ten years.	1,433	5,943	38%	50%	outdoor air quality, cost savings, litter	4	3	11	Yes	staff time; funding for outreach materials	Public Works	2015	Community survey; outreach statistics	
<b>SW-2</b>	<b>Divert 30% of solid waste to composting and recycling facilities</b>														
SW-2.1	Recycling Expansion Program Expand the City's residential and business recycling programs to weekly residential pick-ups and increased commercial recycling	2,367	3,574	62%	30%	outdoor air quality, litter, closed recycling loop	3	3	13	Yes	staff time	Public Works	2020	Tons of waste recycled	
SW-2.2	Composting Expansion Program Expand the City's residential and business composting program to weekly residential pick-ups and increased commercial composting	53	148	1.38%	1.25%	outdoor air quality, litter, compost available for community	3	3	14	Yes	staff time	Public Works	2020	Tons of waste composted	
SW-2.3	School Recycling and Composting Program Expand and develop the City's school recycling and composting programs.	11	46	0.28%	0.39%	outdoor air quality, litter, student development, compost available for community	3	3	13	Yes	staff time	Public Works	2020	Recycling and composting programs in schools; tons of waste recycled, composted	
SW-2.4	Construction & Demolition Waste Ordinance Expand the City's Construction & Demolition Waste Ordinances to include new businesses	316	474	8%	4%	outdoor air quality, cost savings, litter, closed recycling loop, natural resource conservation	2	4	14	Yes	staff time	Building	2015	Tons of waste landfilled, recycled; building permits	

Measure				Feasibility						Implementation				
Number	Strategy	% Reduction		Effective-ness	Co-Benefits	Name of Benefits	Cost	Urgency	Priority Score	Current Policy	Required Resources	Lead Agency	Timeline	Metric of Success
		in 2020	in 2035											
<i>From CAP</i>													2015, 2020, 2030, 2035	
<b>Water/Wastewater Reduction</b>														
		<i>Target Reductions (MTons CO2e)</i>		114	408									
		<i>Total Reductions Identified from CAP Measures (MTons CO2e)</i>		196	858									
		<i>Total Reduction Identified from State Measures (MTons CO2e)</i>		146	293									
		<i>Shortfall</i>		(228)	(743)									
W-1	<b>Increase water efficiency throughout the community by 50%</b>													
W-1.1	Residential-water saving Equipment Partner with EBMUD to perform audits and provide financing strategies to San Pablo residents needing water-efficiency upgrades to their faucets, sinks, showers and other water equipment.	43	272	37%	67%	cost savings, water conservation	4	3	13	Yes	Staff time	Public Works	2015	Gallons of water consumed; EBMUD audits performed
W-1.2	Commercial water-saving Equipment Partner with EBMUD to perform audits and provide financing strategies to San Pablo businesses needing water-efficiency upgrades to their faucets, sinks, showers, and other water equipment.	13	81	11%	20%	cost savings, water conservation	4	3	13	Yes	Staff time	Public Works	2015	Gallons of water consumed; EBMUD audits performed
W-1.3	Commercial Education and Outreach Launch "sustainability challenge" outreach campaign for local businesses with the goal of reducing water use by 10% over ten years	21	271	19%	66%	cost savings, water conservation, greater sense of community	4	2	11	No	Staff time	Public Works	2020	Gallons of water consumed; businesses participating in challenge
W-1.4	Water Conservation Ordinance Implement a water conservation ordinance to regulate water use during peak temperature hours, expand drought tolerant landscaping and implement water conservation education and outreach.	115	226	100%	55%	cost savings, water conservation, public health, reduced runoff	4	4	14	No	Staff time; funding for enforcement	Public Works; Planning	2015	Gallons of water consumed
W-2	<b>Increase water recycling throughout the community by 1%</b>													
W-2.1	Greywater Systems Encourage the use of graywater for irrigation, vehicle cleaning and other outdoor uses.	4	8	3%	2%	cost savings, water conservation, energy savings, reduced water transportation	2	2	8	No	Staff time	Building	2020	Gallons of water treated

Measure						Feasibility					Implementation					
Number	Strategy			% Reduction		Effective-ness 1= low, 5=high	Co-Benefits 1= low, 5=high	Name of Benefits	Cost 5= low, 1=high	Urgency 1=low, 5=high	Priority Score sum	Current Policy	Required Resources	Lead Agency	Timeline 2015, 2020, 2030, 2035	Metric of Success
		in 2020	in 2035	in 2020	in 2035											
<i>From CAP</i>																
<b>Municipal Climate Action</b>																
		<i>Target Reductions (MTons CO2e)</i>		329	908											
		<i>Total Reductions Identified from CAP Measures (MTons CO2e)</i>		706	1,014											
		<i>Total Reductions Identified from State Measures (MTons CO2e)</i>		175	426											
		<i>Extra</i>		(552)	(531)											
<b>I. Buildings Energy Use Reduction Measures</b>																
<b>B-1</b>	<b>Integrate energy efficiency and other green building practices into new City facilities.</b>															
B-1.1	Municipal Green Building Policy Develop and implement green building standards for major renovations to existing City buildings and new municipal construction.	17	57	5%	6%	3	3	indoor air quality, cost savings, energy security, water conservation	4	3	13	No	Staff time; funding to cover higher costs	Public Works	2015	
B-1.2	Green Roofs Develop a policy to evaluate the feasibility of rooftop gardens and other green roof technologies on all new municipal construction.	0.26	0.85	0.08%	0.09%	2	4	cost savings, stormwater filtration, energy security, water conservation	4	1	11	No	Staff time; funding to cover higher costs	Public Works	2015	
<b>B-2</b>	<b>Conduct efficiency audits and implement energy/water efficiency retrofits in existing City facilities.</b>															
B-2.1	Municipal Energy Audits and Upgrades Continue to conduct energy audits of all City facilities, identify opportunities for savings, and implement recommended, cost-effective energy-efficiency upgrades.	41	48	12%	5%	4	3	indoor air quality, cost savings, energy security, water conservation	4	5	16	Yes	Staff time; opportunities for grant funding	Public Works	2015	
B-2.3	Retrocommissioning Improve energy performance of City buildings by retro-commissioning all electrical and natural gas systems throughout City facilities.	180	241	55%	27%	4	3	Indoor air quality, cost savings, energy security	2	5	14	No	Staff time; opportunities for grant funding	Public Works	2015	
<b>B-3</b>	<b>Establish energy and water management policies and practices for City facilities.</b>															
B-3.1	Plug Load Sensor Controls Install plug load sensor controls to reduce energy consumption in City facilities.	6.6	7.4	2%	1%	2	2	cost savings, energy security	5	3	12	Yes	staff time; rebates	Public Works; IT	2015	
B-3.2	4 Day Work Week and Lights-Out Policy Reduce energy use by decreasing hours of operation by implementing a 4 Day Work Week and a lights-out policy at night at City facilities	63	71	19%	8%	4	4	cost savings, energy security, water conservation, expanded services	5	3	16	Yes	Staff time	ALL	2015	
B-3.3	Expand Tree Cover Develop and implement a municipal tree policy that requires the consideration of tree planting during any major landscape developments at City facilities	1	2	0.30%	0.22%	2	3	Outdoor air quality, cost savings, public health, increased safety, energy security, greater sense of community	3	1	9	No	Staff time	Public Works	2020	
<b>B-4</b>	<b>Consider clean energy alternatives for City facilities/operations</b>															
B-4.1	Solar PV Install a 365 kW-dc photovoltaic array on City Facilities in 2012	131	131	40%	14%	5	4	outdoor air quality, cost savings, energy security, economic development, water conservation	1	5	15	Yes	Staff time; reinvestment funds; grant funding; rebates	Public Works	2015	

Measure					Feasibility						Implementation					
Number	Strategy			% Reduction		Effective-ness 1= low, 5=high	Co-Benefits 1= low, 5=high	Name of Benefits	Cost 5= low, 1=high	Urgency 1=low, 5=high	Priority Score sum	Current Policy	Required Resources	Lead Agency	Timeline	Metric of Success
		in 2020	in 2035	in 2020	in 2035											
<b>II. Streetlight Measures</b>																
S-1	<b>Implement energy management practices for City owned streetlights.</b>															
S-1.1	LED Streetlights Replace low-efficiency streetlights with high-efficiency light-emitting diodes (LEDs ) fixtures and develop an energy-efficiency standard for all new streetlights.	110	140	33%	15%	4	2	cost savings, increased safety, energy security	1	4	11	Yes	Staff time; opportunites for grant funding; PG&E consent	Public Works	2020	
<b>III. Waste Reduction Measures</b>																
W-1	<b>Implement waste reduction practices in all City facilities</b>															
W-1.1	Waste Prevention Develop waste prevention policies for municipal operations	7	14	2.13%	1.54%	3	3	outdoor air quality, litter, cost savings, public health	5	3	14	Yes	Staff time; funding to cover associated costs	Public Works	2015	
W-2	<b>Encourage recycling of used materials whenever feasible at City facilities.</b>															
W-2.1	Expand Recycling and Composting Programs Audit and expand recycling and composting programs into all City facilities	0.93	2.06	0.28%	0.23%	3	3	cost savings, public health, closed recycling loop, energy security, economic development	4	3	13	Yes	Staff time; funding to cover associated costs; collaboration with haulers	Public Works	2015	
<b>IV. Municipal Transportation Measures</b>																
T-1	<b>Establish energy efficient fleet management and operation practices.</b>															
T-1.1	Fleet Maintenance Improve maintenance regime for increased efficiency for City vehicles (e.g. regularly check tire pressure)	14.19	14.71	4%	2%	3	4	outdoor air quality, cost savings, public health, increased safety, energy security	4	3	14	Yes	Staff time	Maintenance	2015	
T-1.2	Scheduling & Routing Efficiency Develop a scheduling system to encourage employees to reduce trips and carpool when possible.	34	67	10%	7%	3	4	outdoor air quality, cost savings, public health, energy security, greater sense of community	5	2	14	No	Staff time	ALL	2020	
T-2	<b>Provide for alternative transportation options for all City employees.</b>															
T-2.1	Municipal Commuter Programs Partner with public transportation providers to develop and promote employee incentive programs, including developing an online carpool portal to coordinate ridesharing. Continue to install bicycle lockers and changing facilities in City facilities.	41	45	12%	5%	4	4	outdoor air quality, cost savings, public health, energy security, greater sense of community	3	3	14	Yes	Staff time; funding mechanisms; county resources	Public Works, Finance	2020	
<b>V. Purchasing</b>																
P-1	<b>Update &amp; Implement the City's Environmentally Preferable Purchasing Policy</b>															
P-1.1	Environmentally Preferable Purchasing Policy Update policy and tools to enable effective procurement of energy efficient equipment and vehicles, recycled-content paper and products, and goods with reduced packaging.	48	110	15%	12%	3	3	cost savings, energy security, economic development, closed recycling loop, water conservation, reduced waste	5	4	15	Yes	Staff time; funding to cover additional costs	Public Works, ALL	2015	

