



# **County of San Mateo Government Operations Climate Action Plan**



Prepared in collaboration with City/County Association of Governments of San Mateo County

September 2012

## Acknowledgements

### County of San Mateo

#### Board of Supervisors

David Pine, District 1

Carole Groom, District 2

Don Horsley, District 3

Rose Jacobs Gibson, District 4

Adrienne J. Tissier, District 5

Win Huang, Public Works & Parks

Tony Harwood, Public Works & Parks

Kwok Tang, Public Works & Parks

Lori Pastorelli, Public Works & Parks

Ty Kang, Public Works & Parks

Sam Herzberg, Public Works & Parks

Christine Hollender, Real Property

### County of San Mateo Staff

Peggy Jensen, County Manager's Office

Danielle Lee, County Manager's Office

Gordon Tong, County Manager's Office

James Hinkamp, County Manager's Office

Kim Springer, Public Works & Parks

Gary Behrens, Public Works & Parks

Gary Webb, Public Works & Parks

### Partner Agencies

511.org

Peninsula Traffic Congestion Relief Alliance

Pacific Gas & Electric Co.

ICLEI – Local Governments for Sustainability

Joint Venture Silicon Valley

City and County Association of Governments

This Climate Action Plan was developed using the Regionally Integrated Climate Action Planning Suite (RICAPS) funded by a grant from the Bay Area Air Quality Management District (BAAQMD) and by California utility customers, administered by Pacific Gas and Electric Company (PG&E) under the auspices of the California Public Utilities Commission and with matching funds provided by the City and County Association of Governments of San Mateo County (C/CAG).

**RICAPS Steering Committee:** Elizabeth Claycomb (City of Pacifica), Erin Cooke (City of Cupertino), Brandi de Garreaux (City of Portola Valley), Shelly Reider (City of Millbrae), Jim Shannon (City of San Bruno)

**RICAPS Project Consultant:** Kema Services, Inc.

**RICAPS Staff:** Richard Napier (C/CAG), Kim Springer (County of San Mateo), Susan Wright (County of San Mateo)

---

# Table of Contents

## Letter from County Manager John Maltbie

### Executive Summary

|       |                                                            |    |
|-------|------------------------------------------------------------|----|
| 1.    | Introduction .....                                         | 8  |
| 1.1   | Why a Climate Action Plan?.....                            | 9  |
| 1.2   | Climate Science.....                                       | 9  |
| 1.3   | Climate Change Impacts on the Bay Area .....               | 12 |
| 1.3.1 | Infrastructure.....                                        | 12 |
| 1.3.2 | Public Health.....                                         | 14 |
| 1.4   | State Policy and Regulatory Context .....                  | 15 |
| 1.5   | Regional Efforts.....                                      | 16 |
| 1.6   | Local Efforts .....                                        | 18 |
| 1.7   | Climate Action Plan Process .....                          | 19 |
| 1.7.1 | Framework for Climate Action .....                         | 19 |
| 1.7.2 | Inter-agency Collaboration and Plan Development .....      | 20 |
| 2.    | Greenhouse Gas Inventory and Forecast.....                 | 21 |
| 2.1   | Inventory Sources and Data Collection Process .....        | 21 |
| 2.2   | Emissions Calculations .....                               | 22 |
| 2.2.1 | Emissions Forecast for 2020 and 2035 .....                 | 24 |
| 2.3   | Emission Reduction Targets.....                            | 26 |
| 2.3.1 | Reductions from State-Level Actions.....                   | 26 |
| 2.3.2 | County Reduction Target .....                              | 27 |
| 3.    | Climate Action Strategies .....                            | 28 |
| 3.1   | Energy .....                                               | 28 |
| 3.1.1 | Energy Efficient Street Lighting and Traffic Signals ..... | 29 |
| 3.1.2 | Purchasing Energy Efficient Products .....                 | 30 |
| 3.1.3 | Renewable Energy Technology.....                           | 31 |
| 3.1.4 | Increase Energy Efficiency in County Buildings .....       | 32 |
| 3.2   | Transportation .....                                       | 32 |
| 3.2.1 | Alternative Work Schedules .....                           | 33 |
| 3.2.2 | Commute Alternatives Program .....                         | 34 |
| 3.2.3 | Purchase Fuel Efficient, Low Emission Vehicles .....       | 35 |
| 3.3   | Solid Waste .....                                          | 36 |
| 3.3.1 | Divert 75% of all Solid Waste by 2020.....                 | 36 |
| 3.3.2 | Update the County’s Environmental Purchasing Policy .....  | 37 |

|     |                                                                       |    |
|-----|-----------------------------------------------------------------------|----|
| 4.  | Implementation .....                                                  | 38 |
| 4.1 | Prioritizing Measures for Action .....                                | 38 |
| 4.2 | Results of Measure Prioritization .....                               | 39 |
| 4.3 | Summary of Measures .....                                             | 39 |
| 4.4 | Meeting the Emission Targets .....                                    | 40 |
| 4.5 | Implementation: Next Steps .....                                      | 41 |
| 4.6 | Public Participation and Community Engagement .....                   | 42 |
| 4.7 | Timeline .....                                                        | 42 |
| 5.  | Monitoring and Improvement .....                                      | 43 |
| 6.  | Conclusion .....                                                      | 43 |
|     | Appendix A. Glossary of Terms .....                                   | 44 |
|     | Appendix B. 10 Steps to Reduce Your Carbon Footprint .....            | 45 |
|     | Appendix C. Summary of Funding Sources .....                          | 47 |
| 6.1 | Federal Funding .....                                                 | 47 |
| 6.2 | State Funding .....                                                   | 47 |
| 6.3 | Utility Rebate Programs .....                                         | 48 |
| 6.4 | Local Energy Programs .....                                           | 50 |
| 6.5 | Other Funding Opportunities .....                                     | 51 |
|     | Appendix D. Adaptation Planning for Climate Impacts .....             | 53 |
|     | Appendix E. 2005 Greenhouse Gas Inventory and Forecast .....          | 56 |
|     | Inventory Sources and Data Collection Process .....                   | 56 |
|     | Baseline Emissions Inventory for 2005 .....                           | 58 |
|     | Transportation Emissions .....                                        | 64 |
|     | Solid Waste Emissions .....                                           | 66 |
|     | Appendix F. Emission Reduction Measures: Calculations .....           | 69 |
|     | Energy Efficient Street Lighting and Traffic Signals .....            | 69 |
|     | Purchasing Energy Efficient Products .....                            | 71 |
|     | Renewable Energy Technology .....                                     | 72 |
|     | Increase Energy Efficiency in County Buildings .....                  | 74 |
|     | Alternative Work Schedules .....                                      | 75 |
|     | Commute Alternatives Program .....                                    | 76 |
|     | Purchase Fuel Efficient, Low Emissions Vehicles .....                 | 77 |
|     | Divert 75% of all Solid Waste by 2020 .....                           | 79 |
|     | Update the County's Environmentally Preferred Purchasing Policy ..... | 81 |

## List of Figures & Tables

|                                                                                      |    |
|--------------------------------------------------------------------------------------|----|
| Figure 1: Growth and Distribution of Global Anthropogenic GHG Emissions .....        | 10 |
| Figure 2: Projected Sea Level Rise - San Mateo County Shoreline .....                | 12 |
| Figure 3: Iterative Management Processes for Climate Action (Source: ICLEI) .....    | 19 |
| Figure 4: San Mateo County GHG Reduction Target (15% below 2005 levels by 2020)..... | 27 |
| Table 1: Sectors and Emissions in the GHG Inventory .....                            | 21 |
| Table 2: 2005 Government Operations Emissions by Sector.....                         | 23 |
| Table 3: San Mateo County “Business as Usual” Emissions Forecast for 2020 .....      | 24 |
| Table 4: Total Emission Reductions from State of California Programs .....           | 27 |
| Table 5: GHG Emissions Projection and Reduction Target .....                         | 28 |
| Table 6: Summary of Emissions Reduction Measures .....                               | 40 |
| Table 7: Meeting the 2020 Target .....                                               | 41 |
| Table 8: Climate Action Plan Implementation .....                                    | 42 |

## LETTER FROM THE COUNTY MANAGER JOHN MALTBIE

Being an environmentally conscious community is a key component of the San Mateo County Shared Vision 2025. And reducing the County carbon footprint is one of the key initiatives adopted by our Board of Supervisors to achieve that vision. In addition, San Mateo is a “Cool County”. The Board adopted the national Cool County declaration in 2007 which committed us to calculating greenhouse gas (GHG) emissions from our County operations every five years, inventorying our current actions to reduce emissions and developing a plan to reduce our 2005 emissions 80% by 2050 with an intermediate goal of flat emissions by 2010.



I am pleased to report that San Mateo County has exceeded our intermediate goal of flat emissions. Between 2005 and 2010, GHG emissions from County operations went down from about 2 metric tons. That accomplishment was achieved through a variety of actions. A large solar array has been installed on the County parking garage. The facilities staff have improved the efficiency of our heating and ventilating systems and installed motion sensors on lights and replaced high energy fixtures with more energy efficient equipment. The Public Works Department has installed LED traffic signals and high energy streetlights are being changed to LED fixtures as they need replacement. And over 25% of our employees are commuting by public transit and/or working a flex schedule which reduces the GHG emissions from car travel and commutes.

But if we are going to meet the 2050 Cool Counties target, much work remains to be done. This plan is a key first step. The plan documents our work to date and outlines recommended emissions reduction measures, most of which build on our current work. Many of the measures are low or no-cost, some are tied to behavior change, and most generate savings over time. Other GHG reduction measures require larger investments, which will be incorporated into our budget recommendations as funding is available.

By adopting a Climate Action Plan for County Operations that commits us to implement the recommended measures over time, San Mateo County is investing in the future. We enjoy an exceptional natural environment in San Mateo County; this plan helps protect those resources for future generations.

A handwritten signature in blue ink that reads "J. Maltbie". The signature is fluid and cursive, with the first name being more prominent.

John L. Maltbie, San Mateo County Manager

# Executive Summary

---

## Background

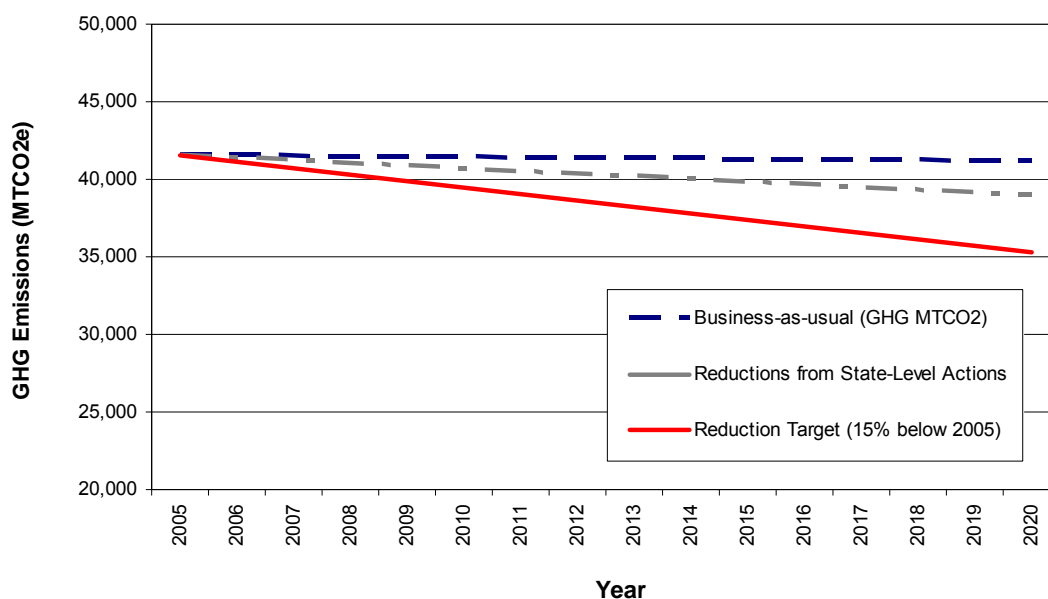
The San Mateo County Government Operations Climate Action Plan guides County efforts to continue to reduce greenhouse gas (GHG) emissions. The Plan is based on the 2005 Inventory baseline, and identifies how the County will meet established reduction targets by 2020 and 2050 as required by AB 32 and the Cool Counties Declaration.

## Cool Counties Commitment

On October 16, 2007, San Mateo County adopted Resolution No 069053, which supported the U.S. Cool Counties Climate Stabilization Declaration. As part of this declaration, San Mateo County committed to three major goals: create an inventory of operational county government greenhouse gas (GHG) emissions and implement policies to target the reduction of these emissions; reduce county geographical GHG emissions to 80 percent below current levels by 2050, with flat emissions by 2010; and to urge Congress and the Administration to take action toward reducing GHG emissions.

## Findings

The current forecast for the County is shown in the graph below. This forecast projects a flat rate of emissions from 2005 onwards, mostly due to current and projected economic conditions.



## The Plan

In order to reach the reduction targets under AB 32, the County will need to reduce its emissions by 5,867 metric tons (MT) of carbon dioxide equivalent (CO<sub>2</sub>e). Reductions resulting from state level legislation such as the Renewable Portfolio Standard are estimated to reduce emissions by 2,600 MT CO<sub>2</sub>e. This lowers the amount of emissions that the County needs to reduce to 3,300 MT CO<sub>2</sub>e. To meet this goal, the County has developed a Climate Action Plan for Government Operations which outlines GHG reduction measures to be taken in the areas of energy, transportation, and solid waste. The specific measures are outlined in the table below:

| Measure Category            | Description of Measure                               | Annual Emission Reductions (MTCO <sub>2</sub> E) | Measure Priority Score | Short Term/<br>Medium Term/<br>Long Term |
|-----------------------------|------------------------------------------------------|--------------------------------------------------|------------------------|------------------------------------------|
| Energy                      | Energy Efficient Street Lighting and Traffic Signals | 25                                               | 3.25                   | Short Term                               |
|                             | Environmentally Preferred Purchasing Policy – Energy | 78                                               | 4.03                   | Short Term                               |
|                             | Renewable Energy Technology                          | 130                                              | 3.55                   | Short Term                               |
|                             | Increase Energy Efficiency in County Buildings       | 667                                              | 3.22                   | Short Term                               |
| Transportation and Land Use | Purchase Fuel Efficient, Low Emission Vehicles       | 320                                              | 3.22                   | Medium Term                              |
|                             | Alternative Work Schedules                           | 484                                              | 3.35                   | Short Term                               |
|                             | Commute Alternatives Program                         | 1,308                                            | 2.93                   | Medium Term                              |
| Solid Waste                 | Environmentally Preferred Purchasing Policy – Waste  | N/A                                              | 2.53                   | Long Term                                |
|                             | 75% waste diversion rate                             | 39                                               | 2.90                   | Short Term                               |

These measures will result in a total of 3,051 MT CO<sub>2</sub>e of emission reductions, which is roughly equivalent to the targeted level of emission reductions in order to reach the AB 32 goal of 1990 emission levels by 2020. Many of the measures are low or no-cost, some are tied to behavior change, and most generate savings over time. Other GHG reduction measures require larger investments, which will be incorporated into budget recommendations as funding is available.



Through the implementation of the Climate Action Plan, the County of San Mateo will reduce its carbon footprint, improve the public health, and create a healthier, more sustainable environment for the County's employees and residents.

## **1. Introduction**

The County of San Mateo is located on the San Francisco Bay Peninsula, bounded by the Pacific Ocean to the west and the San Francisco Bay to the east. It is the 17<sup>th</sup> most populous county in the state, with a population of 720,000 and has over 5,000 employees. In California, county government provides a variety of Countywide services and also oversees the unincorporated areas. Countywide services include operating a County hospital and regional clinics and providing other public health services, operating the County Jail and providing other law enforcement services including a 911 Dispatch Center, providing safety net services and operating a parks system. Services for the unincorporated area include roads and utility system maintenance, planning and building, police and fire services, and access to the County library system.

County government operations impact the physical environment through the delivery of these services by operating facilities and vehicles, disposing of solid waste, and purchasing supplies. To mitigate these impacts, the County of San Mateo has developed the following Climate Action Plan for Government Operations (Plan). The Plan outlines the San Mateo County government's response to the challenges caused by global climate change.

Climate scientists around the world, represented by the Intergovernmental Panel on Climate Change (IPCC), have an unequivocal position: human activity is changing the earth's climate through the release of greenhouse gas (GHG) emissions caused by the combustion of fossil fuels. The longer action is delayed to reduce GHG emissions, the greater the risk is of irreversibly depleting nonrenewable resources and harming our environment.

San Mateo County is committed to reducing our GHG emissions from our government operations and we support local, state, and federal efforts to do the same. Our Plan offers ways to make County buildings and facilities more energy efficient, increase the amount of locally produced renewable energy and recommends "smart" capital improvements. It also provides alternative transportation solutions and ways to reduce the waste heading to landfills. Finally, the Plan outlines measures that will strengthen our efforts to become a more efficient and resource-conservation minded organization.

This Plan was developed in partnership with the City and County Association of Governments (C/CAG) and partially funded by Bay Area Air Quality Management District and Pacific Gas and Electric.

## 1.1 Why a Climate Action Plan?

The objectives of the County of San Mateo Climate Action Plan for Government Operations include:

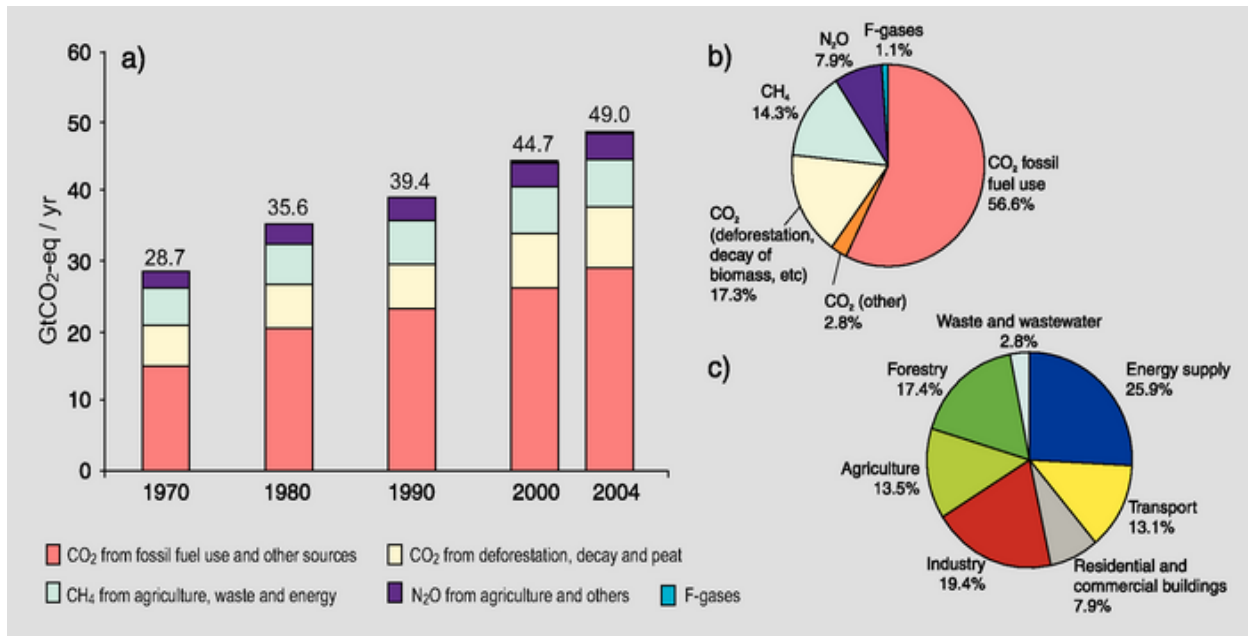
- **Demonstrate environmental leadership** – The plan outlines steps the County will take to reduce GHG emission for government operations and help mitigate the effects of climate change.
- **Save money** - The County will reduce its utility costs through increased energy and water use efficiency.
- **Comply with state environmental initiatives** – California is taking the lead in tackling climate change through the passage of AB 32, the California Global Warming Solutions Act of 2006 and other legislation that include specific requirements for local governments.

## 1.2 Climate Science

Climate change presents one of the most profound challenges of our time. Atmospheric scientists agree that the Earth's climate system is being destabilized by elevated levels of greenhouse gas emissions, primarily from the combustion of fossil fuels to generate energy. Greenhouse gas emissions include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and three man-made gasses: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>).

The three charts in Figure 1 on the next page are from the IPCC, the leading international scientific body on climate change. The charts show the growth and distribution of anthropogenic (human-caused) greenhouse gas emissions in the atmosphere. The bar chart in the graphic shows the increase in CO<sub>2</sub> emissions between 1970 and 2004 by category. Pie chart (b) presents the 2004 greenhouse gas emissions by type of gas while pie chart (c) illustrates the percent distribution by source.

Figure 1: Growth and Distribution of Global Anthropogenic GHG Emissions



Source: International Panel on Climate Change, Fourth Assessment Report

The largest contributor to climate change is carbon dioxide emissions, followed by methane and nitrous oxide. Carbon dioxide is emitted through the combustion of fossil fuels such as coal and petroleum as well as through the decomposition of clear-cut forests (deforestation).

A recent comprehensive study of climate impacts on the United States, written by a task force of U.S. government science agencies, led by the National Oceanic and Atmospheric Administration (NOAA),<sup>1</sup> reached the following key conclusions:

- 1. Global warming is unequivocal and primarily human-induced.** Average global temperature has increased over the past 50 years primarily due to human-induced emissions of heat-trapping gases.
- 2. Climate changes are underway in the United States and are projected to grow.** Climate-related changes have already been observed in the United States and within its coastal waters. These

<sup>1</sup>U.S. Global Change Research Program 2009. "Global Climate Change Impacts in the United States." Page 12. <http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts>

changes include rising temperatures and sea level, rapidly retreating glaciers, thawing permafrost, lengthened growing seasons, lengthened ice-free seasons in the ocean and on lakes and rivers, and earlier snowmelt.

3. **Widespread climate-related impacts are occurring now and are expected to increase.** Climate changes are already affecting water, energy, transportation, agriculture, ecosystems, and health. These impacts are different from region to region and will increase under projected climate changes.
4. **Climate change will stress water resources.** Reduced precipitation, increased evaporation and water loss from plants will increase the frequency of droughts, an especially critical issue in California. This will be exacerbated by declines in mountain snowpacks which provide vital water storage and supply.
5. **Coastal areas are at increasing risk from sea-level rise and storm surge.** Energy and transportation infrastructure and other property in coastal areas are very likely to be adversely affected from rising sea levels.
6. **Threats to human health will increase.** The health impacts of climate change include heat stress, waterborne diseases, poor air quality, extreme weather events, and diseases transmitted by insects and rodents.
7. **Climate change will interact with many social and environmental stresses.** Climate change will combine with pollution, population growth, overuse of resources, urbanization, and other social, economic, and environmental stresses to create larger impacts than from any of these factors alone.
8. **Future climate change and its impacts depend on choices made today.** By mitigating our GHG emissions and adapting to expected impacts, we can work to reduce the effects of climate change.

According to the current scientific consensus, a 2°C increase in average global temperature over the next century is a “safe” level of global warming. Achieving this safe level requires global GHG emissions to be reduced by at least 50% below their 1990 levels by the year 2050.



According to a 2009 study<sup>5</sup> by the CEC, the Pacific Institute, and others, 110,000 people live in areas of San Mateo County that are vulnerable to a 100-year flood event with a 1.4 meter rise in sea level. City and County infrastructure and facilities at risk from the same event include:

- \$24 billion worth of buildings and contents, mostly along the Bay (replacement value);
- 530 miles of roadways;
- 10 miles of railroads;
- San Francisco International Airport (SFO), including the 31 MW United Cogen power plant located there;
- Wastewater treatment plants operated by the Cities of South San Francisco/San Bruno, City of Millbrae, City of San Mateo, South Bayside System Authority, Mid-Coastside Sewer Authority, and SFO (total treatment capacity of approximately 44 MGD);
- 78 EPA-regulated hazardous materials sites;
- 34 square miles of coastal wetlands.

The Pacific Ocean shoreline, from Daly City to the Santa Cruz County line, has a number of areas that will become increasingly vulnerable with sea level rise. With just a 1-foot rise in sea level, areas that are considered to be in 100-year flood zones today are likely to experience such events every 10 years.<sup>6</sup> The shoreline, however, will bear the brunt of wave action and storm surges. For instance, the shore south of Pillar Point Harbor in the vicinity of El Granada south past Miramar and into the town of Half Moon Bay is eroding rapidly. As a result, pedestrian access is restricted and Caltrans has armored the west side of Highway One. Farther north in Moss Beach, a section of Ocean Boulevard was recently closed due to mass sliding of the bluff, initiated by coastal erosion at its base. In addition, erosion in the area just west and north of Airport Road has resulted in the loss of several homes over the years.

---

<sup>5</sup> Heberger, Matthew, Heather Cooley, Pablo Herrera, Peter H. Gleick, and Eli Moore (2009). The Impacts of Sea Level Rise on the California Coast. PIER Research Report, CEC-500-2009-024-D, Sacramento, CA: California Energy Commission.

<sup>6</sup> Heberger, Matthew, Heather Cooley, Pablo Herrera, Peter H. Gleick, and Eli Moore (2009). The Impacts of Sea Level Rise on the California Coast. PIER Research Report, CEC-500-2009-024-D, Sacramento, CA: California Energy Commission.

### 1.3.2 Public Health

Increasing evidence shows that there is a relationship between climate change and public health. Changes in weather patterns can impact how long and well people in San Mateo County work and live. If nothing is done to change the rate of global warming, employees and residents will experience changes in temperature, and potentially, extreme weather. Extreme weather can cause droughts or flooding, which expose workers and residents to injury, disease, and/or mortality. Climate change effects, such as heat exposure, can adversely impact individuals' health by aggravating several chronic diseases, including cardiovascular and respiratory disease. Aggravated diseases can subsequently result in increased instances of illness and death. Heat also increases ground-level ozone concentrations, causing direct lung injury and increasing the severity of respiratory diseases such as asthma and chronic obstructive pulmonary disease. Climate change may also impact air quality; this is particularly of interest given recent statistics that show California is home to the worst air quality in the nation, with over 90% of Californians breathing unhealthy air. According to the California Air Resources Board (CARB), unhealthy levels of ozone (smog) and particulate matter annually contribute to:

- 19,000 premature deaths
- 9,400 hospital admissions for respiratory and cardiovascular disease
- 280,000 asthma and other lower respiratory symptoms
- 22,000 cases of acute bronchitis
- Millions of school and work days lost due to respiratory conditions<sup>7</sup>

These adverse effects can disproportionately affect vulnerable County populations such as children, seniors, disabled residents, low-income communities, limited English-proficient populations, and those with existing chronic illnesses. Efforts to mitigate these effects are costly, and will require long-term planning to minimize the impact on vulnerable groups. .

There are many benefits of climate change mitigation strategies that also improve community health. For example, encouraging people to walk, bike, or ride public transit reduces carbon emissions otherwise produced by single-occupancy vehicles and also promotes physical activity and obesity prevention. Research shows that individuals who live in mixed-use and walkable communities have a 35% lower risk of obesity.<sup>8</sup>

---

<sup>7</sup> American Lung Association. Land Use, Climate Change & Public Health Issue Brief: Improving Public Health and combating climate change through sustainable land use and transportation planning. Spring 2010.

<sup>8</sup> Frank, Lawrence D., et al. Obesity relationships with community design, physical activity, and time spent in cars. American Journal of Preventive Medicine, Volume 27, Issue 2 , Pages 87-96, August 2004.

The San Mateo County Health System offers a number of programs that reduce health risks related to climate change. These activities include:

- Promoting more walkable and bikeable cities to encourage healthier lifestyles and decrease reliance on vehicles that contribute to climate change;
- Informing cities about the risk to public health from climate change;
- Creating tools that support decision-making and capacity building related to mitigating adverse health outcomes from climate change; and
- Leading planning efforts to mitigate the public health impacts of climate change.

Through their initiatives related to climate change, the Health System involves residents throughout the County in a healthier lifestyle and that reduces GHG emissions countywide.

## **1.4 State Policy and Regulatory Context**

The State of California has been a leader in developing and implementing policies and regulations to directly address the risk of severe climate change. The key statewide legislation aimed at reducing GHG emissions is summarized below along with the requirements these laws placed on the County. Sector specific legislation is more fully described in Chapter 3.

### **Assembly Bill 32 (AB 32), the California Global Warming Solutions Act of 2006**

Passed in 2006, AB 32 finds and declares that “global warming poses a serious threat to economic well-being, public health, natural resources and the environment of California,” and sets the goal of reducing GHG emissions back to 1990 levels by 2020”. It granted authority to the Air Resources Board (ARB) to establish multiple mechanisms to meet this goal. The Plan formalizes the County efforts to achieve the AB 32 goals for our government operations.

### **Assembly Bill 1493 (AB 1493), the Pavley Bill**

In 2002, the California legislature enacted the Pavley bill which directed the ARB to adopt standards that will achieve "the maximum feasible and cost-effective reduction of greenhouse gas emissions from motor vehicles," while taking into account environmental, social, technological, and economic factors. The act was amended in September 2009 to include reductions in GHG emissions from new passenger vehicles from 2009 through 2016. Requirements of AB 1493 are addressed by the transportation measures in this plan.

### **Senate Bill 375 (SB 375)**



In September 2008, SB 375 was signed into law to provide emissions reduction goals related to vehicle-miles traveled on a regional planning level by aligning transportation planning efforts with GHG reduction targets and land use and housing allocations. The ARB, in consultation with metropolitan planning organizations, has set a per capita GHG reduction target for emissions of passenger cars and light trucks in the San Francisco Bay Area. The reduction target is 7% below 2005 levels by 2020 and 15% below 2005 levels by 2035. For County government operations, we are adopting an equivalent fleet efficiency goal.

#### **Senate Bill 97 (SB 97), CEQA Guidelines for Addressing GHG Emissions**

California Environmental Quality Act (CEQA) requires public agencies to review the environmental impacts of proposed projects, such as General Plans. It was amended in 2010 to provide guidance to public agencies regarding the analysis, mitigation, and effects of GHG emissions in draft CEQA documents. The CEQA requirement applies to community climate action plans. When asked about CEQA review of the county operations plan, state and regional officials indicated that CEQA review is not necessary for this Plan.

#### **California's 33% Renewable Portfolio Standard (RPS)**

California's Renewable Portfolio Standard (2002) requires California's electric utilities to have 33% of their retail sales sourced from eligible renewable resources in 2020 and all subsequent years. The County will benefit from increased use of renewable energy by our utility provider, PG&E.

#### **Bay Area Air Quality Management District CEQA Guidelines**

The Bay Area Air Quality Management District (BAAQMD) encourages local governments to adopt a GHG Reduction Strategy that is consistent with AB 32 goals. The "qualified" GHG Reduction Strategy may streamline environmental review of community development projects. According to the BAAQMD, if a project is consistent with a Qualified GHG Reduction Strategy, then it can be presumed that the project will not have significant GHG impacts. As noted above, since the County operations plan does not relate to land use or development decisions, CEQA and other related environmental impact reviews are not required.

## **1.5 Regional Efforts**

The following regional efforts promoting GHG reductions are already under way in San Mateo County:

**City/County Association of Governments of San Mateo County (C/CAG).** C/CAG is a council of governments consisting of the County of San Mateo and the 20 cities and towns located in the County. C/CAG deals with issues that affect quality of life in the region. The Association supports a number of sustainability initiatives including San Mateo County Energy Watch, the Congestion Management

Agency, and the Sustainable Communities Strategy/Regional Transportation Plan. C/CAG has taken a lead role in helping many of the cities and the County develop Ghg inventories and climate action plans that are consistent with the ICLEI guidelines.

**Energy Upgrade California in San Mateo County.** This program helps homeowners make improvements to their homes so they will use less energy, conserve water and other natural resources. It connects homeowners with participating contractors who can help plan and complete energy efficiency projects and take advantage of rebates. Energy Upgrade California is a partnership among California counties, cities, non-profit organizations and the state's investor-owned utilities (e.g. PG&E).

**Joint Venture: Silicon Valley Network.** Established in 1993, Joint Venture: Silicon Valley Network provides analysis and action on issues affecting the local economy and quality of life. The organization brings together established and emerging leaders - from business, government, academia, labor, and the broader community - to spotlight issues and work toward innovative solutions. Silicon Valley cities and towns work together on climate change issues through the Joint Venture Public Sector Climate Task Force.

**PG&E's Sustainable Communities Team.** A PG&E Community Energy Manager works with each municipality in San Mateo County to develop a comprehensive energy management strategy for government operations. In addition, PG&E provides city and county energy usage data, GHG inventory assistance and information on grant funding opportunities for projects that help to reduce GHG emissions in each community.

**Silicon Valley Leadership Group (SVLG) Bay Area Climate Change Compact.** SVLG consists of representatives from member companies who work cooperatively with government officials to address major public policy issues affecting the economic health and quality of life in Silicon Valley. In 2009, SVLG organized the Bay Area Climate Change Compact, which establishes a framework for regional cooperation and the reduction of GHG emissions.

**Sustainable San Mateo County (SSMC).** SSMC was established in 1992 by a group of County citizens who sought to create a broader awareness sustainability. SSMC supports multiple programs to promote energy efficiency, alternative transportation and education on sustainability. SSMC's Energy Ambassador program supports the Energy Upgrade California program by providing homeowners free personal energy reviews and education on home energy efficiency.

**Sustainable Silicon Valley (SSV).** In 2004, SSV organized a regional voluntary initiative, setting a visionary target of reducing CO<sub>2</sub> emissions by 20% below the region's 1990 levels by the year 2010. SSV partners participating in the voluntary CO<sub>2</sub> emissions reduction program determine their own baseline

year and a CO<sub>2</sub> percentage reduction goal to reach by 2010. Each pledging partner also chooses how they will meet this target.

## **1.6 Local Efforts**

Although emissions due to government operations are relatively small, governments still play a critical role in the reduction of greenhouse gas emissions. By adopting a climate action plan, San Mateo County can lead by example and demonstrate our commitment to environmental protection.

AB 32 identifies local governments as essential partners in achieving California’s goal to reduce GHG emissions. Local governments have primary authority to plan, zone, and permit how and where land is developed to accommodate population growth and the changing needs of their jurisdictions. They also have responsibility for infrastructure such as energy, water, and waste collection. They own and manage buildings and vehicle fleets and are able to form partnerships with private interests to mobilize and coordinate community action. Furthermore, cities and counties are uniquely positioned to promote economic development that emphasizes sustainable and transit oriented neighborhoods.

To date, the County of San Mateo has undertaken a number of sustainability efforts:

- Adopted the Cool Counties Declaration in 2007 requiring the inventory of the greenhouse gas emissions as a result of government operations and recommending GHG flat rate emissions by 2010 and an 80% reduction from 2005 levels by 2050.
- Formed a County employee Green Team to further develop sustainability efforts for government operations and promote Department initiatives.
- Contracted with ICLEI – Local Governments for Sustainability to provide a nationally accepted protocol for carbon footprinting.
- Commissioned a Strategic Energy Master Plan that includes evaluations of the 10 largest County facilities and prioritized recommendations for reducing energy and water use in each of those buildings.
- Established a GreenStar award program to annually recognize and award up to \$5,000 to a department project that reduces GHG emissions or meets other sustainability goals. Past GreenStar winners include the “Green Jail” project that significantly reduced solid waste and increased composting at the jail, an automated “sleep” system for computers to reduce daily energy use, community gardens for mental health patients at Cordilleras and a countywide bottled water ban.
- Retrofitted lighting and improved HVAC systems in a number of County buildings.

- Banned polystyrene and required the use of compostable plates and silverware.
- Established a 30MPG target for the County sedan fleet which has prompted the purchase of over 130 hybrid vehicles in the last five years.
- Adopted a deconstruction policy which resulted in the shipping of kitchen equipment from the old juvenile hall to a school for blind children in Haiti.
- Offers a carpool, vanpool, biking and walking incentive program along with discounts for public transit passes.
- Installed solar arrays and co-generation plants at County facilities.

In addition to the Climate Action Plan being developed for County government operations, the County is also finalizing a Climate Action Plan for community-wide emissions that is being done in conjunction with an update to the General Plan. The community CAP will address emissions reduction options for the unincorporated areas of the County.

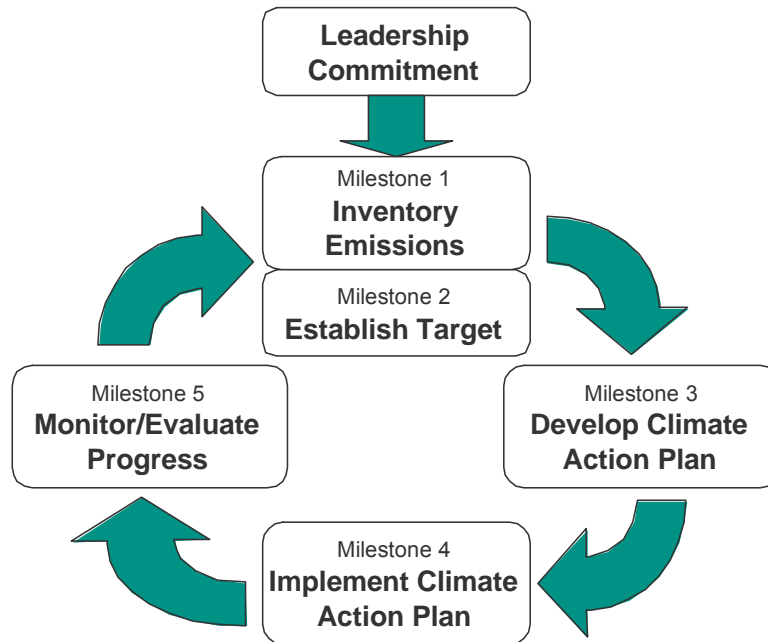
## **1.7 Climate Action Plan Process**

This Plan was developed using a Climate Action Plan template that is consistent with CEQA guidelines. Development of the template was sponsored by C/CAG and is based on the ICLEI — Local Governments for Sustainability (ICLEI) 5-Milestone process as seen in the framework below.

### **1.7.1 Framework for Climate Action**

The ICLEI 5-Milestone process is a management process based on increasing knowledge through each step to achieve the targeted GHG emissions reductions.

Figure 3: Iterative Management Processes for Climate Action (Source: ICLEI)



- **Leadership Commitment:** Define the overall vision and goals for the government entity.
- **Milestone 1 (Inventory Emissions):** Conduct a baseline emissions inventory and forecast.
- **Milestone 2 (Establish Target):** Adopt an emissions reduction target for the forecast year.
- **Milestone 3 (Develop Climate Action Plan):** Identify feasible and suitable strategies and supporting actions to reduce emissions and achieve co-benefits aligned with the overall vision and goals.
- **Milestone 4 (Implement Climate Action Plan):** Enact the plan.
- **Milestone 5 (Monitor/Evaluate Progress):** Establish feedback loops to assess and improve performance.

In November 2009 the County completed the 2005 community and government operations GHG inventories. The 2010 government operations inventory was completed concurrently with the development of this Plan. ICLEI framework Milestones 2 and 3 are addressed in this Plan. The County will implement the actions identified in this Climate Action Plan to complete Milestone 4.

### 1.7.2 Inter-agency Collaboration and Plan Development

This Plan was initiated by the County Green Team, an interdepartmental consortium focused on improving sustainable government operations practices. The Plan was developed collaboratively by

multiple County departments with additional support from external public, private, and non-profit agencies. Data collection for the 2005 baseline emissions inventory also informs the Plan.

## 2. Greenhouse Gas Inventory and Forecast

In 2009, the County completed the 2005 Government Operations Greenhouse Gas Emissions Inventory report (2005 Inventory). The 2005 Inventory provides an important foundation for the Plan as it establishes a baseline year against which progress toward the County goal of reducing greenhouse emissions (15% reduction by 2020 and 80% reduction by 2050) can be measured. The Plan relies on the 2005 Inventory to articulate findings and climate adaptation measures. The Plan also includes a business-as-usual (BAU) forecast of GHG emissions, which enables the County to estimate the emissions reductions needed to meet our goals. The 2005 inventory results are summarized in the following sections. A more detailed presentation of the 2005 inventory is included in Appendix E.

### 2.1 Inventory Sources and Data Collection Process

A GHG emissions inventory involves collecting data from a variety of sources. The 2005 Inventory followed the standard outlined in the ICLEI Local Government Operations Protocol<sup>9</sup> (Protocol). The Protocol describes the necessary data required to accurately analyze GHG emissions in total and by sector. Table 1 highlights government operations sectors and emissions included in the 2005 Inventory.

**Table 1:** Sectors and Emissions in the GHG Inventory

---

<sup>9</sup> Local Government Operations Protocol – For the quantification and reporting of greenhouse gas emissions inventories (Version 1.0). Developed in partnership by California Air Resources Board, California Climate Action Registry, ICLEI – Local Governments for Sustainability, and The Climate Registry. September 2008.

| Sector                               | Emissions sources                                                                                                                 | Energy types                                           |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Buildings and other facilities       | Energy and water use in buildings                                                                                                 | Electricity<br>Natural gas                             |
| Streetlights and traffic signals     | Energy use in outdoor public lighting and traffic signals                                                                         | Electricity                                            |
| Water delivery facilities            | Energy use for transportation of water                                                                                            | Electricity<br>Natural gas                             |
| Airport facilities                   | Energy use in airport facilities                                                                                                  | Electricity<br>Natural gas                             |
| Vehicle fleet                        | All road vehicles<br>Off-road vehicles                                                                                            | Gasoline<br>Diesel<br>Ethanol<br>Liquefied natural gas |
| Power generation facilities          | Energy use in power generation facilities                                                                                         | Electricity<br>Natural gas                             |
| Solid waste facilities               | Energy use in solid waste facilities                                                                                              | Electricity<br>Natural gas                             |
| Wastewater facilities                | Energy use in wastewater treatment facilities                                                                                     | Electricity<br>Natural gas                             |
| Other process and fugitive emissions | Fugitive emissions from landfills<br>Leaked refrigerants from facilities and mobile sources<br>Leaked methane from septic systems | N/A                                                    |

Data from specific government operations sectors was loaded into the ICLEI – Local Governments for Sustainability-developed Clean Air and Climate Protection (CACP) software and emissions were calculated.

The recently complete 2010 inventory and all future inventories will use the most recent version of the Protocol. This industry-accepted methodology for quantifying a local government operations GHG emissions inventory focuses on emissions that occur from combustion sources under operational or financial control of the County (e.g. Scope 1 emissions) and from electricity consumption (Scope 2 emissions<sup>10</sup>). However, Scope 3 emissions<sup>11</sup> were also included, to the extent possible, in order to maximize 2005 Inventory and Plan comprehensiveness.

## 2.2 Emissions Calculations

In the 2005 baseline year, the County of San Mateo emitted approximately 41,517 metric tons of carbon dioxide equivalent (CO<sub>2</sub>e) as a result of its direct emissions, emissions from electricity generation, and

<sup>10</sup> Scope 2 emissions are indirect emissions sources limited to electricity, steam, heating, and cooling consumption. Although consumed for government purposes, Scope 2 emissions simultaneously occur where power sources are generated – they are within County operational control based on the level of use required by government activities.

<sup>11</sup> Scope 3 emissions encompass indirect emissions sources which are not within local government financial or operational control. Examples include emissions related to County operations, yet resulting from non-County assets, such as employee commute vehicles, and the production of materials later purchased by the County.

select other indirect sources.<sup>12</sup> Burning fossil fuels in vehicles and for energy use in buildings and facilities is the largest contributor of GHG emissions. Table 2: 2005 Government Operations Emissions by Sector provides a summary of total GHG emissions resulting from government operations in 2005.

**Table 2: 2005 Government Operations Emissions by Sector**

| <b>Sector</b>                    | <b>Greenhouse Gas Emissions<br/>(metric tons CO<sub>2</sub>e )</b> | <b>Percentage of Greenhouse Gas Emissions</b> |
|----------------------------------|--------------------------------------------------------------------|-----------------------------------------------|
| Buildings and facilities         | 18,558                                                             | 46%                                           |
| Streetlights and traffic signals | 340                                                                | 1%                                            |
| Water delivery facilities        | 47                                                                 | 0.1%                                          |
| Airport facilities               | 125                                                                | 0.3%                                          |
| Vehicle fleet & mobile equipment | 5,066                                                              | 12%                                           |
| Solid waste facilities           | 1,011                                                              | 2%                                            |
| Wastewater facilities            | 26                                                                 | 0.1%                                          |
| Employee commute                 | 15,341                                                             | 37%                                           |
| Government-generated solid waste | 1,002                                                              | 2%                                            |
| <b>TOTAL</b>                     | <b>41,517</b>                                                      | <b>100%</b>                                   |

Transportation emissions constituted the greatest share of baseline GHG emissions (49%).

Comprehensively, mobile emissions (vehicle fleet & mobile equipment and employee commute) from County government operations accounted for approximately 20,407 metric tons of CO<sub>2</sub>e (49%)<sup>13</sup> These emissions come primarily from fuel combustion, but also result from refrigerant leakage from air conditioning and refrigeration components. Within the transportation emissions sector, employee commutes represented the largest share of CO<sub>2</sub>e emissions. Employee commute generated 15,341 metric tons of CO<sub>2</sub>e over the course of 32.5 million vehicle miles traveled to work. Employee commute represented 37% of emissions during the baseline year whereas the vehicle fleet and mobile equipment comprised 12% of total emissions.

<sup>12</sup> Carbon dioxide equivalent is a unit of measure that normalizes the varying climate warming potencies of all six GHG emissions, which are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). For example, one metric ton of methane is equivalent to 21 metric tons of CO<sub>2</sub>e. One metric ton of nitrous oxide is 210 metric tons of CO<sub>2</sub>e.

<sup>13</sup> The Public Works and Parks Department compiled vehicle fleet and mobile equipment emissions data; a County-wide survey designed by ICLEI-Local Governments for Sustainability informed employee commute emissions data.



County buildings and facilities, including Airport facilities, were the largest stationary source emitters. Approximately 46.3% of emissions, 18,683 metric tons of CO<sub>2</sub>e, resulted from energy consumption via buildings and facilities. Natural gas consumption (53%) was most common in building and facility operations, followed by electricity (47%).

Combined, the transportation and facilities sectors comprised approximately 95.3% of total GHG emissions in 2005. The remaining 4.7% are attributed to public lighting (streetlights and stoplights), water transport facilities, and solid waste emissions.

The 2010 inventory, which used the same ICLEI protocol, indicates that the County generated 39.621 metric tons of CO<sub>2</sub>e emissions, a 1.896 metric ton reduction from 2005. The distribution of emissions by sector in 2010 is very similar to that of 2005 with a slight reduction in employee commute emissions and a slight uptick in facilities. While many jurisdictions have increased emissions between 2005 and 2010, the County total emissions is down slightly, exceeding our 2010 target of flat emissions.

## 2.2.1 Emissions Forecast for 2020 and 2035

Based on the 2005 Inventory and initial estimates for the 2010 inventory, the County forecast emissions for the year 2020. The emission forecast represents a “business-as-usual” (BAU) prediction of how GHG emissions would change in the absence of a GHG emissions reduction policy. Conducting an emissions forecast allows us to compare future reductions with projected future emissions levels, not just current levels of emissions.

The projected BAU GHG emissions are based on projections from the 2005 baseline year data. BAU calculations reflect the total emissions that would occur if the County continued the 2005 patterns of travel, energy and water consumption, and waste generation and disposal. The BAU emissions are projected in the absence of any mitigation measures, policies or actions that would reduce emissions over time, including state legislation and any other programs policies and procedures undertaken or signed after 2005. The projections from the baseline year of 2005 use growth factors specific to each of the different government operations sectors. Table 3 below summarizes the results of the forecast.

**Table 3: San Mateo County “Business as Usual” Emissions Forecast for 2020**

| Emissions Sources | 2005<br>(MTCO <sub>2</sub> ) | 2020 | Annual<br>Growth Rate | Percent<br>change from<br>2005 to 2020 |
|-------------------|------------------------------|------|-----------------------|----------------------------------------|
|-------------------|------------------------------|------|-----------------------|----------------------------------------|

|                                  |               |               |               |               |
|----------------------------------|---------------|---------------|---------------|---------------|
| Buildings & Facilities           | 19,817        | 19,817        | 0.00%         | 0.00%         |
| Employee Commute                 | 15,341        | 16,533        | 0.50%         | 7.80%         |
| Vehicle Fleet & Mobile Equipment | 5,066         | 3,694         | -2.08%        | -27.10%       |
| Generated Waste                  | 290           | 312           | 0.50%         | 7.8%          |
| Fugitive Emissions (Landfills)   | 1,011         | 807           | -1.3%         | -20.2%        |
| <b>TOTAL</b>                     | <b>41,525</b> | <b>41,164</b> | <b>-0.06%</b> | <b>-0.90%</b> |

The projections are by sector because specific factors affect each sector differently (e.g. new energy codes for buildings or new fuel economy standards for vehicles). This approach provides a better approximation of future emissions. The following points explain how the emissions forecast was estimated for each sector:

- For all energy sectors, the compounded annual employee workforce growth rate was calculated from 2005 through 2020, using projections normalized from the County's Facilities Master Plan and FY 2012-13 Recommended Budget estimates. Employee workforce numbers are a major factor in all emissions sector projections and the projection of 0.5% annual growth was confirmed in conversations with the County Manager.
- For the Buildings and Facilities energy sector, the analysis was also based on projections contained within the Facilities Master Plan and FY 2012-13 Recommended Budget, which collectively project that floor space will remain constant in the foreseeable future due to limiting fiscal conditions and minimal increases in staff. It was calculated that the growth in energy use in the buildings and facilities sector from 2005 to 2020 to be 0%.
- For transportation emissions, analysis was based on available information regarding workforce commute patterns and workforce growth data through 2020.<sup>14</sup> The recently passed federal Corporate Average Fuel Economy (CAFE) standards and the State of California's pending tailpipe emission standards could significantly reduce the demand for transportation fuel in San Mateo County. An analysis of potential fuel savings from these measures has not been included in this BAU forecast. Regardless of future changes in the composition of vehicles on the road as a result of state or federal rulemaking, emissions from the transportation sector will continue to be largely determined by County employee growth. Conversations with County staff have reinforced estimated employee growth of 0.50% annually.

<sup>14</sup> The City/County Association of Governments (C/CAG) has projected future travel demand for *employed residents*, which comprise 59% of all employees working in the County; that number is projected to grow by 4% by 2020. County travel demand report is available at [http://www.ccag.ca.gov/pdf/Studies/Final%202011%20CMP\\_Nov11.pdf](http://www.ccag.ca.gov/pdf/Studies/Final%202011%20CMP_Nov11.pdf). However, County staff chose to pursue projections extrapolated from sample *municipal* employee commute patterns and estimated workforce growth, to better capture municipal transportation emissions.

- For waste-related emissions growth, the primary determinate for growth in emissions for the waste sector is the workforce population. Therefore, the compounded annual employee workforce growth rate for 2005 to 2020 of 0.50% (the same as the transportation sector projection) was used to estimate future emissions in the waste sector.

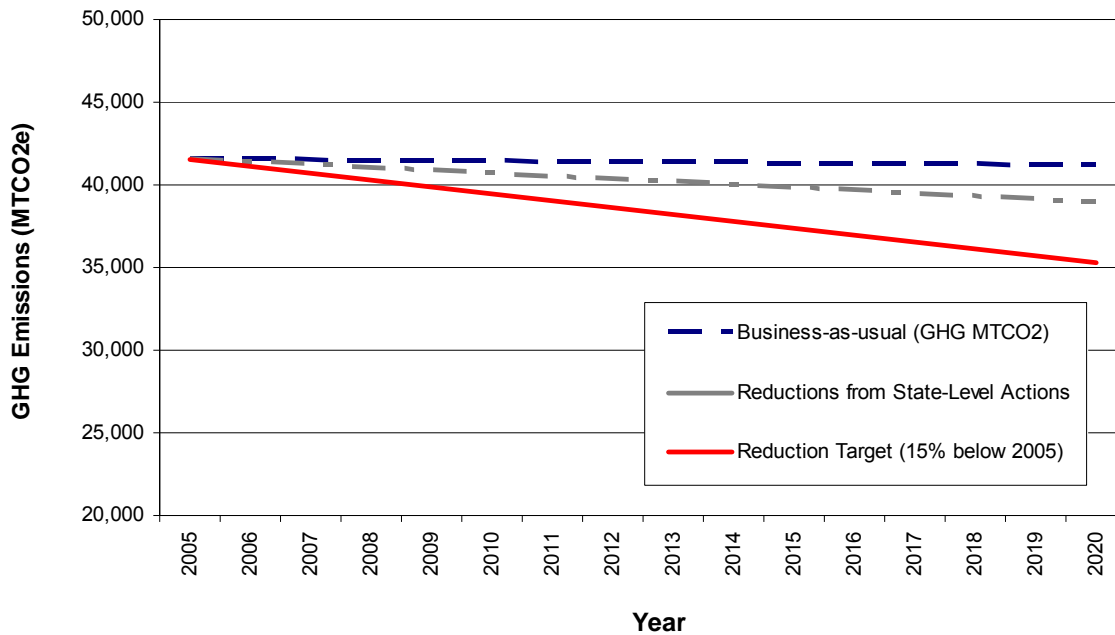
## **2.3 Emission Reduction Targets**

The *California AB 32 Scoping Plan* seeks to bring California to a low carbon future, reaching 1990 emissions levels by 2020. The plan asks municipal governments to reduce their emissions by at least 15 percent by 2020 compared with current levels (current levels are defined as 2008 levels or earlier). The state plan also directs local governments to assist the state in meeting California's emissions goals. The San Mateo County target for government operations is a 15% reduction in emissions by 2020. Progress toward that goal will come from actions by two sources, state activity and steps taken by the county.

### **2.3.1 Reductions from State-Level Actions**

In addition to the actions outlined here, regulations aimed at reducing GHG emissions at the state and regional levels will also contribute to emission reductions in San Mateo County. For example, the California Renewable Portfolio Standard (RPS) mandates that 33% of electricity sold by the State's investor-owned utilities be generated from renewable resources by 2020. These actions are summarized in Section 1.5 of this report. The impact of state-level actions on reducing local emissions is significant, and is shown in relation to the County of San Mateo County's emissions baseline, BAU forecast, and reduction target in Figure 4.

**Figure 4: San Mateo County GHG Reduction Target (15% below 2005 levels by 2020)**



State-level reduction programs will potentially contribute 47.9% of the County emission reductions needed by 2020. Table 4 (below) shows the emissions reductions expected from State-level actions.

**Table 4: Total Emission Reductions from State of California Programs**

| State Initiative                                   | Sector               | % Reduction from 2020 GHG Inventory | Reduction in County's Emissions (MT CO2e) |
|----------------------------------------------------|----------------------|-------------------------------------|-------------------------------------------|
| AB 1493 (Pavley)                                   | Transportation       | 19.7%                               | 728                                       |
| Low Carbon Fuel Standard                           | Transportation       | 7.2%                                | 52                                        |
| 33% RPS                                            | Electricity (Energy) | 21%                                 | 1,843                                     |
| A. Total Statewide Initiative Emissions Reductions |                      |                                     | 2,623                                     |

### 2.3.2 County Reduction Target

The state emission reduction programs will help San Mateo County meet our 2020 goal, but additional County action is also needed. Table 5 highlights baseline emissions, targeted emissions, forecasted emissions, and emissions reductions needed to reach the target.

**Table 5: GHG Emissions Projection and Reduction Target**

| <b>2005 Emissions<br/>(MTCO<sub>2</sub>e)</b> | <b>2020 Target Emissions at<br/>15% below 2005<br/>(MTCO<sub>2</sub>e)</b> | <b>2020 BAU<br/>Emissions<br/>(MTCO<sub>2</sub>e)</b> | <b>Emissions Reductions<br/>Required<br/>(MTCO<sub>2</sub>e)</b> |
|-----------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------|
| 41,517                                        | 35,297                                                                     | 41,164                                                | 5,867                                                            |

The BAU emissions represent the projected 2020 emissions level if County operations proceed in their current form.

### **3. Climate Action Strategies**

By adopting this Climate Action Plan, the County is committing to take action to reduce its GHG emissions. The Plan provides a prioritized list of actions, each of which will be further developed and vetted before being implemented. The programs and policies described provide the County with a path towards reducing emissions that, combined with reductions resulting from State and regional policies, will meet the emissions reduction goals established in AB 32.

Each section below outlines the types of actions, called “measures,” that will lead to specific, quantifiable reduction of GHG emissions from County government operations. Potential funding sources for the measures are listed in Appendix C. The detailed calculations for the costs and emissions reductions projected for each measure are included in Appendix F. The methodology for measure selection and prioritization is outlined in Section 4.1.

#### **3.1 Energy**

Since the 1970s, California has led the nation in energy efficiency and renewable energy. The California Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24, Part 6 of the California Code of Regulations) mandate minimum levels of energy efficiency in both new construction and renovation projects. California has also set targets for “zero net-energy” new buildings, in which efficiency and on-site generation are combined to reduce residential buildings to zero net-energy use by

2020 and commercial buildings by 2030.<sup>15</sup> With the idea of “reduce, then produce,” California has sought to maximize energy efficiency and then look to generate electricity with low-carbon fuels and renewable resources. The state has a long history of supporting renewable energy generation through solar rebates and other renewable energy incentives.

Addressing the energy use in County buildings represents the most immediately achievable and affordable emissions reduction opportunity. Energy efficiency is cost-effective and has co-benefits such as reduced operating expenses over time and promoting green collar jobs. Design and construction of new buildings also provides an opportunity to build with energy-savings in mind. Utility rebates and federal tax incentives further increase the viability of investing in energy efficiency.

The County of San Mateo’s energy strategy will be outlined in the Strategic Energy Master Plan (SEMP), which is currently being developed by the Department of Public Works, Facilities Division. The SEMP is a detailed workplan that prioritizes and calculates the costs and benefits of many of the measures in this Plan.

Programs and initiatives that will promote energy and water efficiency as well as use of renewable energy are described in the following section.

### **3.1.1 Energy Efficient Street Lighting and Traffic Signals**

**Concept:** Replacing conventional street lights and traffic signals with the more energy efficient light emitting diode (LED) technology saves energy and reduces utility costs over time. LEDs are directional, decreasing the amount of light pollution emitted into the night sky. LEDs are also more durable and have a longer lifespan than conventional lighting technology.

**Current Efforts:** The County is currently replacing broken or burned out traffic signal lights with new LED bulbs. As of the date of this document, the County has changed out approximately 80% of the traffic signal lights with LED lights. The County is not currently replacing existing street light fixtures with LED fixtures.

**Timeline:** The County intends to develop a plan for converting street light fixtures to LED fixtures by 2015. That plan will consider the geographical areas served, roadway function, available funding, and neighborhood acceptance. It should be noted that street lights are funded through special districts, so the timing the conversion to LEDs will depend on the reserves in each district. The goal of the street light conversion plan is to convert all street lights

---

<sup>15</sup> California Energy Commission, 2007 *Integrated Energy Policy Report*, CEC-100-2007-008-CMF

fixtures to LEDs by 2035. However, an alternative implementation plan will be developed if the change-out rate is too low to reach this goal or if there are resident concerns.

The current plan of changing out traffic signal lights as they require replacement should allow the County to change all the lights to LED fixtures by 2020.

#### **Emission Reductions**

- Estimated annual emissions savings: **25 MT CO<sub>2</sub>e**
- Total potential reduction by 2020: **375 MT CO<sub>2</sub>e**

**Cost:** The cost of converting all County street lights to LEDs is approximately **\$1.5 million through 2035**. This cost will be paid over time by the lighting districts where the fixtures are located. There is no general fund cost associated with this recommendation and there may be grants available to the districts from PG&E to cover some of the costs. Ongoing operation of LED lights is also lower due to their higher energy efficiency, so after the initial capital costs, there will be operational savings.

### **3.1.2 Purchasing Energy Efficient Products**

**Concept:** Purchasing equipment that is energy efficient reduces emissions, often at low or no additional cost. Computers, televisions, refrigerators and other kitchen appliances are examples of equipment that could be sourced with an environmental preference. Energy efficient products have an EnergyStar certification. Implementing this measure would involve updating and the County's current Environmental Purchasing Policy.

**Current Efforts:** The County Purchasing Policy, which was adopted in 2000, includes some environmental preferences. The policy recommends purchases of environmentally friendly products such as energy efficient lighting fixtures, appliances, and electronic equipment (e.g. photocopiers, computers, printers and energy management systems). Purchased or leased electronic equipment must meet U.S. Environmental Protection Agency or Department of Energy energy efficiency standards.

**Timeline:** Within the next year, the County Purchasing Policy will be evaluated. The review will include an assessment of the current implementation practices and incorporation of the latest information on energy efficient products and technologies is included. An ongoing annual review schedule will also be incorporated into the updated policy.

**Cost:** Since green procurement does not necessarily entail increased spending, the overall expected cost is **low**. Moreover, as energy efficient products reduce energy use, over time this measure should reduce energy costs.

#### **Emission Reductions**

- Estimated annual emissions savings: **78 MT CO<sub>2</sub>e**
- Total potential reduction 2020: **1,170 MT CO<sub>2</sub>e**

### **3.1.3 Renewable Energy Technology**

**Concept:** Renewable energy technology, such as solar panels and wind turbines, generate electricity without generating greenhouse gas emissions. Increasing the amount of renewable energy generated on County property would reduce our reliance on and consumption of fossil fuel based energy, which would result in energy and cost savings in the future. This measure proposes increasing the number of renewable energy projects installed on County buildings and property.

**Current Efforts:** The County has been a pioneer in area of green power, constructing a 260 kW solar system at the Crime Lab and Youth Services Center in 2003 and a 360 kW system over the County parking garage in 2010.

**Timeline:** The County's Strategic Energy Master Plan (SEMP) includes at least one potential major solar PV system installation in the future of 250kW or higher. In addition, the County is participating in the Regional Renewable Energy Procurement Project (R-REP) with the County of Alameda and 20 other public agencies. San Mateo County has submitted 5 potential solar sites for consideration in the R-REP program, which is a joint purchase effort that is starting with over 170 sites. The site assessments will be completed in September of this year. After the sites are evaluated, all the sites with solar potential will be bundled into a single request for proposals which should generate significant economies of scale for these installations. The RFP is expected to be released in the late of 2012.

In addition to retrofitting existing facilities, renewable energy options should be considered during the development of all new County facilities.

**Cost:** The cost of a 250kW solar array is projected to be \$6-8 per watt which equals about **\$1.5 million**. The California Solar Initiative provides grants for certain solar systems, which could



bring down the total initial cost. There are also energy savings associated with the installation of solar systems, which would reduce energy costs over time.

#### **Emission Reductions**

- Estimated annual emissions savings: **130 MT CO<sub>2</sub>e**
- Total potential reduction by 2020: **1,950 MT CO<sub>2</sub>e**

### **3.1.4 Increase Energy Efficiency in County Buildings**

**Concept:** Buildings that are operated efficiently use less power and have fewer GHG emissions. Facilities with advanced energy and environmental controls that are maintained by operating engineers who perform regular energy audits and implement energy efficiency retrofits also use less energy. Examples of steps staff can take to reduce energy consumption in County facilities include replacing inefficient HVAC systems, shutting off electronics that are not in use and turning off lights in rooms when vacant.

**Current Efforts:** The SEMP includes a list of specific energy efficient upgrades to current equipment and facilities along with the associated GHG emission reductions and cost savings.

**Timeline:** The highest return SEMP projects are included in the Capital Improvement Plan for FY 2012-13. Additional projects will be incorporated into future capital plans as funding becomes available.

**Cost:** The estimated cost of the SEMP projects is **\$10 million** over the 8-year project plan. These costs will be partially offset over time by reduced energy costs from increased efficiency and possibly state and/or utility provided incentives.

#### **Emission Reductions**

- Estimated annual emissions savings: **667 MT CO<sub>2</sub>e**
- Total potential reduction by 2020: **10,005 MT CO<sub>2</sub>e**

## **3.2 Transportation**

Almost half of the GHG emissions from County government operations come from transportation; 37% are generated by employee commutes and 12% from the use of the County's vehicle fleet. Senate Bill 375, signed in 2008 by Governor Schwarzenegger, established regional emission targets related to transportation. For the Bay Area, the targets are 7% below 2005 levels by 2020 and 15% below 2005 by

2035. This Plan proposes meeting the SB 375 targets through implementation of the following measures.

### **3.2.1 Alternative Work Schedules**

**Concept:** Compressed work schedules and flextime allow employees to work longer days and reduce the overall number of days they need to be at work. Telecommuting allows employees to periodically work from home on an agreed upon schedule. Compressed work schedules, flextime and telecommuting all reduce the amount of time and/or number of days employees spend commuting to work. This measure recommends updating the County alternative work policy and supporting departments in the implementation of that policy as widely as possible.

**Current Efforts:** San Mateo County has offered alternative work schedules for many years, and approximately 25% of the over 5,000 County employees participate. But the original flex work policies were established many years ago and are in need of updating. A County-wide committee is currently drafting a revised comprehensive alternative work schedule policy that will offer general guidelines for departments interested in updating and implementing alternate work schedule programs.

For telework, grant funding from SamTrans through the Metropolitan Transportation Authority has been secured to pilot projects, develop policy and conduct staff training. Two divisions, Health Policy and Planning in the Health System and Human Resources have volunteered to pilot the re-launching of the telework program and the County is currently looking for a third department to join the pilot. Health Policy and Planning has already developed their procedures and the County timecard system, ATKS, has been modified to include a code for telework. The ATKS code allows us to track changes in telework use pre and post roll-out of the pilots and the new Countywide policy.

After six months, Case studies will be developed from the pilot projects and a “tool kit” that includes sample policies, procedures and process recommendations will be developed for sharing with other County departments and other government agencies.

**Timeline:** Feedback gained from the telework pilot will be used to finalize the new County-wide policy and develop the tool kit which will include training tools and technology recommendations. The tool-kit will be completed in late 2013.

**Cost:** The revised telework policy can be implemented with few additional costs. There may be some costs associated with technology requirements, as well as training classes for both employees and managers. For the pilot departments, these costs paid for by grant funds.

#### **Emissions Reductions**

- Estimated annual emissions savings: **484 MT CO<sub>2</sub>e**
- Total potential reduction by 2020: **7,260 MT CO<sub>2</sub>e**

### **3.2.2 Commute Alternatives Program**

**Concept:** Staff driving alone to work generate high levels of emissions per employee. Alternatives such as public transit, biking, walking, or carpooling have much lower carbon footprints. The County Commute Alternatives Program (CAP) provides financial incentives for employees to use alternatives to single occupancy vehicles to get to work. It also provides an efficient method of reducing emissions, especially for those employees who are unable to telecommute or flex their work schedules. This measure recommends review of the CAP program with the goal of increasing employee participation rates in 2005 by 50% in 2020.

**Current Efforts:** In 2005, about 1,200 employees participated in the CAP, receiving one of two types of commute subsidies. Today, a \$20 monthly subsidy is available for carpooling, vanpooling, walking, or biking. A separate monthly subsidy of \$75 can be applied towards public transit options, such as CalTrain and SamTrans and is the option used by most CAP participants. An August 2012 survey of CAP participants gave the program positive feedback with many comments about the desire for increases in the amount of the financial incentives, particularly for public transit.

**Timeline:** The August 2012 employee commute survey gathered information for the 2010 GHG Inventory as well as feedback on the CAP. This information will be used to make improvements to the current program to increase participation. This measure entails mid-term phasing implementation, to begin by 2016.

**Cost:** A re-evaluation of the program may generate greater total participation which would increase the total amount of subsidies provided. The CAP is funded with Measure A monies, not through the County General Fund.

#### **Emission Reductions**

- Estimated annual emissions savings: **1,308 MT CO<sub>2</sub>e**

- Total potential reduction by 2020: **19,620 MT CO<sub>2</sub>e**

### 3.2.3 Purchase Fuel Efficient, Low Emission Vehicles

**Concept:** County vehicles are available to employees for business-related travel. There are approximately 900 vehicles in the County fleet. Vehicle fleet operations contribute 12% of the County's total GHG emissions. Switching to more fuel efficient or zero emission vehicles, such as hybrids or electric cars, is a GHG emissions reduction strategy and a budget option given current elevated fuel prices. This measure also recommends the installation of the charging infrastructure necessary to support any electric vehicles in the fleet. The County's emissions can be significantly reduced in the transportation sector as a result of the adoption of cleaner, more fuel efficient cars.

In addition to replacing vehicle with no or low emission cars, the County can "right size" the current fleet by installing a reservation system. Another tool to potentially reduce emissions from the current fleet is installation of GPS monitors that track vehicle movement, speed and driving incidents such as hard stops. The monitors have been shown to encourage employees to operate vehicles more efficiently by limiting idling and driving more slowly to optimize fuel use.

**Current Efforts:** In 2008, the Board of Supervisors approved the Fuel Efficient County Vehicle Purchasing Policy (Resolution #069650) with an emphasis on acquiring vehicles that attain at least 30 miles per gallon. The average MPG of the County sedan fleet is currently 28.7. In addition, the Department of Public Works received an SMCSaves grant to assess alternatives for reducing the cost of the County Fleet in 2011. The Department will be reporting back to the Board soon on the results of a series of requests for proposals that they have completed and recommended next steps.

**Timeline:** The County continues to pursue fuel efficient vehicle purchases for the fleet. For example, the Public Works and Parks Department purchased 7 hybrid SUVs between 2007 and 2010. The Purchasing Policy also continues to be re-evaluated for effectiveness with the goal of maximizing fleet vehicle efficiency for the foreseeable future. This measure is slated for near-term implementation, as a continuation of expected Policy updates.

**Cost:** Implementation costs are contingent upon future vehicle fleet inventory needs consistent with the current 7 year/100,000 mile vehicle life cycle policy and adjusted retail values of future available models.

#### Emission Reductions

- Estimated annual emissions savings: **320 MT CO<sub>2</sub>e**

- Total potential reduction by 2020: **4,800 MT CO<sub>2</sub>e**

### 3.3 Solid Waste

Reducing the amount of waste deposited into the landfill through source reduction, reuse, recycling and composting, is an important strategy for reducing emissions from County operations. Waste buried in landfills slowly generates methane over time as a result of decomposition, and while some landfills capture as much methane as possible and combust it for electricity generation, much of the methane generated in landfills leaks into the atmosphere. The only active landfill in the County of San Mateo is the Ox Mountain Landfill, which is owned and operated by Republic Services. A landfill gas recovery system is installed and in use at this facility. Waste from the County's facilities are disposed of at this landfill.

Waste reduction and recycling are also powerful tools for reducing solid waste emissions. Solid waste represents 4% of the County operations GHG emissions. The following measures will reduce the County emissions related to solid waste.

#### 3.3.1 Divert 75% of all Solid Waste by 2020

**Concept:** Diverting waste means reducing the amount of waste being landfilled. Although solid waste represents a minor part of the County's emissions, it is a sector where behavior change can reduce emissions at low or no cost. This measure recommends a goal of 75% waste diversion by 2020, to be accomplished through an expansion of composting and recycling programs.

**Current Efforts:** Currently, the County has composting pilot programs in 400 and 555 County Center as well as the Maguire Jail, Youth Service Center, Gateway Community School, Health Center food service, San Carlos Airport, and the Women's Jail, all of which contribute significantly to the current diversion rate of 40%. Many departments recycle paper and a number are moving toward "paperless" offices. Also, the Surplus Property Division recycles some waste generated at facilities and promotes reuse of unwanted office items by holding auctions.

Additional steps the County will take include centralizing garbage collection in County facilities, expand existing recycling programs and outreach, and integrating composting into County waste diversion programs. Centralized garbage collection will reduce the number of desk-side trash bins and the amount of recyclables being thrown in the trash, particularly paper. Additionally, most municipal solid waste generated can be composted. By further expanding composting

programs, the County can both reduce the amount of waste in landfills and generate beneficial compost.

**Timeline:** The County will evaluate current recycling programs, pursue more prevalent centralized garbage collection, and encourage composting in all County facilities where it is available by the hauling service providers. The program improvements in this measure are slated for mid-term implementation, to begin by 2016.

**Cost:** This measure is a low cost scenario whereby County-wide waste disposal practices and behavior are changed to emphasize more recycling and organic disposal via composting. Additional Facilities Recycling Coordinator staff time, funded by AB 939 revenue, may be required to implement this measure.

#### **Emission Reductions**

- Estimated annual emissions savings: **585 MT CO<sub>2</sub>e**
- Total potential reduction by 2020: **8,775 MT CO<sub>2</sub>e**

### **3.3.2 Update the County's Environmental Purchasing Policy**

**Concept:** Waste prevention is one of the least costly, yet most effective measures for reducing emissions from solid waste. By reducing overall waste generation and purchasing environmentally friendly products, less funding would be required for recycling and other end-of-life programs. Purchasing environmentally friendly and sustainable products will reduce the amount of emissions from solid waste. This also supports companies that take the time and effort to make their products more sustainable, encouraging growth in that sector.

**Current Efforts:** The County currently has an Environmental Purchasing Policy. This measure will re-establish the Environmental Purchasing Committee and set a regular meeting schedule to review and update that policy and guide its implementation. The committee work will be supported by online tools for purchasing agents that guide them to sustainable products. The Committee may also pursue standardization of purchases to assist surplus and efficient reuse of inventory.

**Timeline:** The next steps include a review of the current purchasing policy to update it for current sustainability standards. Stakeholders such as the Purchasing Department and the County Manager's Office would need to be involved.

**Cost:** The relatively low costs associated with this measure include the staff time needed to implement this program. Over time, there should be savings from standardization of purchases and more efficient reuse.

#### **Emission Reductions**

- GHG emissions reduction estimates are not reliable for this measure and are not calculated for this report.

## **4. Implementation**

The preceding chapters describe the principal sources of the County of San Mateo government operations GHG emissions and outline related goals and measures for reducing emissions to 15% below 2005 levels by 2020. This chapter outlines a prioritization process and cost/benefit analysis for the multiple measures of the plan.

### **4.1 Prioritizing Measures for Action**

The County has identified a number of sector-specific measures to reduce greenhouse gas emissions. The measures include programming and policy initiatives across four emissions sectors (Energy, Transportation and Land Use, Waste, and All Other Emissions). Emissions reduction measures were selected based on review of the 2005 Inventory and emissions forecasting data, in addition to the forthcoming Strategic Energy Master Plan (SEMP).

Measures were subsequently prioritized using a scoring system that weighed cost-benefit criteria such as costs, timing, resource savings, interagency synergy, and funding options. Measure evaluation criteria were organized into three categories: benefits, costs, and Implementation and Feasibility. Within each of the three categories, five to six criteria were used to score the measures. The criteria weighting system focused on the cost of implementation relative to the emissions reductions achieved. As a result, the majority of recommended measures are relatively low-cost, or provide a good balance between benefits and cost. Additionally, the measures were weighted to highly rank those that are most likely to reduce total emissions. Finally, the scoring criteria gave preference to measures with a higher potential for external funding such as PG&E grants or rebates.

## 4.2 Results of Measure Prioritization

Once prioritized, each measure was designated as either short, medium or long-term based on their weighted scores. Scores ranged from 0 - 5 with higher scores (i.e., above 3) recommended for implementation in the short term due to the cost benefit ratio.

Proposed timelines are listed below, followed by qualifying scores on the 0 – 5 range (**in bold**). Note that these timeframes refer to beginning of implementation, rather than project completion.

- Short-term actions (0 – 2 years), including the no/low cost measures:  **$\geq 3$**
- Mid-term actions (2-5 years):  **$2.5 < x < 3$**
- Long-term actions (More than 5 years):  **$< 2.5$**

Measures within the energy efficiency category received the highest scores due to the cost to benefit ratio and outside funding potential. These projects included energy efficiency purchasing preferences and street lighting and building retrofits.

## 4.3 Summary of Measures

A summary of all the emissions reduction measures is provided in Table 6 below.



**Table 6: Summary of Emissions Reduction Measures**

| Measure Category            | Description of Measure                               | Annual Emission Reductions (MTCO <sub>2</sub> E) | Measure Priority Score | Short Term/ Medium Term/ Long Term |
|-----------------------------|------------------------------------------------------|--------------------------------------------------|------------------------|------------------------------------|
| Energy                      | Energy Efficient Street Lighting and Traffic Signals | 25                                               | 3.25                   | Short Term                         |
|                             | Environmentally Preferred Purchasing Policy – Energy | 78                                               | 4.03                   | Short Term                         |
|                             | Renewable Energy Technology                          | 130                                              | 3.55                   | Short Term                         |
|                             | Increase Energy Efficiency in County Buildings       | 667                                              | 3.22                   | Short Term                         |
| Transportation and Land Use | Purchase Fuel Efficient, Low Emission Vehicles       | 320                                              | 3.22                   | Medium Term                        |
|                             | Alternative Work Schedules                           | 484                                              | 3.35                   | Short Term                         |
|                             | Commute Alternatives Program                         | 1,308                                            | 2.93                   | Medium Term                        |
| Solid Waste                 | Environmentally Preferred Purchasing Policy – Waste  | N/A                                              | 2.53                   | Long Term                          |
|                             | 75% waste diversion rate                             | 39                                               | 2.90                   | Short Term                         |

#### 4.4 Meeting the Emission Targets

To reduce GHG emissions 15% below 2005 levels by 2020, the County needs to decrease our government operations emissions by 5,867 metric tons of CO<sub>2</sub>e. After factoring in reductions from statewide initiatives, such as the Pavley bill (AB 1493) and the Renewable Portfolio Standard (RPS), the County needs to take steps that will reduce emissions by 3,244 MT CO<sub>2</sub>e

The measures outlined in this Plan will reduce emissions by 759 MT per year, or 11,149 by 2020. This significantly exceeds the required amount of reductions through County measures in this Climate Action Plan; however, the higher County contribution serves as a buffer against possible delays of the statewide initiatives. As a result, if for some reason the state initiatives fail to meet their predicted reductions in emissions, the County will still be able to meet our own emissions reduction commitments. Table 7 outlines emissions reduction target calculations for the County.

**Table 7: Meeting the 2020 Target**

| State Initiative                                                     | Sector               | % Reduction from 2020 GHG Inventory | Reduction in City's Emissions |
|----------------------------------------------------------------------|----------------------|-------------------------------------|-------------------------------|
| AB 1493 (Pavley)                                                     | Transportation       | 19.7%                               | 728                           |
| LCFS                                                                 | Transportation       | 7.2%                                | 52                            |
| 33% RPS                                                              | Electricity (Energy) | 21%                                 | 1,843                         |
| A. Total Statewide Initiative Emissions Reductions (ER1 + ER2 + ER3) |                      |                                     | 2,623                         |
| B. Total City Climate Action Plan Reductions Measures                |                      |                                     | 11,149                        |
| C. Total Expected Emissions Reductions by 2020 (A+B)                 |                      |                                     | 14,525                        |
| D. County of San Mateo Emissions Reduction Requirement for 2020      |                      |                                     | 5,867                         |
| E. Meets/exceeds state goals? (C > D)                                |                      |                                     | Yes                           |

## 4.5 Implementation: Next Steps

To start implementation of the Plan, the County will take the following next steps immediately upon adoption:

- **Hire an Extra-Help Sustainability Coordinator for a Pilot Period** – The County will hire a sustainability coordinator to take primary responsibility for implementation of this Plan. The position is funded by the Green Team, which gets 15% of all County energy savings to invest in furthering sustainability programs, and will be a 9-month pilot project. The position is a full-time fellowship for a recent undergraduate or masters student and will start in the fall of 2012. After the pilot period longer term staffing strategies will be assessed based on available funding.
- **Utilize the San Mateo County Green Team** – The Green Team will guide the process of the Climate Action Plan until the measures are completed. They will support initiatives in their own departments to help implement the emissions reduction measures. The team will also provide feedback and help evaluate and modify the measures over time to ensure that the plan is a dynamic document.

## 4.6 Public Participation and Community Engagement

The County can educate employees and constituents about ways to reduce emissions and also promote sustainable practices by contractors and business partners. Beyond reducing emissions from County Operations, the County can also support community efforts to improve energy efficiency, install renewable energy technologies, facilitate transit/biking/walking initiatives, and support households and businesses in taking other actions. The County can use our many community access points to widely distribute information on ways employees and constituents can reduce their environmental impact.

Specific actions that the government workforce can take today are included in Appendix B of this climate action plan. Funding opportunities are listed in Appendix C.

## 4.7 Timeline

The following timeline (Table 8) lists the major milestones in the climate action plan implementation process. Progress and updates to this schedule should be submitted to the Board of Supervisors and the public as part of an annual Plan Implementation Report.

**Table 8: Climate Action Plan Implementation**

| Milestone                                        | Target Date |
|--------------------------------------------------|-------------|
| 2005 GHG Inventory Completed                     | 09/2009     |
| GHG Reduction Target Established                 | 09/2012     |
| Draft CAP Published                              | 09/2012     |
| Board of Supervisors Review                      | 09/2012     |
| CAP Adoption                                     | 09/2012     |
| Sustainability Coordinator Begins Implementation | 10/2012     |
| 1 <sup>st</sup> Annual CAP Implementation Report | 09/2013     |
| 3 <sup>rd</sup> GHG Inventory Completed          | 09/2016     |
| 1 <sup>st</sup> CAP Update                       | 09/2021     |

## 5. Monitoring and Improvement

Monitoring GHG emissions reduction progress must be done to ensure that the emissions targets are met. If the County is falling short of our GHG reduction goals, additional voluntary and mandatory measures can be added to the plan. Continual, documented progress toward our goals is necessary to maintain our plan as a Qualified GHG Reduction Strategy.

The following describes the monitoring and improvement program.

- The Sustainability Coordinator will issue an Annual Climate Action Plan Implementation Report (ACAPIR), to update the Board of Supervisors, residents, and other interested stakeholders on the status of the Plan measures. The ACAPIR will detail lessons learned and make recommendations for changes to the implementation strategy or the Plan itself.
- The Sustainability Coordinator will track the emissions, resource savings, and any other effects of each implemented measure as well as estimate costs to government, residences, and businesses. Each measure will be summarized in the ACAPIR and made available to the public.
- A full GHG inventory will be conducted every 5 years using the most recent ICLEI community emissions protocol. The inventory will allow the County to understand how emissions levels are tracking for all countywide operations. PG&E can provide annual updates on electricity and natural gas usage to track associated GHG emissions.

## 6. Conclusion

Climate change is a global problem. However, through local solutions designed to meet the needs of our community, we can we mitigate and adapt to the impacts of global warming and help protect the environment. The challenges posed by climate change are unprecedented, but local-level solutions can reduce GHG emissions, increase efficiency and cost-effectiveness in many areas of government operations and help maintain the quality of our environment.

Adoption of this Plan is an important first step for San Mateo County. But adoption also includes a commitment to keep the Plan a living document. To remain useful and relevant, the Plan must be updated as technology and policies progress. A dynamic, up to date Plan will guide County efforts to manage GHG emissions and contribute to a sustainable future for all.

But what can an individual citizen do? Appendix B provides 10 ways that individuals can reduce their GHG footprint and help safeguard our environment for future generations.

## Appendix A. Glossary of Terms

|                   |                                                     |
|-------------------|-----------------------------------------------------|
| AB32              | The California Global Warming Solutions Act of 2006 |
| ARB               | California Air Resources Board                      |
| BAAQMD            | Bay Area Air Quality Management District            |
| CAP               | Climate Action Plan                                 |
| CAPPA             | Climate and Air Pollution Planning Assistant        |
| CEC               | California Energy Commission                        |
| CEQA              | California Environmental Quality Act                |
| CO <sub>2</sub>   | carbon dioxide                                      |
| CO <sub>2</sub> e | carbon dioxide equivalent                           |
| CPUC              | California Public Utilities Commission              |
| EIR               | environmental impact review                         |
| GHG               | greenhouse gas                                      |
| ICLEI             | Local Governments for Sustainability                |
| kWh               | kilowatt hour                                       |
| MFD               | multifamily dwelling                                |
| MPO               | metropolitan planning organization                  |
| MT                | metric ton                                          |
| PACE              | property-assessed clean energy                      |
| PG&E              | Pacific Gas and Electric Company                    |
| Ppm               | parts per million                                   |
| PV                | photovoltaic                                        |
| RPS               | renewable portfolio standard                        |
| U.S. EPA          | United States Environmental Protection Agency       |
| TOD               | Transit-oriented development                        |

## **Appendix B. 10 Steps to Reduce Your Carbon Footprint**

Modified from CoolClimate.org

### **1. Change your commute**

Did you know that one third of the CO<sub>2</sub> produced in the U.S. is from the transportation of people or goods? Pick one day a week to walk, bike, take public transportation or carpool to work or when you are running errands. Silicon Valley Bicycle Coalition (<http://bikesiliconvalley.org/>) has great resources and can help you plan your bike commute. Another resource for planning trips via public transportation is 511.org. If possible, live close to your workplace and talk to your employer about working from home or subsidizing the costs of public transportation. When driving, remember to combine several car trips into one trip and avoid idling. Additionally, you can get better fuel efficiency by following the speed limit. Exceeding the speed limit by just 5 mph during highway travel results in an average fuel economy loss of 6%.

### **2. Be a better consumer**

Did you know that the average American generates about 4.4 lbs of trash each day? To reduce the amount of trash you generate, follow these few easy steps. Use re-usable coffee mugs and shopping bags. If you forget your mug or bag at the store, buy a new reusable mug or bag and keep the extra one in your purse or car for use the next time you are out.

### **3. Shop local**

The shorter the distance your food travels to your plate or that product travels to your home, the fewer greenhouse gases are produced. Declare one day a week to be a "buy local day" and eat foods produced within 50 miles of your house. Participate in community-supported agriculture and community-supported fishery programs and shop at farmers markets.

Buy produce and fish labeled "As Fresh As It Gets," signifying that it was grown or harvested in San Mateo County. Support restaurants and businesses accredited by the "As Fresh As It Gets" campaign, signifying that they use county-grown produce, fish, and other products. For a list of in-season produce and fish, farmers market locations, and accredited businesses and restaurants, visit [www.asfreshasitgets.com](http://www.asfreshasitgets.com).

### **4. Dry-up Household Water Consumption**

Did you know that water-related energy use consumes 19% of California's electricity, 30% of its natural gas, and 88 billion gallons of diesel fuel every year? To reduce your water consumption at home, turn off

your water when it's not being used, take shorter showers, stop unseen leaks by reading your meter, install low-flow shower heads and aerators on your faucet, install and use water-efficient landscaping and irrigation methods (for example, plant drought tolerant plants and/or install permeable surfaces and drip irrigation systems), and use EnergyStar appliances. The Bay-Friendly Gardening Program (<http://www.stopwaste.org/>) provides resources for selecting plants, conserving water and fostering soil health.

## **5. Unplug it**

Did you know that appliances, chargers, home theater equipment, stereos, and televisions use electricity even when their power is off? Eliminating this "leaking" electricity could save you 6–26% on your average monthly electricity bill. Take a walking tour of your home, unplug seldom-used appliances, and install power strips so that the power to frequently used items can be easily turned off.

## **6. Change the lights**

Replace any incandescent light bulbs that remain in your home with compact fluorescent lights (CFLs). Replacing one incandescent light bulb with a CFL can save \$30 or more in electricity costs over the bulb's lifespan.

## **7. Set your Thermostat for the Season**

Set your thermostat in winter to 68° or less during the daytime, and 55° before going to sleep (or when you are away for the day), to save 5 to 20% of your space-heating costs. During the summer, set thermostats to 78° degrees or more to save 5 to 20% of your cooling costs.

## **8. Increase Energy Efficiency at Home**

Did you know that you can save up to 350 pounds of CO<sub>2</sub> and \$150 per year at home by simply keeping air filters clean? To determine more ways to increase energy efficiency, take advantage of subsidized home energy audits offered through Energy Upgrade California. When you are ready to purchase an appliance, ensure that you purchase an EnergyStar appliance. To reduce carbon emissions associated with energy use, install or purchase alternative energy for your electricity needs.

## **9. Stop Unwanted Services**

Did you know that junk mail production in the U.S. consumes as much energy as 2.8 million cars? Stop your junk mail at [www.directmail.com/junk\\_mail](http://www.directmail.com/junk_mail). Stop unwanted catalogs at [www.catalogchoice.org](http://www.catalogchoice.org).

## **10. Get your friends and families to reduce their carbon emissions**

## Appendix C. Summary of Funding Sources

For implementation of the Climate Action Plan, San Mateo County must evaluate strategies for financing climate protection actions and provide adequate, reliable, and consistent long-term program funding. This appendix provides an overview of available funding sources to help determine appropriate potential program funding sources and funding levels to support existing and new programs outlined in this plan. Other funding sources may be available that are not listed here.

### 6.1 Federal Funding

#### Federal Transportation Investment Generating Economic Recovery (TIGER) Grant

<http://www.dot.gov/recovery/ost/>.

The Federal Transportation Investment Generating Economic Recovery (TIGER) grant program was created by the American Investment and Recovery Act (ARRA) of 2009. Cities can apply for a TIGER grant to fund parking garages, and infrastructure to support electric battery-swap station and parking for electric vehicles.

### 6.2 State Funding

#### California Solar Initiative (CSI)

<http://www.gosolarcalifornia.ca.gov/csi/index.php>

The California Solar Initiative (CSI) is the solar rebate program for California consumers that are customers of the investor-owned utilities - Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E). Together with the rebate program for New Solar Homes and rebate programs offered through the dozens of publicly owned utilities in the state— the CSI program is a key component of the Go Solar California campaign for California.

A solar rebate program for customers in PG&E, SCE, and SDG&E territories, this program funds solar on existing homes as well as existing, or new commercial, agricultural, government and non-profit buildings. This program funds both solar photovoltaics (PV), as well as other solar thermal generating technologies. This program is sometimes referred to as the CSI general market program and consists of the following components:

- *CSI-Thermal*. A solar hot-water rebate program for customers in PG&E, SCE, and SDG&E territories. This program funds solar hot water (solar thermal systems) on homes and businesses.



- *Single-family Affordable Solar Homes (SASH)*. A solar rebate program for low-income residents that own their own single-family home and meet a variety of income and housing eligibility criteria. .
- *Multifamily Affordable Solar Housing (MASH)*. A solar rebate program for multifamily affordable housing.
- *CSI Research, Development and Demonstration (RD&D)*. A solar grant program to fund grants to explore solar technologies and other distributed generation technologies.

The CSI offers solar customers different incentive levels based on the performance of their solar panels, including such factors as installation angle, tilt, and location rather than system capacity alone. This performance framework ensures that California is generating clean solar energy and rewarding systems that can provide maximum solar generation.

The CSI program has a total budget of \$2.167 billion between 2007 and 2016 and a goal to install approximately 1,940 MW of new solar generation capacity.

#### **Energy Conservation Assistance Account Program (ECAA)**

<http://www.energy.ca.gov/efficiency/financing/index.html>

Projects that are not eligible for funding under the ARRA Loan Program may be eligible for funding through the ECAA, which offers loans with three percent interest to finance energy-efficiency improvements.

#### **Energy Upgrade California**

<https://energyupgradeca.org/overview>

The Energy Upgrade California program helps residential and commercial consumers and the building industry to access available rebate programs and financing options for energy efficiency and renewable energy projects. The program is a partnership among California counties, cities, non-profit organizations and the state's investor-owned utilities (Pacific Gas & Electric, Southern California Edison, Southern California Gas Company and San Diego Gas & Electric Company), and publicly owned utilities. Funding for this effort comes from the American Recovery and Reinvestment Act (ARRA, also known as federal stimulus funds).

### **6.3 Utility Rebate Programs**

Pacific Gas and Electric (PG&E) offers a full suite of energy efficiency rebates programs to support its customers in saving energy and money.

- Rebates for households: <http://www.pge.com/myhome/saveenergymoney/>
- Rebates for businesses: <http://www.pge.com/mybusiness/energysavingsrebates/>

Below, we provide some specific examples of PG&E programs available to the community.

#### **PG&E San Mateo County Energy Watch Program**

<http://www.smcenergywatch.com>

San Mateo County Energy Watch provides energy efficiency services and retrofits and assists businesses and moderately low-income households to identify cost-effective projects. The program's services include energy audits, special rebates and incentives

#### **PG&E Residential Appliance Rebates**

<http://www.pge.com/myhome/saveenergymoney/rebates/appliance/>

PG&E offers rebates to customers who purchase qualifying energy efficient appliances, including dishwashers, hot-water heaters, and room air conditioners. Rebates range from \$30 to \$75 for qualifying appliances. PG&E and American Water are also currently offering a combined rebate of up to \$250 for installing high-efficiency clothes washers.

#### **PG&E LED Streetlight Replacement Program**

<http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/lighting/lightemittingdiodes/incentives/index.shtml>

The County of San Mateo may be eligible for PG&E's LED streetlight replacement program which provides rebates to cities that replace existing streetlights with more energy efficient LED fixtures (up to \$125 per fixture).

#### **PG&E Commercial Appliance Rebates**

<http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/index.shtml>

PG&E offers rebates to business customers on hundreds of products including refrigeration units, lighting fixtures, heating systems, food service appliances, boilers and water heaters, and insulation. More information and a complete list of products eligible for rebates is available online at

#### **PG&E Home Energy Efficiency Improvements Rebates**

<http://www.pge.com/myhome/saveenergymoney/rebates/remodeling/>

PG&E offers rebates to customers who make energy efficiency improvements when remodeling their homes. Currently PG&E offers a rebate of up to \$0.20 per square foot for cool roof installations and

\$0.15 per square foot of attic and wall installation installed. Additionally, PG&E has rebates for homeowners who upgrade their home's heating and cooling systems. Rebates are available for installing energy efficient furnaces (up to \$300), air conditioning units (up to \$50) and whole house fans (up to \$100). Finally, PG&E will provide up to \$400 in rebates to customers who test and seal their home's duct system. More information on this program is available at

## **6.4 Local Energy Programs**

### **Acterra's High Energy Homes Project**

<http://www.acterra.org/programs/highenergy/index.html>

Acterra's High Energy Homes project helps residents in homes with high PG&E bills to analyze and identify costly energy "leaks" that provide little or no value. Through a free on-line analysis of your PG&E bill data, the program creates an energy profile for your home and highlights low-cost energy-saving opportunities that can significantly reduce your bills and conserve energy. The audit starts online via a secure website. A home visit may be scheduled if the data from your home's energy profile presents an unusual pattern.

### **California Youth Energy Services**

<http://www.risingsunenergy.org>

Since 2000, Rising Sun Energy Center has run CYES, a summer youth employment and community efficiency retrofit program in the Bay Area. CYES hires young people (ages 15-22) and trains them to become Energy Specialists, serving their communities with a FREE Green House Call. Energy Specialists install free energy and water saving devices, and provide personalized recommendations and education for further savings in homes. CYES provides services to all community members regardless of income. However, it was designed to serve hard-to-reach residents including renters, non-English speaking households, and low-moderate income households. It provides youth with opportunities for training and meaningful employment; which are often not adequately available to them. CYES youth receive employability skills training, paid summer employment, and the foundation for a green career. The program is operating in the City of San Mateo in Summer 2011, and will be expanding further into San Mateo County in 2012.

### **Green@Home HouseCalls**

<http://www.acterra.org/programs/greenathome/index.html>

Green@Home HouseCalls help fight climate change by saving residents energy, money and CO2. Trained volunteers meet with residents in their homes to install simple energy-saving devices and create home energy conservation plans. Volunteers demonstrate environmentally friendly choices and foster a

deeper awareness of the need for change. HouseCalls are available to all residents of participating cities whether you rent or own.

### **RightLights Program**

The RightLights Program provides subsidized energy efficiency upgrades of lighting and refrigeration systems, with free professional assistance to help businesses lower energy bills and boost cash flow. RightLights is available Generally, any commercial PG&E customer who receives electric service on the A1, A6, A10, or E19-v rate schedules is eligible for the program. Property owners as well as businesses who lease their space are encouraged to apply. Multi-family residential properties are eligible for RightLights in their common-use areas only.

### **Sustainable San Mateo County's Energy Ambassador Program**

<http://sustainabilityhub.net/contest/ea-parties/>

Sustainable San Mateo County's *Energy Ambassador* Program educates homeowners on home energy efficiency as it relates to behaviors, electricity usage, and the building envelope. In order to do this, Sustainable San Mateo County (SSMC) takes a "top-down" approach to make sure homeowners recognize all aspects of home energy efficiency. The program has three components we use to engage homeowners; a Personal Energy Review, invitation to attend an Energy Ambassador Party, and hosting an Energy Ambassador Party. The ultimate goal of the program is for homeowners to take steps in each area of energy efficiency while helping to educate their friends and neighbors through the Energy Ambassador party.

At *Energy Ambassador Parties*, Sustainable San Mateo County uses the host's home as a case study. Guests have a chance to enjoy some refreshments, mingle with some like-minded people, and learn about the value of getting a home energy assessment and making energy efficiency improvements.

### **Sustainable San Mateo County's Personal Energy Review Program**

<http://sustainabilityhub.net/contest/per>

With a *Personal Energy Review*, or PER, Sustainable San Mateo County (SSMC) customizes a free one-on-one evaluation for each homeowner. It is a chance to learn about the three aspects of home performance (behavior, electricity usage, and the building envelope). An SSMC staff member or volunteer will visit your home. During the visit, SSMC will analyze how your home is performing and what it is costing you. In other words, SSMC helps identify the issues in your home and what your utility bill is. Once we all understand your home, we can help you create a plan for curing those symptoms.

## **6.5 Other Funding Opportunities**

### **American Forests Global ReLeaf Grant Program**

[http://www.americanforests.org/global\\_releaf/](http://www.americanforests.org/global_releaf/)

American Forests is a non-profit organization founded in 1875 that promotes forest conservation. American Forest's Global ReLeaf Program provides grants to fund tree-planting projects in urban and natural areas.

#### **California ReLeaf Urban Forestry Grant Program**

<http://californiareleaf.org/programs/grants>

The California ReLeaf Urban Forestry grant program provides funding to assist nonprofit and community-based groups throughout California with urban forestry projects. The program is funded through a contract with the California Department of Forestry and Fire Protection (CAL FIRE).

#### **Large Landscape Audit**

BAWSCA and its participating member agencies offer this audit program to select large landscapes within the service area free of charge. This program includes the development and monthly distribution of landscape water budgets for selected accounts and actual large landscape surveys to assess landscape watering needs. A key component of the program is ongoing monitoring/tracking of actual water use and estimated water savings for the sites surveyed. If you have water conservation related questions, please call 650-349-3000 or send an email to [bawsca@bawsca.org](mailto:bawsca@bawsca.org). You can also check with your local water company; some offer water audits for no charge.

#### **Waste Audits by Recology**

Recology offers a free waste audit to its business customers. A Waste Zero Specialist will come to your facility to advise you on the size/type of bins you could use and make other recommendations to help you reduce the amount of waste generated. To make an appointment, call (650) 595-3900.

## Appendix D. Adaptation Planning for Climate Impacts

Effective adaptation planning and management entails dealing with uncertainty. It is a long-term process that should allow immediate action when necessary and adjust to changing conditions and new knowledge. San Mateo County plans to initiate an inclusive planning process that ensures the resulting actions are feasible and widely accepted. Adaptation will likely be an ongoing process of planning, prioritization and specific project implementation.

Five important steps to effective adaptation planning are summarized below:

### **1. Increase Public Awareness; Engage and Educate the Community**

It is critical that the public understand the magnitude of the challenge and why action is needed. The planning process should be inclusive of all stakeholders. Local outreach campaigns are needed to promote awareness of the dangers of heat exposure and recommend low-cost and low-GHG adaptation strategies. These efforts should leverage similar efforts undertaken at the regional, state, and federal levels.

### **2. Assess Vulnerability**

Understanding vulnerability to sea level rise and other climate change impacts is critical to developing adaptation effective strategies. A detailed vulnerability analysis should be performed to assess potential climate change impacts to infrastructure and natural systems. Future vulnerability of assets and infrastructure can then be assessed using conceptual models of shore response to sea level rise. Shore response models can be applied for one or more climate change scenarios and planning horizons, and a strategy for adapting can be developed with due consideration to priorities and time frames. Both short-term and long-term adaptation strategies should be identified. Level of risk can be categorized in terms of likelihood of damage within the forecasting period and the severity of the damages. This allows planners to prioritize their response to sea level rise. The vulnerability assessment can also provide a framework for agency and community education and participation, feed into other planning documents, and identify funding needs.

### **3. Establish Goals, Criteria and Planning Principles**

Engage with stakeholders to establish planning priorities, determine decision criteria, and build community support for taking action. Rank physical and natural assets for preservation efforts. Where possible, look for situations where a mitigation action has adaptation co-benefits (e.g., planting trees to reduce urban heat islands while sequestering carbon and providing habitat).

### **4. Develop Adaptation Plan**

Identify specific strategies, develop actions and cost estimates, and prioritize actions to increase local resilience of City infrastructure and critical assets, including natural systems like wetlands and urban forests. Look for synergies between natural processes and engineering solutions. There is a continuum of strategies available to manage sea level rise, ranging from coastal armoring (levees, seawalls, etc.) to elevated development to a managed retreat or abandonment of low-lying development. An adaptation plan should include a prioritized list of actions (e.g. projects) with a timeline, capital expenditure plan, and framework for monitoring and adaptive management.

## 5. Ongoing Monitoring and Adaptive Management

Reassess climate change vulnerabilities on a regular basis and modify actions accordingly. This includes monitoring the effectiveness of current policies, strategies and actions, and keeping up with changing science, funding opportunities, and regulatory actions.

A menu of potential adaptation strategies and measures is provided in the table below.

**Adaptation Strategies and Measures**

| Climate Change Impacts                                                                                                 | Sample Adaptation Measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sea Level Rise</b><br><br>Risks to existing facilities, natural systems, private property and public infrastructure | <ul style="list-style-type: none"> <li>• Educate and engage the community on the need for long-range planning</li> <li>• Partner or collaborate with other jurisdictions and agencies to increase awareness and build community support for action</li> <li>• Identify funding mechanisms and seek public-private partnerships where interests converge</li> <li>• Use natural backshore wave-buffering processes to reduce wave erosion and run-up on levees</li> <li>• Increase or maintain the buffering capacity of tidal wetlands to protect against storm surges and keep pace with sea-level rise</li> <li>• Move levees further inland to allow marshes and mudflats to naturally transgress landward</li> <li>• Protect and restore wetlands that provide vital habitat and carbon storage, and allow for landward migration of habitat over time</li> <li>• Make modifications to low-lying wastewater treatment facilities. Consider opportunities for integrating wastewater treatments and wetlands</li> <li>• Avoid new development in areas at risk based on sea level projections</li> <li>• Do coastal armoring with levees and seawalls to protect vital infrastructure from erosion, inundation, and flooding</li> </ul> |
| <b>Extreme Heat Events</b><br><br>Risks to public health and infrastructure                                            | <ul style="list-style-type: none"> <li>• Identify vulnerable communities and develop emergency preparedness plan</li> <li>• Establish cooling centers, especially for vulnerable populations</li> <li>• Reduce urban heat islands through use of cool roofs and other reflective surfaces</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

|                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                            | <ul style="list-style-type: none"> <li>• Do targeted tree planting and enact new requirements for shading in new parking lots and other large paved areas</li> <li>• Reduce risk of wildfires through fuels reduction in the urban-wild land interface</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Regional Drought</b><br><br>Risks to reliable water supply, and potential conflicts between urban and agriculture users                 | <ul style="list-style-type: none"> <li>• Increase capacity for community water storage</li> <li>• Promote local water conservation</li> <li>• Make water conservation a top priority for agriculture in the region</li> <li>• Do water reclamation and reuse projects</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Increased Flooding and Severe Weather Events</b><br><br>Risks to public health, private property, public infrastructure, and ecosystems | <ul style="list-style-type: none"> <li>• Integrate local flood management plans with adaptation planning</li> <li>• Identify vulnerable communities and develop emergency preparedness plans</li> <li>• Establish local land use policies that decrease flood risk; avoid building in high-risk areas</li> <li>• Make modifications to storm water system routing and storage. Develop storage areas for peak flows</li> <li>• Maximize use of bioswales and permeable surfaces in both greenscape and hardscape areas to improve aquifer recharge and mitigate flooding from stormwater</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Air Quality and Other Public Health Concerns</b>                                                                                        | <ul style="list-style-type: none"> <li>• Restrict use of fireplaces and open fires on high-risk days</li> <li>• Monitor potential threats to public health, including new diseases, and develop public awareness</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Threats to Species, Ecosystems, and Ecosystem Services</b>                                                                              | <ul style="list-style-type: none"> <li>• Design urban forest program to improve biodiversity, provide heat relief, and sequester carbon</li> <li>• Preserve wetlands, salt marshes, and other critical coastal habitats</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Risks to Local Agriculture and Food Supply</b>                                                                                          | <ul style="list-style-type: none"> <li>• Promote conservation of local agricultural land</li> <li>• Promote the use of public and private land and rooftops for producing food</li> <li>• Promote the planting of fruit and nut trees</li> <li>• Support local farmers markets by providing incentives such as reduced costs for permits and support in attaining electronic benefit transfer (EBT) point-of-sale terminals</li> <li>• Provide incentives and remove regulatory obstacles to encourage animal husbandry and local food production and distribution</li> <li>• Provide and promote educational opportunities for residents at all levels of the educational system (preschool through college) to gain skills in organic gardening; fruit production; animal husbandry; food preservation and cooking; and affordable, healthy eating</li> <li>• Develop a city-run or city-supported food gleaning program that organizes volunteers or compensates workers to collect food from trees and shrubs on land owned by cities or within cities to distribute through food banks and other local distribution channels</li> <li>• Reduce food waste by implementing a local composting where all food scraps, food-soiled paper, waxed cardboard, wood crates and landscape trimmings from markets, restaurants, homes, hotels, and schools, would be collected and made available for distribution to rural or urban gardeners</li> </ul> |



## **Appendix E. Baseline GHG Inventory and Forecast**

Chapter 2 of this Plan incorporates findings from the County of San Mateo 2005 Government Operations Greenhouse Gas Inventory (2005 Inventory). Sections 2.1 and 2.2 of this Plan generally address baseline GHG emissions per emissions sector. By contrast, this appendix section details sector-specific data, sources, methodologies, and assumptions for developing baseline GHG emissions based on municipal operations. In effect, Appendix F is an extension of 2005 Inventory findings contained in Chapter 2.

### **Greenhouse Gas Inventory and Forecast**

In 2009, the County completed the 2005 Government Operations Greenhouse Gas Emissions Inventory report (2005 Inventory). The emissions inventory provides an important foundation for the Plan as it establishes a baseline year (2005) against which progress toward the County goal of reducing greenhouse emissions (80% reduction by 2050) can be measured. GHG emissions resulting from government operations occur under the purview of specific departments based on the type and scope of emissions. Departments that manage GHG-emitting infrastructure and activities are therefore responsible for assembling and delivering relevant emissions data for GHG emissions inventories. The 2005 Inventory utilized data gathered from multiple County government departments and agencies in order to define sector-specific emissions. This Plan relies on the 2005 Inventory to articulate findings and climate adaptation measures.

The completed Plan includes a business-as-usual (BAU) forecast of GHG emissions, which will enable the County of San Mateo to estimate the amount of emissions reductions needed to meet its goal. The BAU forecast is compared to the state GHG emissions targets set by AB 32, to ascertain comparative emissions trends. The forecast relies on current County government operations trends, such as workforce levels and facility and transportation utility, which are then projected for future milestone years to guide how the County may address climate change.

### **Inventory Sources and Data Collection Process**

A GHG emissions inventory requires the collection of information (data) from a variety of government sources and sectors, in addition to external agencies, such as utility companies. For example, in this Plan, Pacific Gas & Electric (PG&E) supplied energy use data for facilities, such as electricity and natural gas usage. The emissions inventory completed for the Plan follows the standard outlined in the Local

Government Operations Protocol<sup>16</sup> (Protocol). The Protocol describes the necessary data required to accurately analyze GHG emissions. According to the Protocol, data collection methods are hierarchical; multiple methods for data collection are available, depending upon data detail and availability. For each reported sector, the County executed the most appropriate method given the available data. Chosen methods are subsequently highlighted in respective sections describing sector emissions results.

### Sectors and Emissions in the GHG Inventory

| Sector                               | Emissions sources                                                                                                                 | Energy types                                           |
|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Buildings and other facilities       | Energy and water use in buildings                                                                                                 | Electricity<br>Natural gas                             |
| Streetlights and traffic signals     | Energy use in outdoor public lighting and traffic signals                                                                         | Electricity                                            |
| Water delivery facilities            | Energy use for transportation of water                                                                                            | Electricity<br>Natural gas                             |
| Airport facilities                   | Energy use in airport facilities                                                                                                  | Electricity<br>Natural gas                             |
| Vehicle fleet                        | All road vehicles<br>Off-road vehicles                                                                                            | Gasoline<br>Diesel<br>Ethanol<br>Liquefied natural gas |
| Power generation facilities          | Energy use in power generation facilities                                                                                         | Electricity<br>Natural gas                             |
| Solid waste facilities               | Energy use in solid waste facilities                                                                                              | Electricity<br>Natural gas                             |
| Wastewater facilities                | Energy use in wastewater treatment facilities                                                                                     | Electricity<br>Natural gas                             |
| Other process and fugitive emissions | Fugitive emissions from landfills<br>Leaked refrigerants from facilities and mobile sources<br>Leaked methane from septic systems | N/A                                                    |

Data relevant to a specific government operations sector is typically managed by the department overseeing operations that contribute to respective emissions sources. For example, the Facility Services division of the Department of Public Works and Parks operates and maintains the majority of the Buildings and facilities sector, and subsequently delivered backup power generator and refrigerant use data.<sup>17</sup> Usage data was then input to an ICLEI-designed Excel database that derived CO<sub>2</sub>e emissions calculations.

<sup>16</sup> Local Government Operations Protocol – For the quantification and reporting of greenhouse gas emissions inventories (Version 1.0). Developed in partnership by California Air Resources Board, California Climate Action Registry, ICLEI – Local Governments for Sustainability, and The Climate Registry. September 2008.

<sup>17</sup> Although the Buildings & Facilities sector is managed by the Department of Public Works and Parks, electricity and natural gas data for that sector was supplied by PG&E.

Future inventories will utilize the most recent version of the Protocol. This industry-accepted methodology for quantifying a local government operations GHG emissions inventory focuses on emissions that occur from combustion sources under operational or financial control of the County (e.g. Scope 1 emissions) and from electricity consumption (Scope 2 emissions<sup>18</sup>). However, Scope 3 emissions<sup>19</sup> were also included, to the extent possible, in order to maximize 2005 Inventory and Plan comprehensiveness. Scope 3 emissions are classified as upstream emissions that the County generally contributes to but has no operational or financial control over.

## Baseline Emissions Inventory for 2005

In the 2005 baseline year, the County of San Mateo emitted approximately 41,517 metric tons of carbon dioxide equivalent (CO<sub>2</sub>e) as a result of government operations.<sup>20</sup> Municipal sector emissions are calculated and reported because the County of San Mateo generally has more control over these emissions than emissions from other sectors, such as community-wide sectors, and thus the County can implement specific policies and programs to reduce municipal emissions. Burning fossil fuels in vehicles and for energy use in buildings and facilities is the largest contributor of GHG emissions. The table below provides a summary of total GHG emissions resulting from government operations in 2005.

---

<sup>18</sup> Scope 2 emissions are indirect emissions sources limited to electricity, steam, heating, and cooling consumption. Although consumed for government purposes, Scope 2 emissions simultaneously occur where power sources are generated – they are within County operational control based on the level of use required by government activities.

<sup>19</sup> Scope 3 emissions encompass indirect emissions sources which are not within local government financial or operational control. Examples include emissions related to County operations, yet resulting from non-County assets, such as employee commute vehicles, and the production of materials later purchased by the County.

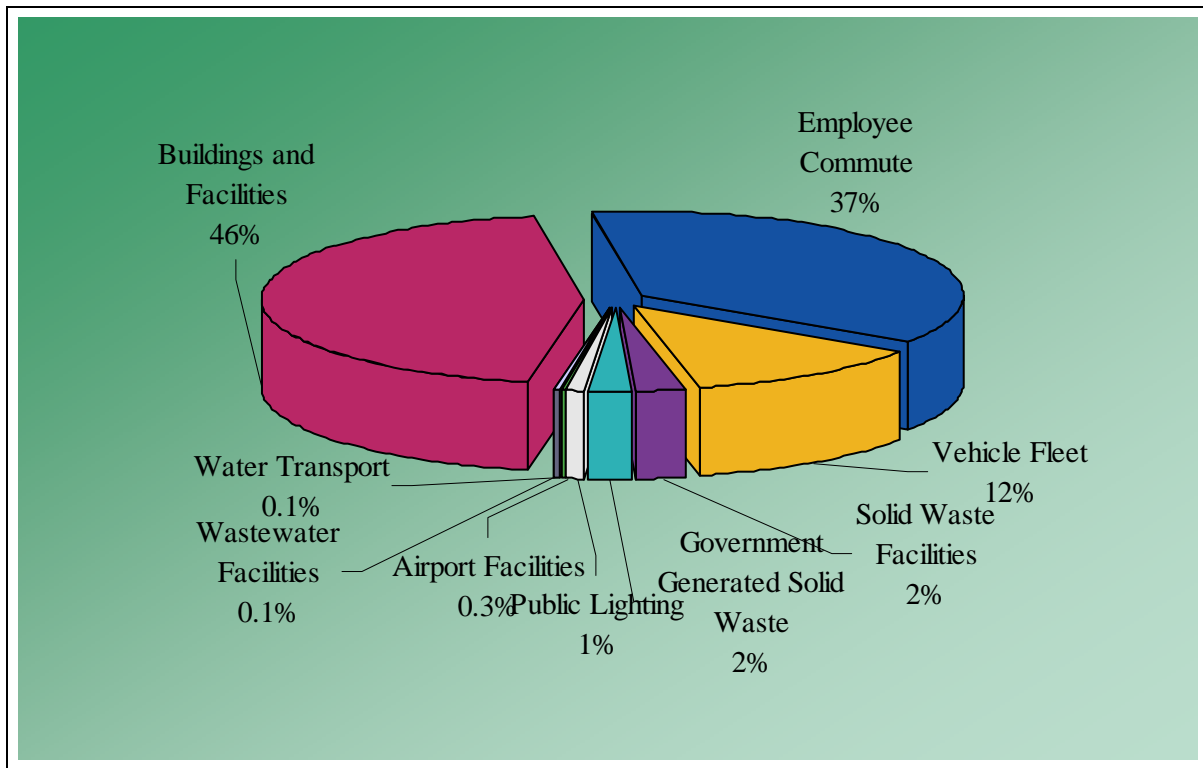
<sup>20</sup> Carbon dioxide equivalent is a unit of measure that normalizes the varying climate warming potencies of all six GHG emissions, which are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). For example, one metric ton of methane is equivalent to 21 metric tons of CO<sub>2</sub>e. One metric ton of nitrous oxide is 210 metric tons of CO<sub>2</sub>e.

### 2005 Government Operations Emissions by Sector

| Sector                           | Greenhouse Gas Emissions<br>(metric tons CO <sub>2</sub> e ) | Percentage of Greenhouse Gas Emissions |
|----------------------------------|--------------------------------------------------------------|----------------------------------------|
| Buildings and facilities         | 18558                                                        | 46%                                    |
| Streetlights and traffic signals | 340                                                          | 1%                                     |
| Water delivery facilities        | 47                                                           | 0.1%                                   |
| Airport facilities               | 125                                                          | 0.3%                                   |
| Vehicle fleet                    | 5066                                                         | 12%                                    |
| Solid waste facilities           | 1011                                                         | 2%                                     |
| Wastewater facilities            | 26                                                           | 0.1%                                   |
| Employee commute                 | 15341                                                        | 37%                                    |
| Government-generated solid waste | 1002                                                         | 2%                                     |
| <b>TOTAL</b>                     | <b>41517</b>                                                 | <b>100%</b>                            |

Sectors that include facilities (e.g. buildings, water delivery, airport) primarily represent energy use, in the form of electricity supplied by the local utility. Off-road equipment includes lawnmowers, garden equipment, as well as construction, industrial, and light commercial equipment; these equipment are categorized under vehicle fleet. Additionally, although emissions from employee commute and government-generated solid waste are classified under Scope 3 emissions – considered optional per the Protocol - they were included for completeness. The figure below shows the proportion of San Mateo County's total GHG emissions from all major sectors for 2005.

### Government Operations Emissions by Sector (2005)



As shown above, the two largest categories of emissions are related to energy use in buildings and facilities (46%) and employee commute (37%).

### Electricity and Natural Gas Emissions

General buildings and facilities, vehicle fleet, public lighting, airport facilities, and water transport equipment collectively represent government operations sectors that utilize electricity or natural gas energy, sometimes concurrently. In addition to producing subsequent GHG emissions, aggregate propane emissions were also evident among certain facilities, though in less significant quantities. Electricity usage is measured in kilowatt/hours (kWh); natural gas units are therms (therms). The extent of each energy type usage was reported by PG&E, based on supplied metering data. Whereas the County does not utilize direct access energy sources (i.e., wholesale energy), natural gas is purchased via ABAG Power<sup>21</sup>, a joint powers authority and third party energy supplier.

<sup>21</sup> Information provided by Gary Behrens, Facilities, Maintenance, and Operations Manager, Department of Public Works, County of San Mateo.

The total cost of energy consumption among government operations sectors in 2005 was \$8,049,874. PG&E-supplied electricity costs accounted for \$5,120,443 (64%) while ABAG Power-supplied natural gas accounted for \$1,788,476 (22%); the Vehicle Fleet sector entailed \$1,139,272 (14%) of the remaining aggregate costs. The table below provides a sector-by-sector look at electricity and natural gas consumption costs for the year 2005.

#### 2005 Government Operations Energy Costs by Sector

| Sector                   | Cost               |
|--------------------------|--------------------|
| Buildings and Facilities | \$6,629,736        |
| Vehicle Fleet            | \$1,139,272        |
| Public Lighting          | \$168,322          |
| Airport Facilities       | \$77,984           |
| Water Transport          | \$34,559           |
| <b>TOTAL</b>             | <b>\$8,049,874</b> |

The buildings and facilities sector represents the largest emitter of electricity and natural gas emissions for the baseline 2005 year, as well as incurring the greatest energy fiscal costs. In 2005, general County buildings and facilities, excluding Airport facilities, emitted 18,558 metric tons of CO<sub>2</sub>e. By contrast, the following table shows specific sector energy use and emissions by facility type.

#### Energy Use and Emissions from Facilities

| Facility            | Greenhouse Gas Emissions (metric tons CO <sub>2</sub> e) | Percent Emissions of All Facilities | Electricity Use (kWh) | Natural Gas Use (therms) | Total Energy Cost  |
|---------------------|----------------------------------------------------------|-------------------------------------|-----------------------|--------------------------|--------------------|
| FM&O*               | 9,157                                                    | 49.3%                               | 18,005,982            | 964,326                  | \$3,196,918        |
| Hospital            | 6,265                                                    | 33.8%                               | 12,404,130            | 656,103                  | \$1,958,527        |
| Leased Facilities   | 2,440                                                    | 13.1%                               | 6,577,699             | 182,048                  | \$1,139,215        |
| Parks               | 407                                                      | 2.2%                                | 1,663,738             | 6,604                    | \$213,927          |
| Human Services      | 124                                                      | 0.7%                                | 83,169                | 19,758                   | \$35,495           |
| ISD**               | 94                                                       | 0.5%                                | 263,525               | 5,536                    | \$48,242           |
| Other Facilities*** | 71                                                       | 0.4%                                | 224,737               | 3,823                    | \$37,412           |
| <b>TOTAL</b>        | <b>18,558</b>                                            | <b>100%</b>                         | <b>39,222,980</b>     | <b>1,838,198</b>         | <b>\$6,629,736</b> |

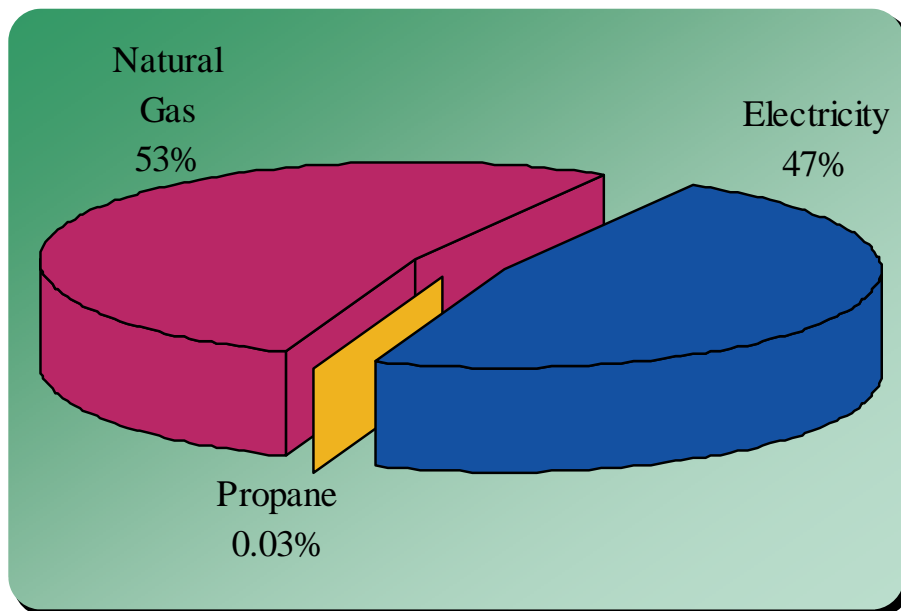
\* Emissions estimate includes natural gas combustion in the cogen unit at the Maguire Jail.

\*\* Emissions estimate includes consumption of 974 gallons of propane in ISD facilities.

\*\*\* Includes Fire, Library, Housing, Mental Health, Public Works, and Sheriff Facilities.

In the baseline 2005 year, natural gas emissions (53%) were most common due to building and facility operations, followed by electricity (47%) and propane (0.03%). The figure below further details emission shares among stationary facilities in the County.

**Buildings & Facilities Emissions – Fuel Type**



The County vehicle fleet and mobile equipment sector relies on natural gas power in relatively limited quantities. The 2005 Inventory indicated that the level of therm usage accounted for approximately 1% of CO<sub>2</sub>e emissions among fleet vehicles as fleet vehicles utilized 6,919 therms of natural gas compared to 453,188 gallons of gasoline in 2005. In total, fleet vehicles produced 95% of mobile CO<sub>2</sub>e emissions versus approximately 4% from mobile equipment, and a minimal percentage (less than 1%) via leaked refrigerants from mobile sources, as further detailed in the following sections.

Public lighting contributes to County government operations GHG emissions through electricity consumption. In 2005, the County consumed 1.5 million kWh via public lighting which consequently contributed 340 metric tons of CO<sub>2</sub>e. The table below indicates the level of electricity use by County operated public lighting.

### Electricity Use & Emissions from Public Lighting

| Source       | Greenhouse Gas Emissions (metric tons CO <sub>2</sub> e) | Percent Emissions of All Lighting | Electricity Use (kWh) | Cost             |
|--------------|----------------------------------------------------------|-----------------------------------|-----------------------|------------------|
| Public Works | 259                                                      | 76.3%                             | 1,159,706             | \$129,086        |
| FM&O         | 81                                                       | 23.7%                             | 360,730               | \$39,236         |
| <b>Total</b> | <b>340</b>                                               | <b>100.0%</b>                     | <b>1,520,436</b>      | <b>\$168,322</b> |

Airport facilities emissions are also reported in this Plan, excluding aircraft emissions. Emissions resulting from County-owned and operated aircraft flight are instead included in mobile emissions, such as vehicle fleet and mobile equipment. Furthermore, private aircraft emissions are not under County purview and are thusly excluded as well. The County operates two municipal airports, San Carlos Airport and the Half Moon Bay Airport. In 2005 County airports collectively emitted an aggregated approximate of 125 metric tons of CO<sub>2</sub>e; 2005 Inventory indicates per airport totals were unavailable during data collection. The Inventory additionally describes approximately 600 privately-owned aircraft situated at the respective County airports, which were excluded from emissions counts for aforementioned reasons.

Water transport facilities handle water, stormwater, and wastewater storage and distribution. As shown in following table, this sector contributed 47 metric tons of CO<sub>2</sub>e, via electricity and natural gas-powered facilities. Water transport facilities are stratified by departments and entailed specific energy costs. The total energy cost for 2005 baseline year emissions was \$34,559. In terms of total electricity and natural gas use, water transport facilities consumed 207,115 kWh and 69 therms, respectively.

### Energy Use and Emissions from Water Transport Equipment

| Source       | Greenhouse Gas Emissions (metric tons CO <sub>2</sub> e) | Percent Emissions of Water Transport Equipment | Electricity Use (kWh) | Natural Gas Use (therms) | Cost (\$)       |
|--------------|----------------------------------------------------------|------------------------------------------------|-----------------------|--------------------------|-----------------|
| Public Works | 46                                                       | 99.0%                                          | 205,043               | 69                       | \$34,053        |
| Parks        | 0.5                                                      | 1.0%                                           | 2,072                 | -                        | \$506           |
| <b>Total</b> | <b>47</b>                                                | <b>100.0%</b>                                  | <b>207,115</b>        | <b>69</b>                | <b>\$34,559</b> |

It is important to note that emissions associated with the generation of electricity, which comprise a significant portion of the greenhouse gasses associated with building energy, can vary widely from year to year. The GHG emissions associated with electricity use are based on an emissions factor specific to PG&E's territory and are calculated annually by PG&E and then made available to municipalities. The



source of the emission factor used for the 2005 Inventory is the PG&E Power/Utility Protocol (PUP) spreadsheet of the PG&E California Climate Action Registry Report. In future inventory years, the emission factor may be found in the Additional Optional Information tab of PG&E's Electric Power Sector report spreadsheet, which is part of PG&E's Report to The Climate Registry. PG&E's specific emissions factor is calculated by dividing PG&E's total emissions from their power plants (in pounds of CO<sub>2</sub>) by the total amount of electricity (in megawatt-hours or MWh) delivered to end users. This factor varies year over year because PG&E's electricity sources change. For instance, the utility specific emissions factor for PG&E in 2006 was 455.81 lbs/MWh whereas in 2008 it was 641.35 lbs/MWh. For PG&E, the variance is typically dependent on the availability of hydroelectric resources. During low precipitation years, there is less water available to generate emissions free hydropower. Because of this, PG&E must compensate by supplying more electricity generated from natural gas or coal.

The 2005 emissions factor of 489.16 was used for the 2005 Inventory. For future inventories, a three-year average emissions factor will be used if large variances occur from year to year.

## **Transportation Emissions**

Mobile emissions associated with the County vehicle fleet and mobile equipment sector (12%), in addition to employee commute patterns (37%), collectively constituted the greatest share of GHG emissions (49%) in the 2005 Inventory (see Figure 4). However, County vehicle fleet and mobile equipment, in addition to the employee commute sector, represent distinct energy consumption sectors and emission scopes. County vehicle fleet and mobile equipment emissions are Scope 1 emissions and contribute directly to government operations, as they are funded and operated by the County. Employee commute emissions, which are indirect and beyond the purview of government financial and operational control, thusly represent Scope 3 emissions. By way of comparison, Scope 1 emissions entail fuel purchased for vehicle use. The Public Works Department compiled vehicle fleet and mobile equipment emissions data; a County-wide survey informed employee commute emissions data.

The County vehicle fleet and mobile equipment sector transports County employees, equipment, and goods for tasks conducive to County services. Maintenance trucks, police cruisers, and fire trucks are examples of fleet vehicles and mobile equipment. Vehicles and mobile equipment emit GHGs primarily through the fuel combustion and propulsion processes. Primary fuels – listed in order of volume consumed - include gasoline, diesel, and natural gas. Mobile emissions also result from refrigerant leakage stemming from air conditioning and refrigeration components within the vehicle fleet and mobile equipment. The following table illustrates sector emissions for the baseline 2005 year.

### Vehicle Fleet and Mobile Equipment Emissions

| Function           | GHG Emissions (metric tons CO <sub>2</sub> e) | Percent of All Mobile Emissions | Gasoline Consumption (gal) | Diesel Consumption (gal) | Natural Gas Consumption (therms) | Cost               |
|--------------------|-----------------------------------------------|---------------------------------|----------------------------|--------------------------|----------------------------------|--------------------|
| All Fleet Vehicles | 4,838                                         | 95%                             | 453,188                    | 72,079                   | 6,919                            | \$1,092,097        |
| Mobile Equipment*  | 226                                           | 4%                              | 3,798                      | 19,007                   | -                                | \$47,175           |
| Refrigerants       | 2                                             | 0.05%                           | N/A                        | N/A                      | N/A                              | N/A                |
| <b>Total</b>       | <b>5,066</b>                                  | <b>100%</b>                     | <b>456,986</b>             | <b>91,086</b>            | <b>6,919</b>                     | <b>\$1,139,272</b> |

\* Emissions estimate includes six gallons of propane (LPG) consumption.

Comprehensively, mobile emissions from County government operations accounted for an estimated 5,066 metric tons of CO<sub>2</sub>e. The vehicle fleet comprised 95% of total sector emissions; as of 2005, the fleet also consisted of approximately 875 vehicles.<sup>22</sup>

Among all transportation emissions sectors, the employee commute sector represented the largest share of CO<sub>2</sub>e emissions. Employee commute patterns generated 15,341 metric tons of CO<sub>2</sub>e over the course of 32,510,058 vehicle miles traveled to work in 2005. The employee commute sector emitted the equivalent of 37% of GHG emissions related to all County government operations emissions. The table below reinforces aggregated employee commute emissions data.

### Emissions from Employee Commutes

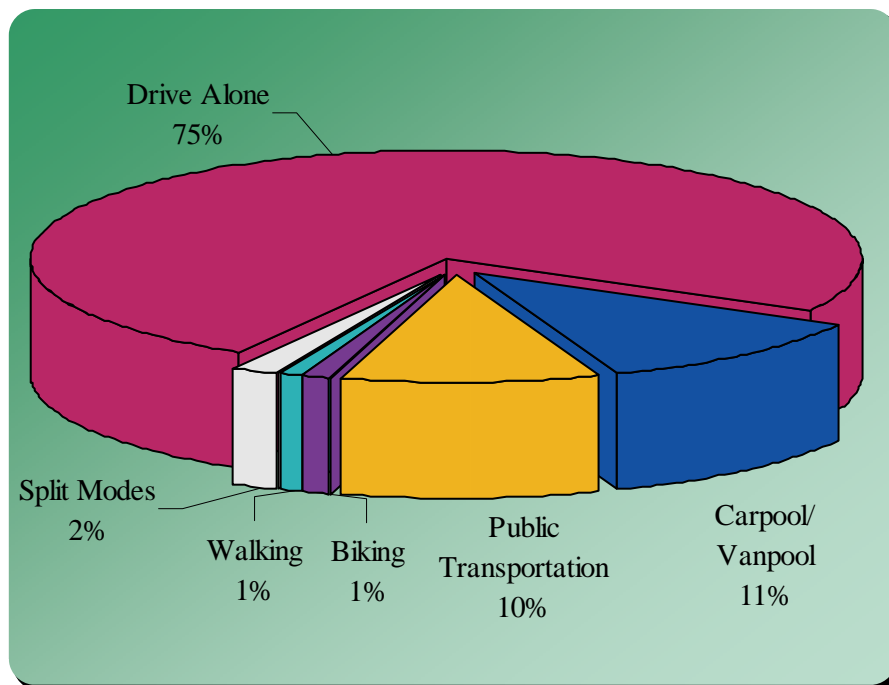
|                                  | Greenhouse Gas Emissions (metric tons CO <sub>2</sub> e) | Estimated Vehicle Miles Traveled to Work | Average Estimated Vehicle Miles Traveled to Work |
|----------------------------------|----------------------------------------------------------|------------------------------------------|--------------------------------------------------|
| <b>All Employees (Estimated)</b> | 15,341                                                   | 32,510,058                               | 5,950                                            |

Employee commute data resulted from a County-wide survey designed by ICLEI-Local Governments for Sustainability that yielded 1086 responders for a 20% response rate. County employees volunteered personal commute habits such as daily distance traveled, type of vehicle, and motivation for commute preferences. Employee commute options spanned six categorical transportation modes, motorized and non-motorized, including solo driving, public transit, and walking. Survey results indicated that

<sup>22</sup> Estimate provided by Kim Springer, Resource Conservation Programs Manager, Department of Public Works, County of San Mateo.

approximately 96% of County employees commuted by a single, motorized vehicle mode: 75% of employees commuted by driving alone while 11% chose carpool/vanpool commuting, and 10% preferred public transportation options. Less than 5% chose split modes, which includes transferring from one mode to another on a single trip, or non-vehicular modes, such as walking or biking. The following figure illustrates modal splits among County employees.

**Transportation Emissions – Employee Commute Modal Shares**



## Solid Waste Emissions

Solid waste derived from County government operations encompasses solid waste facilities and government generated solid waste sectors. These respective sectors each accounted for 2% of County CO<sub>2</sub>e emissions in 2005; all solid waste activities collectively contributed 4% of County emissions. Emissions from waste result from organic materials decomposing in the anaerobic environment of a landfill that produces methane—a GHG 21 times more potent than carbon dioxide. Organic materials (e.g., paper, plant debris, food waste, and so forth) generate methane within the anaerobic environment of a landfill while non-organic materials do not (e.g., metal, glass, and so on). The County owns two landfills, in Pescadero and Half Moon Bay, which were closed as of 2005. However, residual "fugitive" emissions from the landfills continued, as a result of continuous material decomposition. The

following table shows the approximate breakdown of respective baseline fugitive emissions at the defunct, County-operated landfills.

#### Solid Waste Emissions by Facility

| Gas             | Source                 | Greenhouse Gas Emissions<br>(metric tons CO <sub>2</sub> e) |
|-----------------|------------------------|-------------------------------------------------------------|
| CH <sub>4</sub> | Pescadero Landfill     | 298                                                         |
| CH <sub>4</sub> | Half Moon Bay Landfill | 713                                                         |
| <b>Total</b>    |                        | <b>1,011</b>                                                |

Landfill gas (LFG) collection does not occur at either landfill site. Although the Half Moon Bay landfill contains gas monitoring wells, gas capture and destruction capabilities are not deployed. Absent LFG collection measures, fugitive emissions were calculated using the First Order Decay (FOD) model<sup>23</sup> with data sourced from the Department of Public Works and Parks. The model estimates emissions from landfills based on a variety of factors such as historical waste deposits, length of operations, types of waste deposited, and local climate.

The County generated solid waste at over 30 government sites in 2005 where solid waste was collected and transported for eventual processing and storage at landfills outside of County jurisdiction. Waste emissions occur at landfills, as opposed to the point of waste generation.<sup>24</sup> The table below identifies specific facilities' impacts on GHG emissions, as a function of solid waste generation.

#### Emissions from Government Generated Solid Waste

| Source                               | Greenhouse Gas Emissions<br>(metric tons CO <sub>2</sub> e) | Estimated Landfilled Waste<br>(Tons) |
|--------------------------------------|-------------------------------------------------------------|--------------------------------------|
| <b>Burlingame Long Term Care</b>     | 159                                                         | 627                                  |
| <b>Maguire Correctional Facility</b> | 129                                                         | 510                                  |
| <b>Women's Jail</b>                  | 127                                                         | 502                                  |
| <b>SMC Health Center</b>             | 98                                                          | 386                                  |

<sup>23</sup> FOD model provided by the CA Air Resources Board: <http://www.arb.ca.gov/cc/protocols/localgov/pubs/pubs.htm>

<sup>24</sup> ICLEI. 2005 GHG Inventory, p. 27.

|                                 |              |              |
|---------------------------------|--------------|--------------|
| Self-Haul, Parks and Recreation | 85           | 334          |
| Hillcrest Juvenile Hall         | 64           | 251          |
| Work Center                     | 53           | 209          |
| Human Services Department       | 39           | 153          |
| Hall of Justice                 | 32           | 126          |
| San Carlos Airport              | 32           | 125          |
| All Other Facilities (20)       | 185          | 729          |
| <b>Total</b>                    | <b>1,002</b> | <b>3,953</b> |

## Appendix F. Emission Reduction Measures: Calculations

The following calculations are taken from the RICAPS Selection of Measures Tool v2. Potential 2020 cumulative reductions calculated by multiplying annual emissions by 15 years (2005 – 2020), assuming immediate implementation. Annual estimated GHG emission reductions also assume complete implementation.

### Energy Efficient Street Lighting and Traffic Signals

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |         |                                                                        |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------------------------|
| Resource Savings              | $Energy\ Savings\ (kWh) = \left[ S \times (W_i - W_e) \times \left( \frac{h \times d}{1000} \right) \right]$ <p>           S = # of installed lights (by 2020)<br/>           W<sub>i</sub> = Power rating in watts of existing lights<br/>           W<sub>e</sub> = power rating in watts of efficient lights<br/>           h = number of hours per day operating<br/>           d = number of days per year operating         </p> <p>kWh saved = 100 x 350 x 12 x 365 / 1000 = 153,300 kWh</p> |         |                                                                        |
|                               | Where                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |         |                                                                        |
|                               | S=                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2176    | Estimated number of installed lights every year (2176 lights/30 years) |
|                               | W <sub>i</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 70      | Power rating in watts of existing lights                               |
|                               | W <sub>e</sub> =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 50      | Power rating in watts of efficient lights                              |
|                               | h=                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 12      | number of hours per day operating                                      |
|                               | d=                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 365     | number of days per year operating                                      |
|                               | F=                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.13    | Projected PG&E emissions factor in MT CO <sub>2</sub> /MWh             |
| Resource Savings Calculation: | Total electricity savings=                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 190,618 | kwh/year                                                               |

|                                     |                                                                                                                                     |             |                                              |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------|
| GHG Emission Reduction              | $GHG\ Reduction\ (mtons) = \frac{\left[ S \times (W_i - W_e) \times \left( \frac{h \times d}{1000} \right) \right]}{1000} \times F$ |             |                                              |
| GHG Emission Reduction Calculations | Total GHG Emissions Reduced=                                                                                                        | 25          | metric tons CO2e/year                        |
| Costs and Savings                   | Total Capital Cost = [Number of units installed x cost per unit] + [Cost of installation] – [Available rebates]                     |             |                                              |
|                                     | Where:<br>Number of units installed:                                                                                                | 2176        | units                                        |
|                                     | Where<br>Cost per unit=                                                                                                             | \$700       | dollars/unit                                 |
|                                     | Cost of installation=                                                                                                               | \$0         | dollars                                      |
|                                     | Available rebates=                                                                                                                  | \$0         | dollars                                      |
|                                     | Total savings= kwh reduced/year * \$/kwh                                                                                            |             |                                              |
|                                     | Where:<br>\$/kwh=                                                                                                                   | \$ 0.21     | PG&E projected 2020 rates for commercial     |
|                                     | Some staff time may be needed to implement the program.                                                                             |             |                                              |
|                                     | 0.0                                                                                                                                 | FTE         | =estimated staff time to develop new program |
| Costs and Savings Calculation       | Total Capital Cost =                                                                                                                | \$1,523,200 | dollars                                      |
|                                     | Total Savings =                                                                                                                     | \$40,017    | dollars/year                                 |

Source: Original cost estimates from Ann Stillman, Deputy Director, Public Works, 8/21/2012; revised estimates derived from project timeline adjustment to 2020 from 2035.

## Purchasing Energy Efficient Products

|                                     |                                                                                                                                                                                        |                                    |                                               |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------------------------------------|
| Resource Savings                    | Energy savings = projected baseline electricity consumption in 2020 (kWh) x Psavings x Preplaced                                                                                       |                                    |                                               |
|                                     | Where:                                                                                                                                                                                 |                                    |                                               |
|                                     | Baseline usage=                                                                                                                                                                        | 39,781,759                         | Kwh/year                                      |
|                                     | Psavings=                                                                                                                                                                              | 15%                                | percentage of savings achieved by Energy Star |
|                                     | Preplaced=                                                                                                                                                                             | 10%                                | percentage of devices replaced by 2020        |
|                                     | Examples:<br>Baseline usage = 11,000,000 kWh/year<br>Total energy Savings = 11,000,000 x 0.25 x 0.15 = 412,500 kWh/year                                                                |                                    |                                               |
| Resource Savings Calculation        | Total electricity savings= 596,726 Kwh/year                                                                                                                                            |                                    |                                               |
| GHG Emission Reductions             | GHG Savings = Energy savings (kWh)/1000 x EF (0.13 metric tons/MWh)                                                                                                                    |                                    |                                               |
|                                     | Where:                                                                                                                                                                                 |                                    |                                               |
|                                     | EF=                                                                                                                                                                                    | 0.13                               | metric tons CO2e/MWh (EF=emission factor)     |
|                                     | 1000                                                                                                                                                                                   | = conversion factor for kWh to MWh |                                               |
|                                     | Example:<br>Total GHG Savings = 412,500 /1000 x 0.13 = 54 metric tons/year                                                                                                             |                                    |                                               |
| GHG Emission Reduction Calculations | Total GHG emissions reduced = 78 metric tons CO2e/year                                                                                                                                 |                                    |                                               |
| Costs and Savings                   | Low cost/no cost. Green procurement does not necessarily require more spending and may save money over the long run, although some staff time may be needed to implement this program. |                                    |                                               |
|                                     | 0.5                                                                                                                                                                                    | FTE                                | =estimated staff time to develop new program  |
|                                     | Total savings= kwh reduced/year * \$/kwh                                                                                                                                               |                                    |                                               |



|                               |                   |            |                                          |
|-------------------------------|-------------------|------------|------------------------------------------|
|                               | Where:<br>\$/kwh= | \$<br>0.21 | PG&E projected 2020 rates for commercial |
| Costs and Savings Calculation | Total Savings =   | \$125,272  | dollars/year                             |

Source: Baseline usage from 2005 County of San Mateo GHG Inventory

### Renewable Energy Technology

|                               |                                                                                                            |                                    |                                                          |
|-------------------------------|------------------------------------------------------------------------------------------------------------|------------------------------------|----------------------------------------------------------|
| Resource Savings              | Annual Energy Savings (kWh) = S × E × 8760                                                                 |                                    |                                                          |
|                               | Where:<br>S =                                                                                              | 600                                | = Number of additional kW of solar installations by 2020 |
|                               | E =                                                                                                        | 19%                                | = efficiency of generation (recommend 19%)               |
|                               | Hrs/yr =                                                                                                   | 8760                               | = number of hours per year                               |
|                               | Example:<br>102 kW of solar installations<br>Total Energy Savings = 102 × 0.19 × 8760 = 169,768.8 kWh/year |                                    |                                                          |
| Resources Savings Calculation | Total Annual Energy Savings:                                                                               | 998,640                            | kWh/year                                                 |
| GHG Emission Reduction        | Total GHG Savings = Energy Savings (kWh) / 1000 x 0.13 MT CO2/MWh                                          |                                    |                                                          |
|                               | Where:<br>EF =                                                                                             | 0.13                               | metric tons CO2e / MWh                                   |
|                               | 1000                                                                                                       | = conversion factor for kWh to MWh |                                                          |
|                               | Example:<br>Total GHG Savings = 169,769/1000 x 0.13 = 22 metric tons/year                                  |                                    |                                                          |

|                                               |                                                                                                                      |                  |                                              |
|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------|----------------------------------------------|
| GHG<br>Emission<br>Reductions<br>Calculations | Total GHG Savings =                                                                                                  | 130              | metric tons CO2e/year                        |
| Cost and<br>Savings                           | Total Capital Cost = Total cost of Solar Units (bulk purchase + installation) + Total Staff Cost - Available Rebates |                  |                                              |
|                                               | Where<br>Total Bulk Cost =                                                                                           | \$5,000,000      | Total dollars for units and installation     |
|                                               | Some staff time may be needed to implement the program.                                                              |                  |                                              |
|                                               | 0.5                                                                                                                  | FTE              | =estimated staff time to develop new program |
|                                               | Available Rebates =                                                                                                  | \$2,020,000      | Dollars                                      |
|                                               | Total Savings = kWh reduced/year x \$/kWh                                                                            |                  |                                              |
|                                               | Where:<br>\$/kWh =                                                                                                   | \$<br>0.21       | PG&E projected 2020 rates for commercial     |
| Cost and<br>Savings<br>Calculations           | Total<br>Capital Cost =                                                                                              | \$2,980,000      | Dollars (Capital costs minus rebates)        |
|                                               | Total Savings =                                                                                                      | \$<br>209,647.34 | Dollars/year                                 |

Notes: Annual emission reductions include 362 kW project at County parking garage built after 2005 baseline.

Source: Cost estimates from Doug Koenig, Deputy Director, Public Works, 8/21/2012

## Increase Energy Efficiency in County Buildings

|                                     |                                                                                                                                                                                         |                                                                                                            |                                              |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| Resource Savings                    | Electricity Energy Savings (kWh)=Ee×(Csf×13.63)                                                                                                                                         |                                                                                                            |                                              |
|                                     | Gas Savings (therms)=Eg×(Csf×0.26)                                                                                                                                                      |                                                                                                            |                                              |
|                                     | Where:                                                                                                                                                                                  |                                                                                                            |                                              |
|                                     | Csf =                                                                                                                                                                                   | 2,117,000                                                                                                  | # Sq feet of building space upgraded by 2020 |
|                                     | Ee =                                                                                                                                                                                    | 10%                                                                                                        | Target electric energy savings               |
|                                     | Eg =                                                                                                                                                                                    | 10%                                                                                                        | Target gas savings                           |
|                                     | 13.63                                                                                                                                                                                   | = Average electric use intensity for commercial buildings in kWh/square foot/year (CEUS)                   |                                              |
|                                     | 0.26                                                                                                                                                                                    | = Average natural gas intensity for commercial buildings in therms/square foot/year (CEUS)                 |                                              |
| Resource Savings Calculation        | Example:<br>200,000 sq. feet retrofitted<br>Electricity Energy Savings = 0.10 x (200,000 x 13.63) = 272,600 kWh/year<br>Natural Gas Savings = 0.10 x (200,000 x 0.26) 5,200 therms/year |                                                                                                            |                                              |
|                                     | Electric Energy Savings (kWh) =                                                                                                                                                         | 2,885,471                                                                                                  | kWh/year                                     |
|                                     | Gas Savings (therms) =                                                                                                                                                                  | 55,042                                                                                                     | therms/year                                  |
| GHG Emissions Reduction             | GHG Savings (metric tons)=(kWh reduced/1000×0.13)+(therms reduced/10×53.06/1000)                                                                                                        |                                                                                                            |                                              |
|                                     | 0.13                                                                                                                                                                                    | PG&E emissions factor for electricity in metric tons/MWh                                                   |                                              |
|                                     | 53.06                                                                                                                                                                                   | Emissions factor for natural gas in kg CO2/MMBtu                                                           |                                              |
|                                     | 1000                                                                                                                                                                                    | = conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation) |                                              |
|                                     | 10                                                                                                                                                                                      | = conversion factor for therm to MMBtu                                                                     |                                              |
|                                     | Example:<br>Total GHG Savings =((272,600)/1000 x 0.13) + ((5,200)/10 x 53.06/1000) = 35+ 28 = 63 metric tons/year                                                                       |                                                                                                            |                                              |
| GHG Emissions Reduction Calculation | Total GHG Savings =                                                                                                                                                                     | 667                                                                                                        | Metric Tons CO2e/year                        |
| Cost and Savings                    | Staff or consultant's fees for energy audit + cost of all commercial square feet energy efficiency upgrades - available rebates                                                         |                                                                                                            |                                              |

|                               |                                                                            |              |                                                                                 |
|-------------------------------|----------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------|
|                               | Some staff time may be needed to implement the program.                    |              |                                                                                 |
|                               | 0.5                                                                        | FTE          | =estimated staff time to develop new program                                    |
|                               | Total Cost of Csf Energy Efficiency Upgrades =                             | \$18,762,000 | Cost for Equipment and installation                                             |
|                               | Available Rebates =                                                        | \$3,724,000  | Energy Efficiency Rebates                                                       |
|                               | Total Savings = kWh reduced/year x \$/kWh + therms reduced/year x \$/therm |              |                                                                                 |
|                               | Where:<br>\$/kWh =                                                         | \$<br>0.21   | PG&E projected 2020 rates for commercial                                        |
|                               | Where:<br>\$/Therm =                                                       | \$<br>1.02   | PG&E projected 2020 rates for commercial                                        |
|                               |                                                                            |              |                                                                                 |
| Cost and Savings Calculations | Total Capital Cost of all Energy Efficiency Upgrades =                     | \$10,000,000 | Total cost of audits, purchases & installation of equipment - potential rebates |
|                               | Total \$ Savings Annually =                                                | \$662,084    | Dollars/year                                                                    |

Source: County of San Mateo Strategic Energy Master Plan (draft), July 20, 2012; cost estimates from the Strategic Energy Master Plan

### Alternative Work Schedules

|                  |                                                      |                               |                                                                 |
|------------------|------------------------------------------------------|-------------------------------|-----------------------------------------------------------------|
| Resource Savings | VMT Reduction = Baseline VMT x [C x (T/P) x (X/230)] |                               |                                                                 |
|                  | Gasoline savings = (VMT reduction / fleet mpg )      |                               |                                                                 |
|                  | Where:                                               |                               |                                                                 |
|                  | Baseline VMT=                                        | 32,000,000                    | Baseline vehicle miles traveled                                 |
|                  | C =                                                  | 0.75                          | % of total expected 2020 jurisdictional VMT from commuting      |
|                  | T=                                                   | 1,000                         | # of new telecommuters in jurisdiction from this program        |
|                  | P=                                                   | 5,400                         | total jurisdictional population                                 |
|                  | X =                                                  | 50                            | average # of workdays per year new telecommuters work from home |
|                  | 230                                                  | = number of workdays per year |                                                                 |
|                  | fleet mpg=                                           | 20.0                          | average fleet miles per gallon                                  |

|                                    |                                                                                                                                                                                                                 |                                                          |                                              |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------|
|                                    | Example:<br>VMT Reduction = 1,250,000 * [0.5 * (2,500/80,000) * (50/230)] = 4,246 VMT<br>Gasoline Reduction = 4,246 VMT / 27.5 mpg = 154 gallons of gasoline                                                    |                                                          |                                              |
| Resource Savings Calculation       | VMT Reduced =                                                                                                                                                                                                   | 966,184                                                  | VMT/year                                     |
|                                    | Gasoline Reduced=                                                                                                                                                                                               | 48,309                                                   | gallons of gasoline                          |
| GHG Emission Reductions            | GHG Savings = VMT Savings x 0.000501                                                                                                                                                                            |                                                          |                                              |
|                                    | 0.000501                                                                                                                                                                                                        | = Composite emission factor, MT CO2 per VMT (EMFAC 2007) |                                              |
|                                    | Example:<br>GHG Savings = 4246 VMT x 0.000501 = 2 metric tons                                                                                                                                                   |                                                          |                                              |
| GHG Emission Reduction Calculation | GHG Savings=                                                                                                                                                                                                    | 484                                                      | metric tons CO2e                             |
| Costs and Savings                  | Assume mild office energy use directly proportional the number of employees present. The cost of energy use is reduced by the reduction in average office attendance rate.<br>Cost may include some staff time. |                                                          |                                              |
|                                    | 0.1                                                                                                                                                                                                             | FTE                                                      | =estimated staff time to develop new program |
| Costs and Savings Calculation      | None                                                                                                                                                                                                            |                                                          |                                              |

Source: Population, VMT, and commuting percentage numbers from the 2005 County of San Mateo GHG Inventory

### Commute Alternatives Program

|                                                      |    |
|------------------------------------------------------|----|
| <b>Calculations:</b>                                 |    |
| Average number of miles commuting roundtrip each day | 25 |
| Average number of days working per month             | 22 |
| Average miles per gallon of car                      | 20 |

|                                                                                                                                    |             |
|------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Resulting monthly CO2 emissions from driving one car (lbs CO2)                                                                     | 534         |
| Number of employees in CAP in 2005                                                                                                 | 1200        |
| 50% increase in employees                                                                                                          | 600         |
| Assuming 75% participants take transit                                                                                             | 450         |
| Annual CO2 emissions reductions (MT CO2e)                                                                                          | 1308.348457 |
| <i>Source: EPA Personal Emissions Calculator; CAP participation number from Lori Pastorelli, CAP Program Manager, Public Works</i> |             |

### Purchase Fuel Efficient, Low Emissions Vehicles

|                              |                                                                        |                                                          |                                   |
|------------------------------|------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------|
| Resource Savings             | VMT Reduction = GHG Reduction/0.000501                                 |                                                          |                                   |
|                              | Where:                                                                 |                                                          |                                   |
|                              | 0.000501                                                               | = Composite emission factor; MT CO2 per VMT (EMFAC 2007) |                                   |
|                              | Example:<br>VMT Reduction = 63/0.000501 = 125,905 VMT reduced/year     |                                                          |                                   |
| Resource Savings Calculation | VMT Reduced =                                                          | 637,834                                                  | VMT/year                          |
| GHG Emission Reductions      | GHG Savings = Q x (GHG Reduction Ratio x P)                            |                                                          |                                   |
|                              | GHG Reduction Ratio = 1 - (Alternative emissions / Baseline emissions) |                                                          |                                   |
|                              | Where:<br>Baseline emissions =                                         | Efb x 1/FE x VMT x 365 x C                               |                                   |
|                              | Alternative emissions =                                                | EFa x (1/FE) x ER x VMT x 365 x C                        |                                   |
|                              | Where:<br>FE=                                                          | 28                                                       | = fuel economy (miles per gallon) |

|                                     |                                                                                                                                                          |                 |                                                                                             |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------|
|                                     | ER=                                                                                                                                                      | 1.56            | = Energy ratio from the US Department of Energy: <i>see table in CAPCOA pg. 305 (VT-2).</i> |
|                                     | VMT=                                                                                                                                                     | 60              | = vehicle miles traveled per day                                                            |
|                                     | 365                                                                                                                                                      | = days per year |                                                                                             |
|                                     | EF <sub>b</sub> =                                                                                                                                        | 8.81            | = Baseline emission factor for CO2 (kg emissions per gallon)                                |
|                                     | Ef <sub>a</sub> =                                                                                                                                        | 4.46            | =Alternative emission factor for CO2 (kg emissions per gallon)                              |
|                                     | C=                                                                                                                                                       | 0.001           | = Conversion factor                                                                         |
|                                     | P=                                                                                                                                                       | 30%             | = Proportion of fleet switching to alternative fuel                                         |
|                                     | Q=                                                                                                                                                       | 5,066           | Current fleet GHG emissions (metric tons CO2e)                                              |
|                                     |                                                                                                                                                          |                 |                                                                                             |
| GHG Emission Reduction Calculations | Baseline emissions=                                                                                                                                      | 7               | metric tons CO2e                                                                            |
|                                     | Alternative emissions=                                                                                                                                   | 6               | metric tons CO2e                                                                            |
|                                     | GHG Reduction Ratio =                                                                                                                                    | 0.21            | Ratio                                                                                       |
|                                     | GHG Savings=                                                                                                                                             | 320             | metric tons CO2e                                                                            |
| Costs and Savings                   | Cost includes up-front investment in new electric vehicles. However, expected positive net return after several years. Cost may include some staff time. |                 |                                                                                             |
|                                     | 0.1                                                                                                                                                      | FTE             | =estimated staff time to develop new program                                                |
|                                     | 10-year costs savings (Edmunds): [C1 + (F1x10) + (R1x10)] - [C2 + (F2x10) + (R2x10)]                                                                     |                 |                                                                                             |
|                                     | Where:                                                                                                                                                   |                 |                                                                                             |
|                                     | C1=                                                                                                                                                      | \$20,000        | Old vehicle purchase cost                                                                   |
|                                     | F1=                                                                                                                                                      | \$3,000         | Old vehicle annual fuel cost                                                                |
|                                     | R1=                                                                                                                                                      | \$2,000         | Expected annual repair and maintenance costs for old vehicle                                |
|                                     | C2=                                                                                                                                                      | \$30,000        | New vehicle purchase cost                                                                   |
|                                     | F2=                                                                                                                                                      | \$1,000         | New vehicle average annual fuel cost                                                        |

|                              |                                                                                                                                                                |         |                                                              |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------------------------------------------------|
|                              | R2=                                                                                                                                                            | \$2,000 | Expected annual repair and maintenance costs for new vehicle |
|                              | Example:<br>$\text{Cost Savings} = [\$20,000 + (\$3,000 \times 10) + (\$2,000 \times 10)] - [\$30,000 + (\$1,000 \times 10) + (\$2,000 \times 10)] = \$10,000$ |         |                                                              |
| Cost and Savings Calculation | \$10,000 Total savings over 10 years                                                                                                                           |         |                                                              |

Source: Current emissions from the 2005 County of San Mateo GHG Inventory; Fleet conversion estimates from County's efficient vehicle purchasing policy

### Divert 75% of all Solid Waste by 2020

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |             |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------|
| Resource Savings | <b>Total Base Year Disposal = Mbylsw = City base year inventory landfilled solid waste</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |       |             |
|                  | <b>NOTE: The municipal landfilled solid waste amount (Mbylsw) figures can be found in the Waste Section of City's municipal Green House Gas Inventory and reflects the total disposal amount after diversion for the base year.</b>                                                                                                                                                                                                                                                                                                                                 |       |             |
|                  | Where:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |             |
|                  | Municipal base year inventory landfilled solid waste amount (Mbylsw) =                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 3,953 | Metric Tons |
|                  | <b>Total Municipal Future Year Disposal Amount = <math>(Mbylsw / (1 - Dby)) \times (1 - Dfy)</math></b><br><b>2. To find Municipal future year disposal amount (for purposes of simplicity, assume future year waste generation is the same as base year waste generation):</b>                                                                                                                                                                                                                                                                                     |       |             |
|                  | <b>2.1-</b> Take the municipal base year landfilled solid waste amount (Mbylsw) figure found in the Waste Section of City's Municipal Greenhouse Gas (GHG) Inventory and divide it by $[1 - (\text{diversion rate in base year})]$ (Dby) to get the municipal base year waste generation (Mbyg) amount. Assume the municipal operations achieved the same diversion rate as the entire City, unless other data are available showing the exact municipal diversion rate. Then, multiply by $(1 - [\text{the diversion goal in the future year}])$ (Dfy) percentage. |       |             |
|                  | Example:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |       |             |
|                  | Total Municipal Future Year Disposal Amount = $((600 / (1 - 0.55)) \times 0.25) = 333 \text{ Tons}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |       |             |
|                  | Diversion Rate in baseline year (Dby)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 40%   |             |



|                                     |                                                                                                                                                                                                                                                                        |       |                                              |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------|
|                                     | Diversion Rate in future year (Dfy)                                                                                                                                                                                                                                    | 75%   |                                              |
| Resource Savings Calculations       | Where:<br>Municipal Base Year Generation Amount (Mbyg) =                                                                                                                                                                                                               | 6,588 | Metric tons                                  |
|                                     | Total Municipal Future Year landfilled solid waste amount =                                                                                                                                                                                                            | 1,647 | Metric tons                                  |
| GHG Emission Reductions             | <b>1. To find base year CO2e emissions:</b>                                                                                                                                                                                                                            |       |                                              |
|                                     | <b>1.1- The base year CO2e emissions can be found in the Waste Section of the city's Municipal Greenhouse Gas (GHG) Inventory.</b>                                                                                                                                     |       |                                              |
|                                     | <b>1.2 - Calculate the emissions factor for landfilled waste To calculate the emission factor, divide the emissions in metric tons of CO2e by the total tonnage of waste in the baseline inventory. See example below. The emission factor should remain constant.</b> |       |                                              |
|                                     | Example:<br>Landfilled solid waste amount = 6969 MT CO2e / 38,170 tons of waste = 0.182577941 MT CO2e/ton of waste                                                                                                                                                     |       |                                              |
| GHG Emission Reduction Calculations | <b>2. To find future year CO2e emissions:</b>                                                                                                                                                                                                                          |       |                                              |
|                                     | <b>2.1- Take the future year disposal amount and multiply by the emission factor.</b>                                                                                                                                                                                  |       |                                              |
|                                     | <b>2.2- Subtract future year disposal CO2e emissions from baseline year CO2e emissions to calculate GHG emission reductions.</b>                                                                                                                                       |       |                                              |
|                                     | Total municipal baseline emissions from landfilled solid waste                                                                                                                                                                                                         | 1,002 | metric tons CO2/year                         |
|                                     | (Cbylsw) Emissions Factor =                                                                                                                                                                                                                                            | 0.253 | Metric tons CO2e/ ton of landfilled waste    |
| Costs and Savings                   | Total future year GHG emissions                                                                                                                                                                                                                                        | 418   | Metric tons CO2e/year                        |
|                                     | Total annual emissions reductions by 2020:                                                                                                                                                                                                                             | 585   | Metric tons CO2e/year in 2020                |
| Costs and Savings                   | Cost may include additional staff time.                                                                                                                                                                                                                                |       |                                              |
|                                     | 0.5                                                                                                                                                                                                                                                                    | FTE   | =estimated staff time to develop new program |

|                               |      |
|-------------------------------|------|
| Costs and Savings Calculation | None |
|-------------------------------|------|

*Source: Baseline waste tonnage and emissions from 2005 County of San Mateo GHG Inventory; waste diversion rate based on discussions with Public Works staff*

### **Update the County's Environmentally Preferred Purchasing Policy**

No emission reduction calculations available.