



# Climate Action Plan



County Government Operations

June 2012

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#### THIS DOCUMENT AVAILABLE IN ALTERNATE FORMATS

In keeping with the County's sustainability goals and our efforts to save resources and reduce waste, this document has been created in an electronic format, with bookmarks to facilitate navigation and allow duplex printing of single chapters. If you have a disability and the format of this or any material on our web site interferes with your ability to access some information, please email the County of Sacramento webmaster at: [dgsweb@saccounty.net](mailto:dgsweb@saccounty.net). The webmaster will refer your request to the appropriate Department or program for assistance.

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## CHAPTER 1

## Purpose and Context for this Plan



The County of Sacramento is committed to carrying out its operations in ways that are efficient and cost-effective and that minimize its environmental footprint, in order to both provide exceptional services to its constituents and preserve natural resources for current and future generations.

## Audience for this Plan

This Plan is written for County employees, elected officials and other interested stakeholders. Other local governments and the public may also be interested in the Plan as a source for best practices and to learn how the County is setting an example for the community. Readers may want to focus on specific sections based on their interests and/or their jobs. For easy reference, the tables in Chapter 4 present the measures according to implementing County department.

## Purpose and Need for this Plan

This document, the Sacramento County Climate Action Plan for Government Operations (Plan), describes measures the County is taking or will take to reduce greenhouse gas (GHG) emissions<sup>1</sup> from its operations while improving efficiencies, saving energy and money, and providing a number of other benefits for its employees and the community it serves.

The State of California has indicated that local governments such as Sacramento County have an important role to play in reducing GHG emissions. Responding to the evidence about causes and consequences of climate change, the state passed the landmark Global Warming Solutions Act of 2006, Assembly Bill 32 (AB 32). As a first step, that bill requires the State to reduce GHG emissions to 1990 levels by the year 2020. Through its 2008 Scoping Plan, the California Air Resources Board (CARB) established a plan to meet this goal, including recommended GHG emission reduction targets for local government (see Chapter 2).

Prior to the passage of AB 32, the County had already taken a number of steps to modernize and improve the efficiency of its operations and save money in ways that also reduced GHG emissions. For example, often with the help of grants and utility incentives, the County initiated actions to improve energy efficiency in its buildings through energy conservation programs and equipment upgrades. Similarly the County had already taken actions that reduce community-wide GHG emissions by building a landfill-to-gas energy plant at the County's Kiefer Landfill which provides enough power for 9,000 homes, and promoting water conservation to residents and businesses (less water use translates to less energy use and fewer associated GHG emissions).

The actions in this Plan present the County an opportunity to further modernize and improve the efficiency of its operations and services and set an example for the greater community.

1. Greenhouse gases (described more in Chapter 2) trap heat in the atmosphere, causing earth's temperatures to rise and leading to shifts in weather patterns. While natural variations have altered the climate significantly in the past, it is very unlikely that the changes in climate observed since the mid-20th century can be explained by natural processes alone. The vast majority of scientists agree that human activity, particularly the generation of greenhouse gases, is a key contributing factor to our changing climate. (For more information about climate change, see the website of the International Panel on Climate Change: [www.ipcc.ch](http://www.ipcc.ch) or NASA's website: [climate.nasa.gov/](http://climate.nasa.gov/))

# CLIMATE ACTION PLAN

## County Government Operations Reflected in this Plan

Sacramento County (as a geographical entity) encompasses almost 1,000 square miles and is home to more than 1.4 million people according to the 2010 U.S. Census Bureau. Parts of the county have been incorporated into cities whereas others remain unincorporated. About 11,600 County employees (2011) provide an array of services to the public, some of which (e.g., social services, legal services and Sheriff) apply to the entire County and others (e.g., issuing development and building permits and managing infrastructure and parks) apply only to the unincorporated areas.

To provide these services, the County owns, leases and operates numerous buildings and facilities (including offices, corporation yards and community centers); owns and operates four public-use airports including Sacramento International Airport; owns and manages a solid waste landfill (Kiefer Landfill); owns and cares for 30 parks, parkways and open space with a combined total of about 6 million trees; owns and operates a fleet of light and heavy duty vehicles; and maintains an extensive system of infrastructure, including roads, bridges, streetlights and signals, and storm drainage system.

This Plan describes measures to reduce GHG emissions related to all those facilities and operations except solid waste collection and disposal. Since the landfill serves the greater community and solid waste collection and transfer do the same, those operations will be reflected in a future Climate Action Plan addressing community-wide emissions.

Water delivery infrastructure in the County is owned and operated by about 20 different water purveyors. The Sacramento County Water Agency (SCWA) provides water to a portion of the unincorporated county. Through contractual arrangement, SCWA is staffed by County employees and therefore, measures to reduce GHG emissions associated with its operations are included in this Plan.

Sanitary sewage collection and treatment is handled by other separate legal entities (SRCSD, the Sacramento Area Sewer District and various cities), and GHG emission reduction measures for those operations are described in different plans.



Photo: Sacramento County Sheriff



## Guidance Provided by the Climate Action Plan Strategy and Framework Document

As a first step in documenting its efforts towards sustainability and climate action, the County prepared the *Sacramento County Climate Action Plan– Strategy and Framework Document* (Strategy and Framework Document) a comprehensive overview of what the County has done and can to be more efficient, save money and to reduce GHG emissions. Originally published in draft form in May 2009 (called the Phase 1 Climate Action Plan at that time), the document was updated and significantly refined for adoption by the Board of Supervisors on November 9, 2011. Goals, actions, and the overall strategy articulated in the Strategy and Framework Document were all considered during development of this Plan, the *Sacramento County Climate Action Plan for Government Operations*. In particular, the following strategies outlined in the previous document apply to this Plan:

- Lead by example by reducing GHG emissions associated with the County's own operations
- Establish priorities for actions that reduce GHGs considering the emissions inventories, cost-effectiveness, ease of implementation, and the extent to which the actions produce other benefits besides those related to climate change
- Leverage the County's existing climate change-related programs, investments and accomplishments, and seek to do more with existing resources
- Address projected vulnerabilities associated with climate change. As resources allow or as required, implement cost-effective actions that would lessen the projected impacts or yield other benefits. In particular, take steps to conserve and effectively manage water resources
- Practice adaptive management. Add, suspend, or modify implementation measures as appropriate based on ongoing evaluations and priority setting

This Plan builds on and refines the work of the Strategy and Framework Document with respect to County government operations. It:

- Provides a more accurate and detailed picture of the GHG emissions and sources related to County government operations (see Chapter 2)
- Describes the planning process and cost/benefit analysis used to select measures for implementation by the County and summarizes the alternative action plans resulting from the analysis (see Chapter 3)
- Presents the preferred action plan to reduce GHG emissions associated with County government operations to a level 15% below current levels by 2020 (see Chapter 4)
- Describes the procedures for implementation of the Plan, evaluation for continuous improvement and future updates (see Chapter 5)

After the County has made progress on implementing this Plan and gained a strong foothold on reducing GHG emissions associated with its own operations and services, it will address GHG emissions from the community.

This Plan is intended to set the County on track to meet its GHG emissions reduction targets while creating a more sustainable and efficient organization and one that is better equipped for a changing world.

In addition to describing the measures the County has and can take to reduce GHG emissions and increase the efficiency and sustainability of its operations, this Plan:

- Demonstrates the County's commitment to sustainability
- Educates and informs County employees, environmental regulators and the greater community about the steps the County has or will be taking
- Contributes to regional, state, and international efforts to reduce GHG emissions for the benefit of existing and future generations

# CLIMATE ACTION PLAN

## This Plan in the Context of the County's Sustainability Program

Sustainability refers to meeting the needs of the present without compromising the ability of future generations to meet their needs. Core values of the County's sustainability program, established in 2008, include increasing efficiency, creating jobs and building the new green economy, while improving and preserving the environment. This is reflected in the County mission statement adopted by the Board of Supervisors in May 2011: "Improve residents' quality of life by providing cost-effective public services while fostering economic health, regional cooperation and stewardship of community assets."

The County's commitment to sustainability is a critical strategy to help address challenges facing the County, such as:

- Economic uncertainty
- Predicted uncertainties in the region's water supply, which a changing climate is expected to exacerbate
- Concerns about energy reliability
- Forecasted escalating energy prices (given global demand and other factors)
- Other challenges due to climatic changes including increased flooding risks and stresses to the agricultural industry

Many of the measures described in this Plan, such as those aimed at increasing energy and fuel efficiency, are needed to reduce operating costs and continue providing high quality services to County residents, regardless of the state's climate change mandates. Most of the actions that reduce GHG emissions provide multiple additional benefits (referred to as co-benefits). For example, many of the measures that reduce GHG emissions also conserve energy, which saves money and helps shield the County from uncertainties regarding future energy costs. Another example: more efficient vehicles consume less fuel, save taxpayers' money, and release fewer air pollutants, benefitting air quality and public health.

California has been shown to be particularly vulnerable to the environmental, economic and societal implications of a changing climate. Addressing the myriad of challenges facing the County requires a continued shift in long-standing practices and thinking. Cost-saving measures can be undertaken to use resources more efficiently, streamline systems, and reduce demand on natural resources such as non-renewable energy sources, water, and land.



The county has partnered with SMUD to install solar panels on several buildings, including this 100 kW solar array for Sacramento County's Health & Human Services Building which came online in April 2008. In just 3 years, it has produced 450,000 kwh of electricity, reducing greenhouse gases equivalent to taking 61 cars off the road for a year. (Photo: Dan Mendonsa)

Some co-benefits also help the County adapt to changes forecasted due to a changing climate. For example, the co-benefit of saving energy becomes more critical if a changing climate increases demands for air conditioning (due to predicted increased heat waves). Similarly, conserving water becomes even more important if a changing climate adds unpredictability to the water supply.

Co-benefits are listed for the actions in the Strategy and Framework Document as well as this Plan.

## Countywide Participation in the Planning Process

The County's collaborative effort to address climate change began when the State of California passed AB 32 and Senate Bill (SB) 97<sup>2</sup>. At the time, the County's environmental review staff were preparing an Environmental Impact Report (EIR) for the County's Draft 2030 General Plan. These new laws required that their analysis consider the proposed project's GHG emissions and potential contribution to climate change. Recognizing that future projects subject to CEQA would likely need a similar analysis, the staff proactively coordinated with other County departments and cities within the County to create a countywide GHG emissions inventory that would serve as the basis for future efforts to quantify and reduce GHG emissions in a manner consistent with state law. County environmental staff also created "thresholds of significance" to aid in determining whether a proposed project's GHG emissions were a "significant impact" as defined by CEQA.

In 2007, the County Executive created an internal multi-departmental advisory team to increase awareness of County managers and initiate discussions about actions the County was taking or could take to reduce GHG emissions and become more sustainable. In 2008, to prepare for the



All Sacramento County department heads met together in Fall 2008 to collaborate about potential climate change impacts and sustainable solutions; that meeting provided valuable information for development of this plan.



In 2008 the County held two informational public workshops with the Board of Supervisors to discuss the need for the Climate Action Plan.

development of the Strategy and Framework Document, the County held two informational public workshops with the Board of Supervisors in the spring and a Department Head Sustainability Workshop in the fall for about 50 managers. The County's Sustainability Program Manager was also hired at that time, and she relied on feedback from the various workshops to inform the strategic planning process.

Throughout 2009-2011, staff in numerous County departments and groups (see Acknowledgements) contributed ideas, data and staff resources for preparation of both the Strategy and Framework Document (adopted by the Board of Supervisors in November 2011) and this Plan. They participated in various rounds of reviews of preliminary analysis results and draft work products. This multi-department collaboration helped to ensure that the analysis presented in these documents is accurate and the identified measures are feasible to implement.

The success of the Plan depends on continued commitment to the collaborative process during its implementation, as discussed in Chapter 5.

2. SB 97 required the Governor's Office of Planning and Research (OPR) to develop, and the Natural Resources Agency to adopt, amendments to the California Environmental Quality Act (CEQA) Guidelines addressing the analysis and mitigation of greenhouse gas emissions.

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## CHAPTER 2

# Greenhouse Gas Emissions and Reduction Targets

In Sacramento County, like the state and country as a whole, the most common source of GHG emissions is energy—energy used for transportation (i.e., burning vehicle fuel) as well as energy used to produce and deliver electricity and gas for heating, cooling and lighting in residential and commercial/industrial buildings.

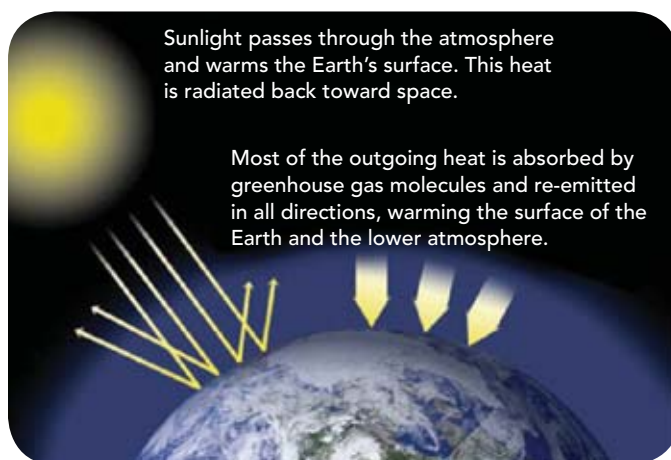
This subject is introduced and discussed in detail in Chapter 2 of the County's Strategy and Framework Document; data is presented there for the entire county and broken out for the unincorporated portion of the county and County government operations. This chapter briefly summarizes the information for easy reference and presents updated and refined data related to County government operations.

### Sources and Impacts of Greenhouse Gases (GHG)

Greenhouse gases (GHG) include a variety of different gases that are released into the atmosphere and act as global insulators. As illustrated in Figure 2-1, energy from the sun warms the earth's surface, which in turn, radiates heat back toward space. However, accumulated GHGs in the atmosphere absorb and trap the heat, causing temperature to rise.

Many GHGs, such as water vapor, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O), occur naturally in our environment, but scientists have measured steady increases in most of these gases (all but water vapor in the list above) since the mid-1700s, when the industrial revolution began. Carbon dioxide, by far the most commonly-emitted GHG, is released primarily by burning of fossil fuels (e.g., oil, coal and natural gas). Methane, another common greenhouse gas, is generated through the natural decomposition of wastes in municipal landfills, and is also a product of livestock and agricultural operations.

**FIGURE 2-1** The Greenhouse Effect



A layer of greenhouse gases – primarily water vapor, and including much smaller amounts of carbon dioxide, methane and nitrous oxide – act as a thermal blanket for the Earth, absorbing heat and warming the surface to a life-supporting average of 59 degrees Fahrenheit (15 degrees Celsius). (Source: NASA)



# CLIMATE ACTION PLAN

In Sacramento County, like the state and country as a whole, the most common source of GHG emissions is energy--energy used for transportation (i.e., burning vehicle fuel) as well as energy used to produce and deliver electricity and gas for heating, cooling and lighting in residential and commercial/industrial buildings. This is true for the County's government operations as well; as described later in this chapter, over half of all government GHG emissions comes from operation of the vehicle fleet, buildings and facilities.

Not all energy is the same when it comes to GHG emissions. Burning of fossil fuels creates the most emissions; of those, coal produces the most GHGs and natural gas burns the cleanest. Non-fossil fuel energy sources such as hydroelectric, wind, and solar power result in negligible GHG emissions.

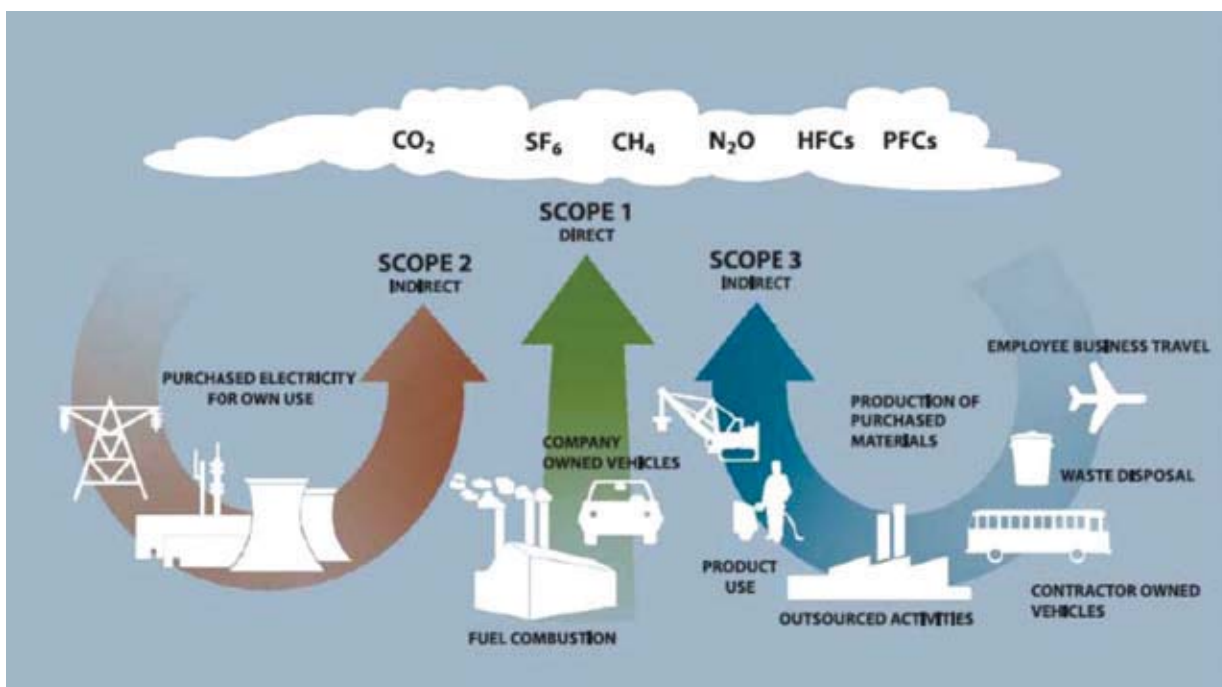
GHG emissions associated with vehicles are determined by three factors: vehicle fuel efficiency (miles traveled per gallon of fuel), the type of fuel used (for example, natural gas produces less GHG emissions than gasoline or diesel), and vehicle miles traveled (VMT).

The quantity of GHG emissions from energy use in buildings depends on:

- the amount of energy used (which depends on factors such as building design and the efficiency and operation of the heating and air conditioning system)
- the type of energy used (e.g., electricity or natural gas)
- In the case of electricity, the primary energy source used to create it (i.e. how was the electricity generated? For example, by burning coal or from a renewable source such as solar power?)

Local government operations produce GHG emissions both directly and indirectly, as shown in Figure 2-2, and the County only has control over the direct sources. For Sacramento County, examples of direct sources include GHG emissions from operation of buildings and County fleet vehicles. An example of an indirect source includes emissions associated with electricity purchased from the Sacramento Municipal Utility District (SMUD) by the County for use in buildings and operations.

**FIGURE 2-2** Indirect and Direct Sources of Emissions Associated with Local Government Operations



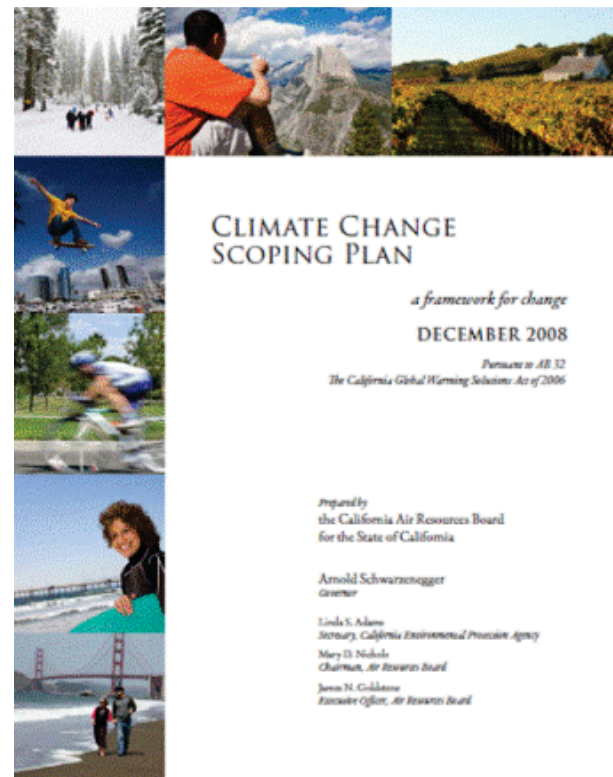
(Source: Fig 4.1 from LGOP Manual. Original source: WRI/WBCSD GHG Protocol Corporate Standard, Chapter 4 (2004).

## The County's Role in Reducing GHG Emissions

The State of California has indicated that local governments such as Sacramento County play an integral role in helping to achieve the State's AB 32 GHG emission reduction goals for several reasons:

- The County's operations generate GHGs.
- The County serves and influences the broader community. For example, its operations affect the type, quantity, quality and location of services available to residents. Its actions also set an example which may influence community behavior.
- As a provider of many municipal services, the County may be directly affected by the projected consequences of climate change, such as droughts that stress water supplies, more extreme storms that trigger flooding, and heat waves that strain electricity resources and present public health risks. It is in the County's best interest to do whatever is feasible to cost-effectively mitigate the projected changes.

As discussed previously, AB 32 requires that by 2020, statewide GHG emissions be reduced to 1990 levels. In turn, the California Air Resources Board (ARB), the lead agency for implementing AB 32, interpreted this law for application to local governments in the state. Since it is difficult for local governments to accurately quantify their 1990 GHG emission levels due to lack of data, ARB recommended in their 2008 Scoping Plan that local governments reduce their GHG emissions by 15% below current levels by the year 2020. For the County, like many other local governments in the state, 2005 was selected at the baseline year for which reliable data was available, to approximate the "current levels" of GHG emissions referenced in ARB's Scoping Plan. The ARB's recommendations are intended to place California on the path to meeting the longer term goal of an 80% reduction in emissions below 1990 levels by 2050, consistent with the Governor's Executive Order S-3-05.



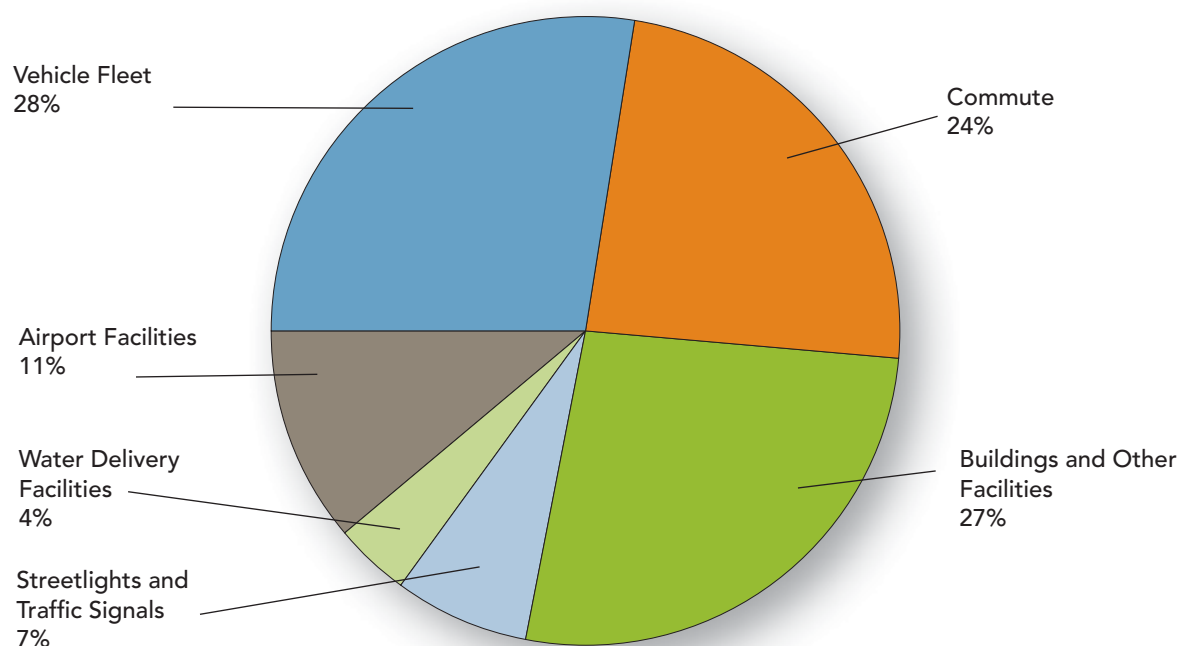
In addition to encouraging local governments to adopt GHG emission reduction goals, the ARB adopted the Local Government Operations Protocol (LGOP) to provide local governments guidance on how to inventory and report GHG emissions from government buildings, facilities, vehicles, infrastructure and other government operations. The LGOP is a set of common standards and calculation tools for estimating and reporting GHG emissions. Use of the protocol is intended to help ensure that strategies developed and implemented at the local level can be appropriately quantified and credited toward California's efforts to reduce greenhouse gas emissions statewide. The County used the updated 2010 protocol (version 1.1) to calculate the 2005 baseline GHG emissions reported in this Plan and to analyze potential actions for implementation, as described in Chapter 3. As encouraged by ARB and discussed in Chapter 5, the County further plans to use this protocol to track progress in achieving reductions from municipal operations over time.

# CLIMATE ACTION PLAN

**TABLE 2-1**  
Sacramento County Government GHG Emissions for 2005 by Government Operations Sector

Sector	Description	GHG Emissions	Percent
Vehicle Fleet	Energy (fuel) consumed by County's fleet of 3,225 vehicles, including light-duty cars and trucks, Sheriff's patrol cars and motorcycles, and heavier-duty maintenance and construction-related vehicles.	37,720	28
Buildings and Other Facilities	Energy used to operate (heat, cool, light, etc.) buildings owned and leased by the County. Examples include the downtown administration buildings, the main jail and the Rio Cosumnes Correctional Center, the County courthouse, regional parks facilities, and buildings/facilities at the County's Branch Center on Bradshaw Road.	35,870	27
Commute	Energy (fuel) used by employees commuting to and from work.	31,970	24
Airport Facilities	Energy used for the County's ground operations (i.e., airfield and landside maintenance equipment, roadways, parking); excludes aircraft emissions, as well as Airport fleets and employee commute data (the last two were included in other sectors for this analysis).	14,980	11
Streetlights and Traffic Signals	Energy used to power 22,374 streetlights (17,738 High Pressure Sodium and 4,636 Mercury Vapor) and traffic signals at 442 signalized intersections throughout the unincorporated County.	8,810	7
Water Delivery Facilities	Energy used to operate water delivery facilities under the jurisdiction of the Sacramento County Water Agency (SCWA). Many other water purveyors operate in the County (including delivering water to various County buildings and facilities), but their energy use was not considered in this plan.	5,580	4
<b>Total</b>		<b>134,930</b>	<b>100</b>

**FIGURE 2-3**  
Sacramento County Government GHG Emissions for 2005 by Government Operations Sector (metric tons CO<sub>2</sub>e)





## GHG Emissions from Sacramento County

### Original 2005 Baseline GHG Emissions Inventory for Sacramento County and County Government Operations

During 2008-2009, Sacramento County initiated and led the effort to prepare the first GHG baseline inventory for the entire county, including the incorporated cities in the county. The purpose of the inventory was to develop an understanding of GHG emission sources in the county, their relative contribution to the countywide total, and to create a baseline against which to measure progress toward reducing emissions by 15% by the year 2020, as recommended by ARB to comply with AB 32.

The original 2005 GHG baseline emissions inventory for the County was prepared by ICF/Jones and Stokes and published in June 2009 (ICF, 2009). Additional refinements were made in 2010 with respect to on-road transportation, wastewater treatment, water-related and high global warming potential (ICF, 2010 and Fehr and Peers [Milam and Donkor], 2010) using updated inventory protocol and quantification techniques. The refined 2005 baseline data was described in the County's *Strategy and Framework Document*; results were shown for the entire County (countywide emissions), for the unincorporated portion of the county area, and for County government operations. The original 2005 baseline inventory was prepared using a high-level "top-down" approach that collected basic data from the County and relied on a number of assumptions using industry standard protocol and techniques available at the time.<sup>3</sup>

### Revised 2005 Baseline GHG Emissions for County Government Operations

For this Plan, the 2005 GHG emissions for County government operations were estimated using a "bottom up" approach based on detailed operational data which yielded results considered to be more reliable and accurate than previously reported. The differences in results are due to the addition of data from a 2010 employee commute survey (described in Appendix C), removal of solid waste

The 2005 GHG emissions inventory was refined for this Plan using actual utility billing records and detailed operational data provided by County departments. The results showed that operation of the County vehicular fleet is the largest contributor to County government emissions at 28%, followed closely by County buildings and facilities (27% of the total government emissions), County employee commute (24%) and airport facilities (11%). GHG emissions associated with energy used by streetlights and traffic signals and water delivery facilities combined represent 11% of the total County government emissions.

(now considered a type of community-wide emission as described later) and use of actual energy consumption data for 2005 (e.g., utility bills and fuel purchase records) obtained directly from implementing departments. In comparison, the previous inventory methodology used some 2006 and other recent-year data as a proxy for 2005 emissions for some sources.

Table 2-1 and Figure 2-3 present the revised 2005 baseline GHG emissions inventory for County government operations; these numbers replace those included in the *Strategy and Framework Document*. As with previous reports, the GHG emissions are reported in units of metric tons of carbon dioxide equivalent (CO<sub>2</sub>e).<sup>4</sup>

3. The ICLEI association of Local Governments for Sustainability Clean Air and Climate Protection (CACP) software version 1.1 was used to generate the GHG emissions estimates, as well as version 1.0 of the Local Governments Operations Protocol (LGOP) adopted by ARB in September 2008.

4. Because carbon dioxide is the most prominent GHG in the atmosphere, it is commonly used as the metric for measuring GHG emissions. In this case, other GHG emissions, such as methane, are converted to "equivalent CO<sub>2</sub>" or "CO<sub>2</sub>e". This approach is useful for standardizing and comparing emissions from different sources and across sectors.

# CLIMATE ACTION PLAN

## Assumptions and Sources of Data Used to Prepare Revised 2005 GHG Emissions Inventory for Government Operations

The detailed list of County accounts and associated data contributing to the revised 2005 GHG emissions baseline is provided in Appendix A and more details are provided in Chapter 3. The following are some highlights for quick reference in understanding the results presented above:

### Data Included in the Inventory

The following GHG emissions are included in the revised 2005 inventory presented in this Plan, consistent with LGOP guidance.

- **Airports.** The GHG emissions associated with airport facilities are broken out separately from other County facilities. The reported emissions are associated with energy used for the County's ground operations only (i.e., airfield and landside maintenance equipment, roadways, parking). Aircraft emissions are excluded because the County does not have control over those operations (aircraft are owned and operated by private airline companies and regulated by the Federal Aviation Administration). Also, the Airport fleets and Airports employee commute data were not broken out for this inventory; those emissions are included in emissions shown for the vehicle fleet and commute categories.
- **Buildings and Other Facilities.** The revised 2005 GHG emissions for County buildings and facilities (excluding airport facilities) were calculated using SMUD (electricity) and PG&E (natural gas) usage records provided by the County Energy Program Manager for Year 2005.
- **Vehicle Fleet.** The revised 2005 GHG emissions for County vehicle fleets (including airports fleets) were calculated using vehicle type, mileage and fuel consumption records provided by the Dept. of General Services Fleets Division and Airports for Year 2005.
- **Commute.** The estimated fuel consumed by employees commuting to work and employee commute patterns, including vehicle miles traveled and vehicle efficiency, were derived from the 2010 employee commute survey (see Appendix C). The survey provided data for the Year 2009 which were back cast to 2005 based on employee counts. It was assumed that the County's transit and carpool incentives available to employees were the same in both years.
- **Streetlights and Traffic Signals.** The revised 2005 GHG emissions for streetlights and traffic signals were calculated using SMUD (electricity) usage records provided by the County Energy Program Manager for Year 2005 and data provided by the County's Department of Transportation regarding type and quantity of streetlights and signals.
- **Water Delivery Facilities.** The 2005 emissions were calculated based on energy used to operate water delivery facilities under the jurisdiction of the Sacramento County Water Agency (SCWA). Many other water purveyors operate in the County (including delivering water to various County buildings and facilities), but their energy use was not considered in this plan.



### Data Not Included in the Inventory

The following GHG emissions are not reflected in the revised 2005 inventory presented in this Plan; future updates to the inventory will address these sources to the extent possible:

- Solid Waste Facilities.** Emissions associated with solid waste generation in County buildings and from County operations are not included in the baseline emissions inventory shown above due to unavailability of data. Emissions associated with operation of the County-owned Kiefer Landfill are also not included in the inventory due to the community-wide nature of the solid waste sector and uncertainty regarding the allocation of responsibility between the County and other jurisdictions that contribute refuse to the landfill. All solid waste emissions, including emissions associated with waste generation by County residents in the unincorporated area, will be addressed in a future community wide climate action plan for unincorporated Sacramento County.
- County Water Use.** Emissions associated with water use in County operations were not included in this government inventory because data was not readily available. Additionally, there are over 20 water purveyors in the county and many County buildings are located in another purveyor's service area, where water supply is not under the direct jurisdiction of the Sacramento County Water Agency (SCWA). Consequently, it is assumed that those GHG emissions would be accounted for in other jurisdictions' or water purveyors' inventories.
- Wastewater Facilities.** The Sacramento Regional County Sanitation District (SRCSD) provides regional wastewater conveyance and treatment services to residential, industrial and commercial customers throughout unincorporated Sacramento County; the cities of Citrus Heights, Elk Grove, Folsom, Rancho Cordova, Sacramento and West Sacramento; and the communities of Courtland and Walnut Grove. SRCSD is governed by a 17-member Board of Directors representing the jurisdictions served. Given that SRCSD is not under the direct operational control of Sacramento County, emissions associated with wastewater conveyance and treatment are not included in the baseline emissions inventory.

### Projected "Business as Usual" GHG Emission Levels for Sacramento County

The business as usual projected GHG emissions for the County are affected by population growth/decline and associated changes in County services and operations. The County population grew by 16% (increasing from about 1.2M to 1.4M) between 2000 and 2010<sup>5</sup>. Similarly, between 2000 and 2009, County staff full-time equivalent (FTE) positions increased from 12,235 to 14,796 to provide services to the growing population. However, starting in 2009, the effects of the ongoing economic recession began affecting the County, including a significant decrease in revenues. This required the County to reduce staffing and service levels. For example, County staff positions dropped from 14,796 FTE in 2009 to 13,340 in 2010, and additional reductions have been made since then. Similar reductions in County staffing and service levels could continue in the near term as the County responds to further revenue shortfalls. Therefore, it is not expected that the County's internal operations will grow considerably in the near future, and may actually continue to contract as further consolidations and efficiencies are instituted.

While economic recovery and growth are expected to resume at some point, it remains uncertain as to when the County's operations will match or exceed 2005 service levels (year of baseline GHG emissions inventory). However, the County anticipates that when the economy improves and the housing and commercial markets rebound, new homes, commercial and employment uses will be built in the unincorporated area. The exact timing of such new development and corresponding demand for new County services to support it are unknown.

For the purposes of this Plan, it is assumed that growth in County operations will generate GHG emissions at an average increase of 1% annually between 2010 and 2020.

5. US Census Bureau, 2011.

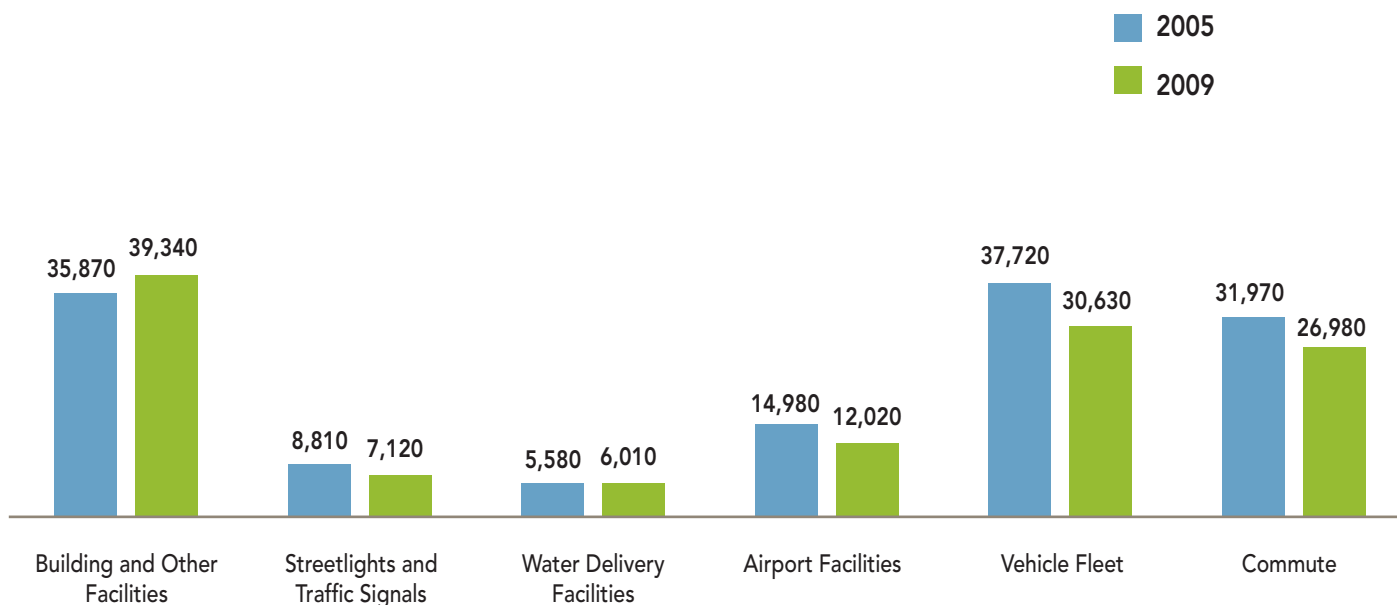
# CLIMATE ACTION PLAN

## GHG Emissions Reduction Target for Sacramento County Government Operations

To meet the ARB's recommended 15% reduction goal described previously, Sacramento County's target is to reduce annual GHG emissions from its operations by 20,240 metric tons CO<sub>2</sub>e by 2020 (a decrease from 134,939 to 117,332 metric tons CO<sub>2</sub>e). The County has already made progress since 2005 towards meeting this target. Figure 2-4 shows the change in estimated GHG emissions that was achieved between 2005 and 2009 by sector (the detailed breakdowns are shown in Appendix A, Attachment 8.2). The net or total GHG emissions declined from 134,939 metric tons CO<sub>2</sub>e in 2005 to 122,107 metric tons in 2009. This is a reduction of 12,824 metric tons. Chapter 3 (Table 3-2) shows how the 2005-2009 reduction factors into the projected GHG reductions for the various alternative plans considered in the County's cost-benefit analysis.

Sacramento County's target is to reduce annual GHG emissions from its operations by 20,240 metric tons CO<sub>2</sub>e by 2020. This represents a 15% reduction from 2005 emissions, consistent with State recommendations.

**FIGURE 2-4**  
County Government GHG Emissions by Sector for Years 2005 and 2009 (metric tons CO<sub>2</sub>e)



Buildings and other facilities and water delivery facilities were the only sectors to increase emissions over this period. This is likely due to new facilities constructed (eg. the highly efficient Animal Care building) and leased (eg. community service centers) since 2005. The largest reductions in emissions were in the vehicle fleet and commute sectors which were impacted by the reduction in full time County employees during that period, resulting in fewer vehicle miles traveled for work and commuting, as well as availability and use of more fuel-efficient vehicles. The Airports sector also saw a reduction between 2005 and 2009, due to increased energy efficiency of buildings and operations and other sustainability projects implemented by SCAS. However, airports energy consumption is expected to show an increase starting in mid-2011 due to the opening of new Terminal B. Although the new terminal is modern and energy efficient (certified LEED Silver) it is much larger than the terminal it replaced in order to accommodate projected growth in air travel. The decrease in emissions for the other sectors is generally attributed to actions completed by the County to increase energy efficiency of its operations.



Table 2-3 provides a sense of scale of the types of actions that can be taken to influence a 15% reduction from 2005 levels by 2020<sup>6</sup>. Since it would be impossible to rely solely on any one of the broadly-stated actions noted, the County analyzed a broad menu of feasible, cost-effective programs and projects to collectively meet the GHG reduction target while saving energy and costs and providing a wide range of co-benefits. The next chapter describes the process used to analyze and select measures for the preferred action plan.

**TABLE 2-3**  
Examples of Scale of Actions Necessary to Meet GHG Reduction Target

1 MT CO <sub>2</sub> e reduction is roughly equivalent to one of the following:	20,240 MT CO <sub>2</sub> e reduction is roughly equivalent to one of the following:
Saving 112 gallons of gasoline	Saving 2.3 million gallons of gasoline
Saving 3,600 kilowatt hours of electricity	Saving 72.8 million kilowatt hours of electricity
Saving 190 therms of natural gas	Saving 3.8 million therms of natural gas
Planting 46 trees	Planting 931,040 trees

6. City of Sacramento, Climate Action Plan, February 2011.

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CHAPTER 3

Process to Identify and Analyze Measures for this Plan

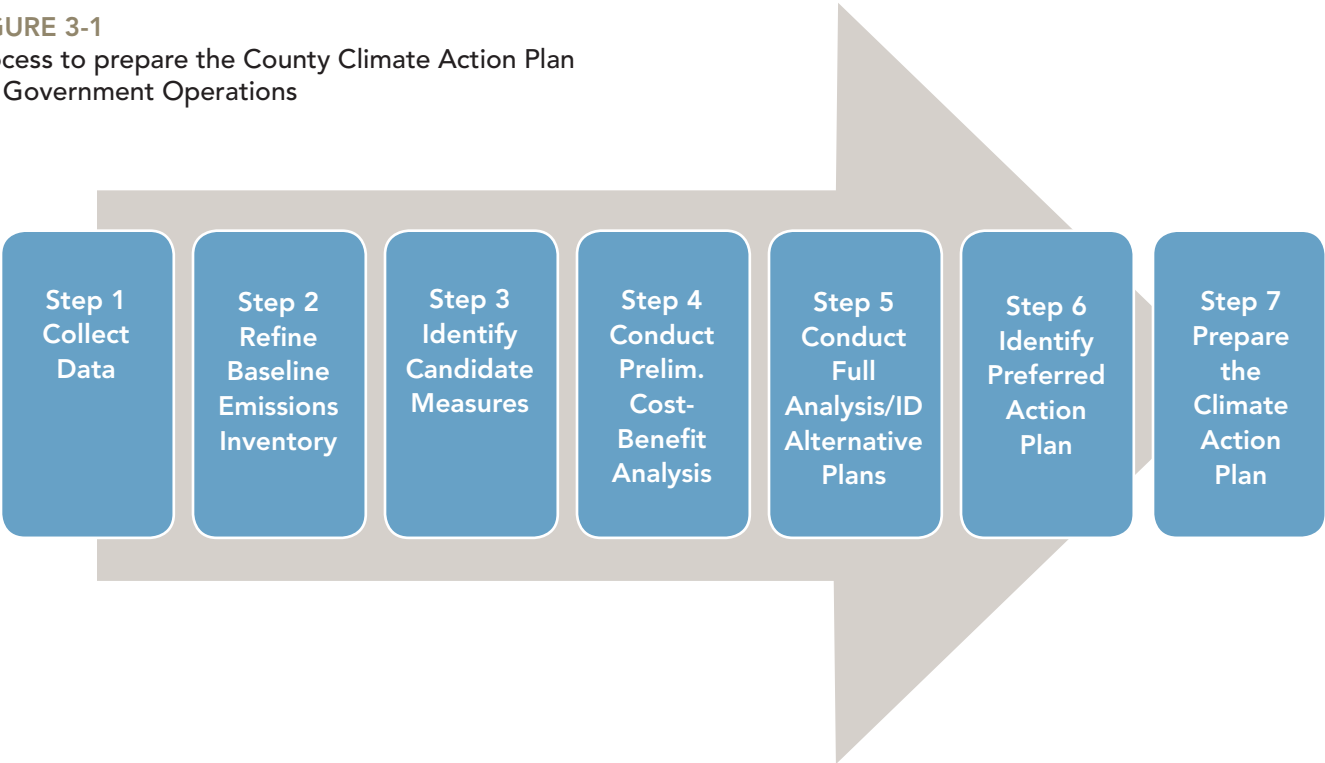
Many County departments were involved in the planning process, which ensured a thorough approach and raised staff awareness about how County operations affect sustainability.

PROCESS OVERVIEW

This Plan was produced through a collaborative process that engaged managers and their staff in numerous County departments and enhanced staff understanding of how their operational choices can impact the sustainability of their department and the County as a whole. Several steps were completed over a two-year period to create this Plan (see Figure 3-1); each step involved considerable work and input by affected County departments.

The County hired The Energy Alliance Association (TEAA) in 2010 to provide technical expertise and advice to the overall process, refine the 2005 GHG emissions baseline (Step 2) and conduct an economic and greenhouse gas (GHG) reduction analysis of potential measures (Steps 4 and 5). Appendix A presents the final TEAA report that documents the process and the results.

FIGURE 3-1  
Process to prepare the County Climate Action Plan for Government Operations





# CLIMATE ACTION PLAN

**Step 1. Collect Data.** An extensive amount of data was compiled from various sources, including County energy and fuel bills, operational and project data provided by the various departments, and the results of an employee commute survey conducted in fall 2010 with an impressive participation by about 30% of County employees.

**Step 2. Refine 2005 GHG Emissions Baseline for County Operations.** (this step was described in more detail in Chapter 2). The original 2005 GHG emissions inventory for County government operations prepared in 2009 was refined using the data collected in the previous step, to provide a more accurate baseline for estimating GHG emission reduction goals and measuring progress in reducing emissions over time.

**Step 3. Identify Candidate Measures.** A comprehensive list of over 300 completed, underway and potential future measures to reduce GHG emissions from County operations was developed, using the May 2009 Draft Strategy and Framework Document and several other resources. Some of the measures were qualitative in nature (e.g., policies), for which it was not possible to estimate GHG reductions. The long list of measures was narrowed down to about 90 quantifiable measures that could be analyzed for costs/benefits based largely on availability of sufficient high quality data necessary for the analysis.

**Step 4. Conduct Preliminary Cost-Benefit Analysis.** A preliminary analysis was conducted and results were distributed for review by the implementing departments. Based on feedback, the list was further reduced to the 65 measures (27 completed/committed and 38 future measures) analyzed in the next step.

**Step 5. Complete Comprehensive Cost-Benefit Analysis and Identify Alternative Plans.** TEAA completed a robust and comprehensive cost-benefit analysis of the 38 future quantifiable measures, using extensive data input from staff. (Since the remaining 27 measures were already completed or underway, cost-benefit analysis was not required for those measures). Each of the 38 future quantifiable measures was separately evaluated, and the results were then aggregated into five alternative plans, ranging from a plan containing the 27 measures that were previously completed/committed (since 2005) that fell short of the 15% reduction target, to a plan containing 58 measures that exceeded the target. In this step, the consultant used a set of objective and subjective evaluation criteria established with the County to factor in economic and community benefits.

**Step 6. Identify a Preferred Alternative Action Plan.** Staff identified a preferred plan that best balances increased efficiency, lowering costs and reducing greenhouse gas (GHG) emissions, among other benefits, for consideration by the Board of Supervisors. This plan is described in Chapter 4.

**Step 7. Prepare the Climate Action Plan.** This Plan was prepared to document the process and results, and to describe the recommended measures by emissions category (e.g., buildings, fleets, airports) which also corresponds well to implementation responsibility within the County organization.



## Data Collection

To begin the process, the County's sustainability program staff solicited, collected and compiled an extensive set of data related to County energy consumption from a variety of sources:

- PG&E Natural Gas billing data, Sacramento County Staff, 2005-2009
- SMUD Electricity billing data, Sacramento County Staff, 2005-2009
- Chicago Climate Exchange (CCx) Consumption Data rev 31, Sacramento County Staff, August 18, 2010
- Annual Emissions Report, County of Sacramento, Sacramento County Staff, May 13, 2010
- Sacramento County Fleet Annual Fuel Consumption data, Sacramento County Staff, 2009
- Other data provided by the County Energy Program Manager, the Sacramento County Airport System, and other managers in various departments and divisions in the Internal Services and Municipal Services Agencies.

The County employees' commute to work generates considerable GHG emissions from vehicle fuel consumption. Therefore, an employee survey was conducted in fall 2010 to provide data for quantifying the impacts of employee commuting. This survey identified the miles traveled and mode of travel for a representative sample of County staff (about 30% of the employee population responded to the survey). The results were used to calculate annual fuel consumption and associated GHG emissions associated with employee travel to include in the analysis. The results also provide useful data on the extent to which employees are using County incentives to carpool or take public transit to work. A brief summary of the highlights is provided on the next page and Appendix A (Attachment 8.9) and Appendix C provide more details.



Based on the results of a 2010 employee survey, in 2005, County employee commute accounted for 24% of the County government operations emissions. (Photo: Sacramento Bee)

## Results of 2010 County Employee Commute Survey

Sacramento County conducted an employee commute survey in fall 2010 to provide data for quantifying the impacts of employee commuting. Over 3,000 employees (about 30% of the employee population) answered the survey. The results were used to calculate annual fuel consumption and associated GHG emissions to include in the cost-benefit analysis. Among the key findings, the survey showed that:

- **Commute Mode of Travel** - 86% of County employees usually drive to work alone in their own vehicle, while 8% participate in a carpool for at least part of their commute, 4% take the train, light rail or bus, and less than 1% ride a bicycle or walk.
- **Commute Distance Traveled** - On average, employees travel almost 24 miles a day roundtrip to and from work. In 2009 alone, Sacramento County employees travelled nearly 68 million miles to and from work.
- **Commute Fuel Type** - The vast majority (over 97%) of employee vehicles use gasoline (rather than an alternative fuel such as diesel or biodiesel).

# CLIMATE ACTION PLAN

## Identification of Measures for the Plan

### County Measures

County staff developed a list of over 300 completed, underway and potential future measures to be considered in this Plan, spanning a wide range of County departments and emission categories (see Appendix A, Attachment 8.10). The list included measures that have or possibly could result in reduced GHG emissions associated with the operation of County buildings, facilities, infrastructure, fleets and equipment, as well as employee commutes. To create the list, staff started with the measures in the May 2009 draft of the *Strategy and Framework Document* (then called the *Draft Phase 1 Climate Action Plan*) and added other items based on:

- *Sacramento County Capital Improvement Plan* for the 2009-10 fiscal year
- *County of Sacramento 2009 Federal Stimulus Projects List*, Metro Chamber-SACOG, Sacramento County Staff, 2010.
- *Energy Efficiency Community Block Grant (EECBG) Activity Worksheets*, Sacramento County, 2009
- Other ideas submitted by County staff in various departments

County staff developed a comprehensive list of over 300 measures then selected 65 of those measures for detailed evaluation.

Working closely with all affected County departments, the initial list of over 300 measures was narrowed down to a list of about 90 measures which had the best available information and were good candidates for quantitative analysis of benefits and outcomes. The ability to calculate/demonstrate GHG reductions was an important consideration in this step. The County's consultant conducted a preliminary analysis of these measures using the methodology described in the next section and the results were distributed for review by the implementing departments. Based on feedback, the list was then further reduced to 65 measures, mainly to eliminate duplicate measures and delete lower priority actions.

Those existing/completed measures identified in the *Strategy and Framework Document* which had sufficient high quality data were included in the analysis with the exception of those measures intended to reduce community emissions. For example, most of the measures to reduce GHG emissions related to waste management (e.g. operation of Kiefer Landfill) were described in the *Strategy and Framework Document* but are not included in this Plan.

In addition to quantifiable measures, this Plan describes existing and potential future qualitative measures for which GHG emission benefits could not be quantified (see Chapter 5). Although this Plan does not take GHG emission reduction credit for qualitative measures, it is assumed that such measures will further reduce the County's GHG emissions above and beyond the reductions quantified in this Plan.

This Plan does not take credit towards meeting the emissions target for GHG emission reductions associated with measures completed before 2005 because those emissions are presumably already accounted for in the refined 2005 baseline inventory described in Chapter 2. However, some of those measures are described in Chapter 5 to demonstrate the County's commitment to sustainability.

### Statewide GHG Reduction Measures by Others

Several non-County GHG reduction measures were factored into the consultant's cost-benefit analysis; these statewide measures are integral to each of the five alternative plans discussed later in this chapter.

#### *California Low Carbon Fuel Standard*

In January 2007 Governor Schwarzenegger asserted California's leadership in clean energy and environmental policy by establishing a Low-Carbon Fuel Standard by Executive Order. The target GHG reduction is 10% to be met over a 12-year period. This is projected to reduce the carbon density (CO<sub>2</sub>e/gallon) for gasoline and diesel.

The estimated GHG reduction attributable to this measure for Sacramento County in 2020 (as calculated by the consultant in the analysis) is 1,234 MT CO<sub>2</sub>e. This was factored into the cost-benefit analysis described later in this chapter.

#### *Utility Electric Power Content*

The sources of the energy procured by the utility determine the carbon density (lbs. CO<sub>2</sub> per kilowatt hour [kWh]) of the electricity produced by the utility and used by the County. This "Power Content" is identified by the utility and reported by the California Public Utilities Commission (CPUC) on an annual basis. The California Renewable Portfolio Standard (RPS) requires utilities to lower the carbon density by increasing

procurement from eligible renewable energy resources. As the power content carbon density decreases, the emissions associated with electrical energy use decreases. Also as the carbon density decreases, the CO<sub>2</sub> reductions per kWh displaced by photovoltaic and other energy efficiency measures decreases. Therefore a kWh saved in 2010 saves more CO<sub>2</sub> than a kWh saved in 2015 if the Power Content is more "green" in 2015. This dynamic was factored into the analysis which is time dependent for both the implementation date of the measure and the reporting date for the emissions reduction. SMUD emissions values for 2005 to 2020 were utilized in the analysis.

The estimated GHG reduction attributable to this measure for Sacramento County in 2020 (as calculated by the consultant in the analysis) is 8,748 MT CO<sub>2</sub>e. This was factored into the cost-benefit analysis described later in this chapter.

#### *Clean Car Standards – Pavley, Assembly Bill 1493*

This regulation reduces the GHG emissions in new passenger vehicles sold in California through increased fuel efficiency requirements. This regulation is expected to reduce GHG emissions from California passenger cars by 22 percent in 2012, increasing to 30 percent in 2016. The impacts of the Pavley regulations were incorporated in the analysis for this Plan by modifying the anticipated fuel economy of new vehicles specified in the various fleet replacement strategies.



Photo: Mike Williams

# CLIMATE ACTION PLAN

## Cost-Benefit Analysis Methodology

This section provides a summary of the methodology for the cost-benefit analysis conducted by TEAA, including data sources and assumptions and the basis for grouping measures into five alternative plans. Refer to the report in Appendix A for the details.

### Process

Energy consumption data and project descriptions provided by county staff served as the basis of the work in this analysis. Projects related to building and equipment energy efficiency, fuel efficiency, alternative fuel options, and distributed energy generation (such as solar photovoltaic installations) were identified and quantified based on best available information in fall 2010.

The analysis evaluated individual measures as well as groups of measures organized into five alternative action plans. Measure specific data such as capital cost, year of implementation, financing, energy and cost savings (described in the next section) were processed to yield the following information for each of the five action plans:

- GHG emissions reduction in metric tons CO<sub>2</sub>e avoided and as percentage of baseline
- GHG emissions reduction by sector
- Annual Cash Flow including debt service, replacement cost and incremental operation and maintenance costs
- Simple Payback (SPB)
- Modified Internal Rate of Return (MIRR)
- Net Present Value (NPV)
- Avoided utility company payments (NPV over life of plan)
- Avoided fuel purchases (NPV over life of plan)
- Value invested locally in GHG emission reduction projects

Evaluating costs and financial benefits was an essential part of the planning process.

### Additional Measure Evaluations for Development of the Alternative Plans

To aid in the selection process, each measure was also evaluated and scored for the ten metrics listed below. The evaluation methodology, including weights that were assigned to each of the metrics, is described in Appendix A (Attachment 8.7). The set of criteria includes both objective and subjective metrics that are important to the County. The evaluation scoring served as a check on the measures that were included in the alternative plans; those measures that scored high were given additional consideration for inclusion. The governing consideration was to maintain balance between GHG reduction, total cost and NPV, and develop a trend of increasing aggressiveness from Plan B to E. It is important to note that the scoring of the measures is advisory only and not binding on the County's ultimate selection of measures for implementation. A relatively low score does not preclude a measure, nor should a high score guarantee implementation of a measure by the County.

For each measure, a score was assigned for each of the following evaluation criteria and an aggregate score was calculated:

- Annual Cost Savings
- Investment Value
- GHG Reduction
- Job Creation
- Resolution of Maintenance Problems
- Energy Cost Stabilization
- Implementation Feasibility
- Employee Co-benefits
- Community Co-benefits
- Visibility in the Community

## Assumptions and Sources of Data

### General Assumptions

Several general assumptions were applied throughout the financial analysis for all measures except where actual data was known for a given measure. For example (see additional details in Appendix A, Chapter 3):

- Term of Analysis – 25 years
- Term of Finance – 10 years (based on California Energy Commission (CEC) loans)
- Discount Rate – 6.48%
- Interest Rate – 3.95%
- Inflation Rate – 3.48%
- Energy Cost (electricity, gas) – \$0.112/kWh, \$0.70/therm
- Energy Cost Escalation Rates (electricity, gas) – 3.50%, 2.32%
- Fuel Cost (Gasoline and diesel) – \$2.82/gal
- Vehicle Fuel Cost Inflation Rate – 8%

These and other general assumptions were based on the best available information (e.g., from SMUD and PG&E) and consistent with the LGOP (discussed in Chapter 2). The approach is also consistent with assumptions used in analyses conducted for other municipalities, including the City of Roseville and others in Sonoma County.

There are four basic methods of project financing utilized in this analysis:

- 1) **Standard financing** – at the interest rate and term defined above (general level) unless more specific financing information was known for the measure being analyzed.
- 2) **Power Purchase Agreement** – the project (e.g., solar panels) is housed on County property and is owned by the vendor. The County agrees to purchase the power for the term of the contract.
- 3) **Performance Contract** – the vendor guarantees the savings of the measure for a specific payment financed over time. The term of the project (years of equivalent loan) is set to yield a net zero cash flow to the County.
- 4) **Grant Funding** – assumes the net impact on the General Fund for these measures is zero.

### Measure-Specific Assumptions

In addition to the general assumptions outlined above, each measure included in this analysis has a set of unique inputs and assumptions. Some measures have a highly reliable set of costs and energy reduction estimates due to the nature and maturity of the strategy and supporting data (e.g. lighting retrofits) while other measures rely on more general data/assumptions. The following examples of measure-specific data were processed for the analysis (see Appendix A, Attachment 8.4 for additional details on these and other data):

- **LGOP Sector/Category** – Each measure was assigned an LGOP sector category: Building and Other Facilities, Vehicle Fleet, Water Delivery Facilities, etc. These are the same categories used to prepare the refined GHG emissions baseline inventory (see Chapter 2). Use of the State's protocol ensures consistency in data collection and reporting between jurisdictions statewide.
- **Status (Completed and Future)** – For the purposes of the analysis, measures were assumed to be “completed” if funding was committed and implementation was expected to occur before the end of 2011. Future measures will be considered for future implementation and are dependent on available funding.
- **Project Implementation Date** – Each measure was assigned an implementation date to enable the calculation of cash flows over the life of the plan and the creation of energy cost trend graphs. When a future measure's implementation date was unknown, an implementation date of 2014 was assumed. Since many measures were assigned this date, it created an artificial negative cash flow for the Year 2014 for four of the alternative plans. described later in this section. That aspect will be refined in subsequent updates to the Plan.
- **Financing** – The cash flow for a measure is heavily dependent on whether or not the measure is financed. This funding decision was defined for each measure independently.
- **Net Capital Cost and Applicable Rebates and Incentives** – Each measure has a unique net capital cost (capital cost of a project minus incentives and rebates) based on data supplied by the County.



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- **Incremental Capital/Replacement Cost** – Many of the measures identified to reduce energy consumption, and thereby reduce GHG emissions, involve the replacement of old, poorly performing equipment. In many cases this equipment is at the end of its useful life and is scheduled to be replaced independently of this analysis. In these situations this analysis may include only the incremental cost for exceeding the efficiency of a standard unit or approach. Fleet measures are a common example where this issue comes into play, whereby the cost assumed for the fleet replacement strategies are the incremental capital cost for selecting more efficient models over the standard models. For Example: a hybrid compact vehicle replacing an Impala is assigned a cost premium of \$6000 over an equivalent standard vehicle.

Sixty-five candidate quantitative measures were grouped into five alternative plans for the County's consideration individually and in comparison to the others.

## Summary of Analysis Results: Alternative Action Plans

This section briefly describes the alternative action plans developed by TEAA in the cost-benefit analysis. Refer to Appendix A for the details.

The 65 candidate quantitative measures were grouped into five alternative plans for the County's consideration individually and in comparison to the others. The following describes the makeup of the five alternative plans and Table 3-1 compares the benefits provided by each:

- **Plan A: Completed/Committed Measures** – GHG Reduction of 10.8% below 2005 baseline ("do nothing more" strategy) - This plan consists of 27 projects that have already been completed or are funded and in the process of being completed. Given that the decision to fund and implement these projects has already been made, these projects were not included in the cost benefit analysis.
- **Plan B: Least cost plan meeting 15.1% GHG reduction below 2005 baseline** – This plan includes the 27 completed projects in Plan A and an additional 25 potential future projects including building energy efficiency, water conservation, streetlighting upgrades, and vehicle fleet replacement strategies.
- **Plan C: GHG reduction of 15.2% below 2005 baseline** – This plan includes the 27 completed projects and an additional 28 projects including building energy efficiency, water conservation, streetlighting upgrades, and more aggressive fleet replacement strategies.
- **Plan D: GHG reduction of 15.5% below 2005 baseline** – This plan includes the 27 completed projects in Plan A and an additional 28 potential future projects including building energy efficiency, additional water conservation strategies, streetlighting upgrades, and more aggressive vehicle fleet replacement strategies.
- **Plan E: GHG reduction of 16.2% below 2005 baseline** – This plan includes the 27 completed projects in Plan A and an additional 31 potential future projects including building energy efficiency, streetlighting upgrades, additional water conservation, additional HVAC projects and the more aggressive vehicle fleet replacement strategies.

**TABLE 3-1**  
**Summary of Analysis Results/Benefits for Alternative Action Plans**

GHG Action Plan Summary					
Financial Results					
Analysis	Plan A	Plan B	Plan C	Plan D	Plan E
Metric Tons Saved in 2020	14,519	20,327	20,571	20,929	21,858
GHG 2005 Baseline MTCO <sub>2</sub> e	134,939	134,939	134,939	134,939	134,939
Reduction Target (MTCO <sub>2</sub> e) (15% below 2005 by 2020)	20,241	20,241	20,241	20,241	20,241
Net Reduction below 2005	10.8%	15.1%	15.2%	15.5%	16.2%
Jobs Created	0	580	610	640	710
Net Capital Cost	\$0	\$10,247,000	\$12,862,100	\$17,510,400	\$24,473,700
Internal Rate of Return (IRR)	0.0%	9.9%	8.3%	6.1%	4.5%
Net Present Value (NPV)	\$0	\$1,660,100	\$190,600	(\$2,924,500)	(\$6,666,400)
Annual Cash Flow					
2012	\$0	\$0	\$0	\$0	\$0
2013	\$0	\$600	\$600	\$600	(\$37,400)
2014	\$0	(\$33,100)	(\$33,100)	(\$33,100)	(\$71,000)
2015	\$0	(\$159,600)	(\$686,700)	(\$1,612,900)	(\$2,288,900)
2016	\$0	(\$92,100)	(\$614,800)	(\$1,535,300)	(\$2,198,800)
2017	\$0	(\$22,500)	(\$540,600)	(\$1,455,300)	(\$2,105,800)
2018	\$0	\$49,300	(\$464,000)	(\$1,372,700)	(\$2,009,700)
2019	\$0	\$678,100	\$823,400	\$934,700	\$664,200
2020	\$0	\$754,500	\$905,000	\$1,022,700	\$766,600
2021	\$0	\$833,400	\$989,100	\$1,113,400	\$872,300
2022	\$0	\$914,700	\$1,075,900	\$1,207,200	\$981,500
2023	\$0	\$998,600	\$1,165,400	\$1,303,900	\$1,135,100
2024	\$0	\$1,085,300	\$1,257,900	\$1,403,700	\$1,251,500
2025	\$0	\$2,157,600	\$2,336,300	\$2,562,700	\$3,069,800

\*As discussed previously in this Plan, the negative cash flow values for Year 2014 are due to an assumed implementation date of 2014 for measures where the actual date is not known. This also skews the NPV for the plans and will be refined in the future as planning is completed for the measures.

# CLIMATE ACTION PLAN

Figure 3-2 presents the projected reduction in GHG emissions over time as a result of implementing the alternative action plans. These trends are based on the following key considerations:

- 1) Timely implementation of the action plan measures according to the assumed implementation dates for each measure (shown in Table 3-2 later in this chapter)
- 2) The mix of projected power sources for the electricity provided by the utilities (SMUD and PG&E) due to the requirements of the CA Renewable Portfolio Standard discussed previously in this chapter
- 3) The impact of the CA Low Carbon Fuel Standard, also discussed previously in this chapter

The “no action” scenario shown in Figure 3-2 is hypothetical only, as it excludes measures that have been completed or committed to (already funded). Plan A represents no further action over what has already been completed/committed to. The GHG emissions for the “no action” alternative assumes a 1% increase in emissions per year from 2010 to 2020 (due to growth in operations related to projected population growth in the unincorporated county), as well as the reductions attributed to the renewable energy and fuel standard statewide measures. Note that the “no action” scenario shows a relatively flat trend line over the time period; this is because the estimated 1%/year growth in County emissions is offset to a large degree by the impacts of the two statewide measures.

**FIGURE 3-2**  
Projected GHG Reduction Trends for County Government Operations Through 2020

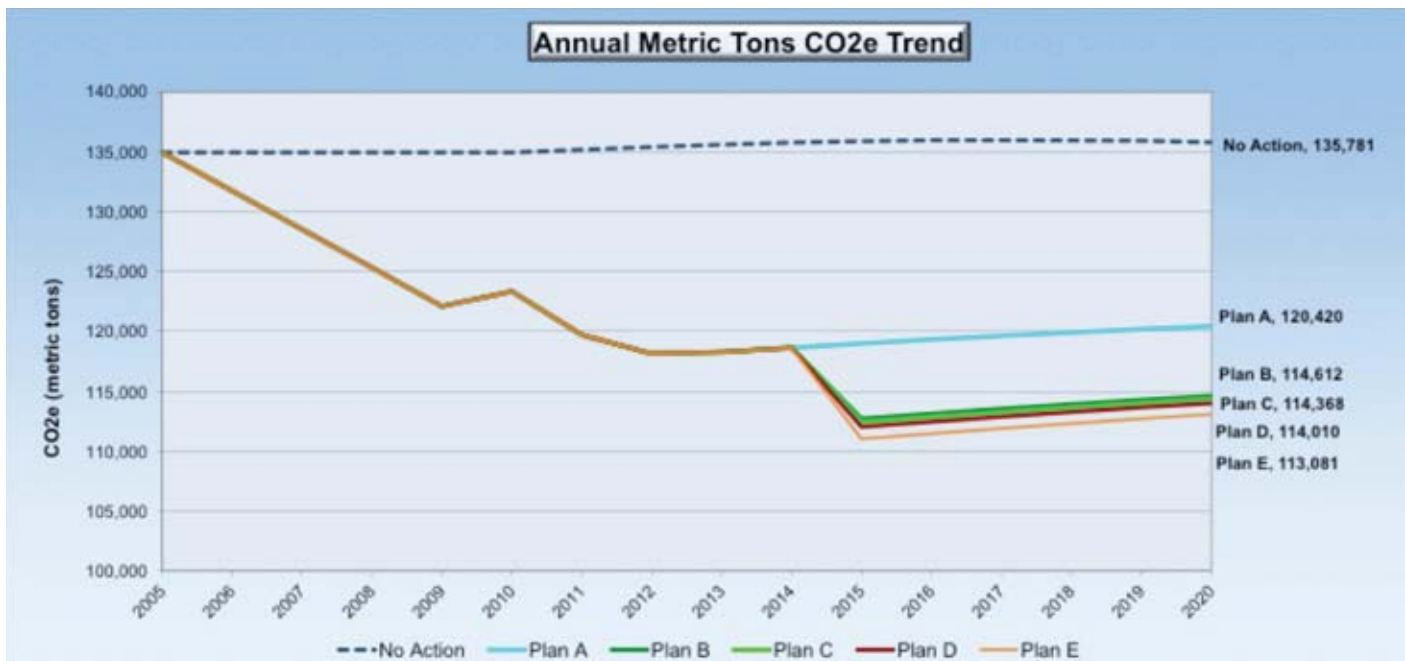




Table 3-2 presents a breakdown of GHG emission reductions that are included in all five of the alternative plans. For Plans B through E, additional reductions are expected due to implementation of future measures identified in Table 3-3.

**TABLE 3-2**  
**GHG Emissions Reductions Included In All Five Alternative Plans\***

Description	2020 GHG Emissions (MT CO <sub>2</sub> e)**
CA Renewable Portfolio Standard	8,748**
CA Low Carbon Fuel Standard	1,234**
Assumed Future GHG Emissions Trend (1% per year 2010-2020)	-14,461**
2005-09 County Emissions Reductions***	12,824
Completed County Measures 2009-11	6,174
<b>Total</b>	<b>14,519</b>

\*The values shown here may be slightly different than those shown in the other graphs and tables in this Plan due to rounding.

\*\* All plans reflect the CA Renewable Portfolio Standard, CA Low Carbon Fuel Standard, and the same Assumed Future GHG Emissions Trend. The quantities shown here were determined for Plan A; Plans B through E will have additional reductions since they include additional measures that lower energy and fuel use.

\*\*\* These emissions reductions (previously discussed in Chapter 2) are based on County utility billing data, fuel records and 2010 employee commute survey results. See Appendix A, Attachment 8.2 for a more detailed breakdown.

Table 3-3 (next page) presents a summary of the 65 quantitative measures that were analyzed for this Plan. The table presents completed/committed measures followed by future measures. The first 5 columns of the table indicate the alternative action plan in which each measure was placed for the analysis. Other data shown here includes the measure name, description, associated LGOP sector, lead implementing County department, implementation data (assumed as 2014 if not known), estimated GHG reduction in 2020, and cost data. Refer to Appendix A for more details. Chapter 4 presents more information on implementation status and funding source(s) for the 52 measures included in the preferred action plan.

Note that a few of the measures shown on Table 3-3 are not included in any of the five alternative plans; in particular, Fleet Scenario 4 and Solar Power Options 2, 4, and 5. Given that only four of the five alternative plans contain future measures, it was possible to include only four of the five fleet scenarios analyzed in the alternative plans. Since the composition and benefits of Fleet Scenarios 4 and 5 are very similar, Fleet Scenario 5 was chosen for inclusion in the fifth alternative plan given

its greater GHG emissions reduction potential. The five solar power options were analyzed to demonstrate the relative costs and benefits of different size solar PV systems (ranging from 100kW to 5.25MW). Although three of the five options are not included in the alternative plans, the County is interested in implementing such projects in the future when found to be cost-effective. This analysis is intended to be used as a starting point for determining feasibility of a future solar project.



# CLIMATE ACTION PLAN

**TABLE 3-3**

County Government Operations Measures Analyzed for this Plan\*

				Analysis Inputs and Results										
				Alternative Plans**										
Sector	Name	Description	County Lead Dept.	A	B	C	D	E	#	Impl. Date	Financed	County General Fund	Annual GHG Reduction (MT CO2e) in 2020	
COMPLETED/COMMITTED (27)														
Buildings and Facilities	Energy Efficiency Retrofits: Gibson Ranch Park	Installed energy-efficient heating, ventilation, and air conditioning (HVAC) at Gibson Ranch Park.	General Svcs	•	•	•	•	•	41	2011	no	no	4.8	
Buildings and Facilities	Energy Efficiency Upgrades: J. Harvie Community Center & Caretaker House	Installed energy-efficiency upgrades (including energy efficient roof/ insulation, electrical system and appliances) when renovating the J Harvey Community Center & Caretaker house.	General Svcs	•	•	•	•	•	42	2011	no	no	3.4	
Buildings and Facilities	Energy Audits and Improvements using Financial Incentive Revolving Fund	Performed energy audits of 35% of square footage of County facilities and implemented cost-effective and short-payback energy efficiency improvements to reduce energy use by 5%. To ensure a sustainable funding source, capital and staff costs, were paid by the financial incentive revolving fund, which will be reimbursed by money saved through ongoing energy savings.	General Svcs	•	•	•	•	•	43	2011	no	no	586.8	
Buildings and Facilities	Replacement of CRT Monitors with Energy Efficient Flat Panel Monitors	Since 2005, replaced CRT monitors with flat panel monitors at virtually all County workstations.	Technology	•	•	•	•	•	45	2010	no	yes	2	
Buildings and Facilities	Sheriff Administration Bldg. Cooling Source Replacement	Provided a new source of energy-efficient cooling for the Sheriff Administration building. Its chiller used an outdated refrigerant which had to be replaced or converted when needing major repairs. This facility was connected to the County Dept. of Technology chillers to supply chilled water for cooling.	General Svcs	•	•	•	•	•	56	2010	no	yes	195.6	

TABLE 3-3 *continued*

Sector	Name	Description	County Lead Dept.	Analysis Inputs and Results									
				Alternative Plans**					#	Impl. Date	Financed	County General Fund	Annual GHG Reduction (MT CO <sub>2</sub> e) in 2020
				A	B	C	D	E					
Buildings and Facilities	Energy Efficient Improvements Mechanical Systems: Mental Health Treatment Center	Modernized building systems at the Mental Health Treatment Center (built in 1991); provided high efficiency lighting technologies and more efficient HVAC systems. This project was an Energy Services Company (ESCO) process enabled under California Government Code 4217.10.	General Svcs	•	•	•	•	•	60	2010	no	no	525.9
Buildings and Facilities	Energy Efficient Upgrades: John Price DA Building	Installed new HVAC controls (meeting current standard for interfacing with downtown central plant), including converting to a variable air volume (VAV) system. The improvements increased HVAC efficiency and alleviated heating/cooling problems.	General Svcs	•	•	•	•	•	61	2011	no	no	76.2
Buildings and Facilities	County Administration Bldg Central Plant Improvements	Replaced outdated equipment at the Downtown District heating and cooling plant (700 H Street; circa 1978-2008) with more efficient environmentally-compliant models. Replaced chillers, heating boilers, variable speed air handlers, and energy efficient pumping systems. Reused existing infrastructure in the rebuilding of the plant.	General Svcs	•	•	•	•	•	62	2011	no	no	1,024.9
Buildings and Facilities	Energy Efficient Improvements to Lighting and Mechanical Systems: Building Inspection Facility	Upgraded lighting and mechanical system to be energy-efficient when other improvements (e.g., roofing) were made to the Building Inspection Facility.	General Svcs	•	•	•	•	•	63	2010	no	yes	108.5
Buildings and Facilities	Department of Technology Virtual Server Consolidation	Virtualized 421 servers on to a platform of 10 physical servers.	Technology	•	•	•	•	•	64	2012	no	yes	251.6
Buildings and Facilities	Solar Power (PV) Option 3	PV 1MW (located at Vineyard Surface Water Treatment Plant) (Power Purchase Agreement)	General Svcs	•	•	•	•	•	65	2011	no	yes	360.9

# CLIMATE ACTION PLAN

**TABLE 3-3** *continued*

County Government Operations Measures Analyzed for this Plan\*

Sector	Name	Description	County Lead Dept.	Analysis Inputs and Results									
				Alternative Plans**					#	Impl. Date	Financed	County General Fund	Annual GHG Reduction (MT CO <sub>2</sub> e) in 2020
				A	B	C	D	E					
Vehicle Fleet	Routing Efficiencies for Waste Collection Trucks	In 2009, the County Dept. of Waste Management and Recycling (DWMR) adjusted the routes of its collections fleet to reduce the number of direct waste haul trips need to Kiefer Landfill. More trucks now take waste to the intermediary North Area Recovery Station (NARS) where various waste streams are combined into larger trucks for delivery to the landfill, thus resulting in a net decrease in vehicle trip miles.	Waste Mgmt & Recycling	•	•	•	•	•	49	2010	no	no	209.6
Vehicle Fleet	Improved Landscape Maintenance Efficiencies at SCAS Facilities: Larger Mowers	Utilize large mowers, 6 to 11 ft wide, which cut twice as much grass as a typical mower, to maintain SCAS landscapes. Though the larger mowers consume more fuel, an aggregate savings is realized by using fewer tractors/mowers.	SCAS	•	•	•	•	•	58	2010	no	no	13.3
Vehicle Fleet	Improved Landscape Maintenance Efficiencies at SCAS Facilities: Swather Mowers	Utilize a swather that cuts 22 feet per pass to maintain airport landscapes. The swather is more fuel efficient than tractor/mowers and cuts at twice the speed of a traditional tractor/mower.	SCAS	•	•	•	•	•	59	2010	no	no	15.2
Airport Facilities	Cogeneration Facility for Terminal B - Sacramento International	Purchased and installed a 1 MW cogeneration facility for the new Central Terminal B complex at Sacramento International Airport.	SCAS	•	•	•	•	•	40	2011	no	no	214.6
Airport Facilities	Green Building Features in Terminal B – Sacramento International	Incorporated energy and water efficiency green building features in construction of Central Terminal B (certified LEED Silver), opened in October 2011 at Sacramento International Airport.	SCAS	•	•	•	•	•	46	2011	no	no	-570.3
Airport Facilities	Terminal B Underground Hydrant Fueling –Sacramento International	Constructed a hydrant fueling system at the new Central Terminal B. This will eliminate the need for fuel trucks at Terminal B, enhancing safety and eliminating air pollution, including GHGs.	SCAS	•	•	•	•	•	47	2011	no	no	0

TABLE 3-3 *continued*

Sector	Name	Description	County Lead Dept.	Analysis Inputs and Results									
				Alternative Plans**					#	Impl. Date	Financed	County General Fund	Annual GHG Reduction (MT CO <sub>2</sub> e) in 2020
				A	B	C	D	E					
Airport Facilities	Reduce Interior Lighting at Terminal A – Sacramento International	Reduce the interior lighting levels (and associated energy consumption) in Terminal A through use of automatic lighting controls (lighting software) set to run on a modified schedule.	SCAS	•	•	•	•	•	51	2010	no	no	124.2
Airport Facilities	Energy Efficient Retrofit at Airport Terminal A Cooling Towers	SCAS renovated Terminal A Cooling Towers, increasing efficiency and reducing energy consumption.	SCAS	•	•	•	•	•	52	2010	no	no	70.6
Airport Facilities	Energy Efficient HVAC Management Systems for Terminal A Central Utilities Plant	Converted central plant to an all-variable speed system and utilized HVAC management system to decrease energy use by optimizing plant operations, scheduling equipment (e.g., equipment is turned off during non-occupied hours), utilizing free cooling, etc.	SCAS	•	•	•	•	•	53	2010	no	no	263.8
Airport Facilities	Energy Efficiency Improvements for Air Handlers at SCAS Facilities	Adjusted economizer operations and programming on existing Direct Digital Control (DDC) constant volume air handlers to fully utilize free cooling.	SCAS	•	•	•	•	•	54	2010	no	no	33.2
Airport Facilities	Shutting Off Airport Escalators After Hours	Seven escalators at the Sacramento International Airport are shut off from midnight to 6 a.m. (saving energy and extending equipment life).	SCAS	•	•	•	•	•	55	2011	no	no	6.1
Airport Facilities	Shutting Off Computer Monitors at Night	Implement policy to shut off computer monitors at night, reducing electricity and extending the life of monitors.	SCAS	•	•	•	•	•	57	2010	no	no	37.6
Street-lights and Traffic Signals	Countywide Streetlight Conversion Project (MV to LED)	Converted 1800 existing mercury-vapor streetlights in the unincorporated county to energy-saving LED lighting technology (ARRA funded project)	SAC-DOT	•	•	•	•	•	39	2011	no	no	281.7
Street-lights and Traffic Signals	Traffic Signal System Upgrade (Energy Efficient LED Bulbs)	Converted all 589 traffic signals in the County from incandescent light bulbs to LED.	SAC-DOT	•	•	•	•	•	44	2010	no	yes	1,942.2
Street-lights and Traffic Signals	Reduce Land-side Lighting at Sacramento International Airport	Turned off three of six 1000W lights on 100ft-tall light masts in landside areas of the Sacramento International Airport.	SCAS	•	•	•	•	•	50	2010	no	no	391.2

# CLIMATE ACTION PLAN

**TABLE 3-3** *continued*

County Government Operations Measures Analyzed for this Plan\*

Sector	Name	Description	County Lead Dept.	Analysis Inputs and Results									
				Alternative Plans**					#	Impl. Date	Financed	County General Fund	Annual GHG Reduction (MT CO <sub>2</sub> e) in 2020
				A	B	C	D	E					
Water Delivery Facilities	Fixed Base Water Meter Reading System (Pilot Study)	SCWA conducted a successful pilot study with establishment of a fixed base water meter reading system for 4000 customer accounts. The computer-based system uses radios saves fuel and labor by eliminating the need for people and vehicles to read meters and also helps identify water leaks. This tool will aid SCWA in meeting the State's mandate for 20% reduction in per capita water use by 2020.	SCWA	•	•	•	•	•	48	2010	no	no	0.1
<b>FUTURE (38)</b>													
Buildings and Facilities	Water Audits and Implementation of Conservation Measures at County Institutions	Conduct audits of County institutions (e.g., Corrections) and implement necessary water conservation measures.	General Svcs and/or Water Resources	•	•	•	•	•	1	2012	no	yes	1
Buildings and Facilities	Efficient Toilet-Flushing Systems: Main Jail	Install prison-grade high efficiency toilet flushing systems ("Flushometer") to replace the current inefficient models.	General Services					•	2	2014	yes	yes	2
Buildings and Facilities	Landscape Audit and Installation of River Friendly Landscaping at County Buildings	Conduct landscape audit and install River-Friendly Landscaping in Public Spaces in-lieu of turf. River-Friendly Landscape" embodies the value of reduced resource use (water, energy and nutrients) and practices the guidelines developed in the local "River Friendly Landscape Program" by the Sacramento Stormwater Quality Partnership.	General Svcs and/or Water Resources	•	•	•	•	•	3	2014	no	yes	5
Buildings and Facilities	Energy Efficient Lighting at Sacramento International Airport Parking Garage	Replace the high-pressure sodium lights at the parking garage at the Sacramento International Airport with energy efficient lighting.	General Services and SCAS	•	•	•	•	•	8	2014	no	no	365

TABLE 3-3 *continued*

Sector	Name	Description	County Lead Dept.	Analysis Inputs and Results									
				Alternative Plans**					#	Impl. Date	Financed	County General Fund	Annual GHG Reduction (MT CO <sub>2</sub> e) in 2020
				A	B	C	D	E					
Buildings and Facilities	HVAC System Efficiency Upgrades: SCAS	Replace 10 old and inefficient package AC units with new high efficiency systems at older airport facilities	General Services and SCAS		•	•	•	•	9	2014	no	no	9
Buildings and Facilities	Water Heater Replacement: Main Jail	Replace the current potable water heaters with more energy-efficient models; current heaters are at the end of their serviceable life and are difficult to maintain.	General Services		•	•	•	•	10	2014	yes	yes	103
Buildings and Facilities	Energy Efficiency Retrofits: Rio Cosumnes Correctional Center	Modernize building systems at the RCCC (built in 1960); install high efficiency lighting technologies and upgrade or replace HVAC systems. This project is an Energy Services Company (ESCO) process enabled under California Government Code 4217.10.	General Services		•	•	•	•	11	2012	yes	yes	282
Buildings and Facilities	Laundry System Efficiency Upgrades: Rio Cosumnes Correctional Center	At the RCCC, change out the conventional laundry methods that rely on hot water and chemicals to a more energy-efficient method that uses ozone (oxygen and electricity) and cold water.	General Services		•	•	•	•	12	2014	yes	yes	127
Buildings and Facilities	Chiller Efficiency Improvements: Juvenile Hall Central Plant	Upgrade chilled water system equipment at Juvenile Hall to operate in variable speed mode in order to reduce energy usage and costs. For every 10% reduction in speed there is a 30% reduction in energy usage.	General Services		•	•	•	•	13	2014	yes	yes	56
Buildings and Facilities	Improved HVAC Controls: Coroner's Building	Upgrade the existing obsolete HVAC control system at the Coroner's Building by providing more stable, reliable and efficient Direct Digital Controls (DDC).	General Services		•	•	•	•	14	2014	yes	yes	70
Buildings and Facilities	Laundry System Efficiency Upgrades: Main Jail	At the Main Jail, change out conventional laundry methods that rely on hot water and chemicals to more energy-efficient ones that use ozone (oxygen and electricity) and cold water.	General Services		•	•	•	•	15	2014	yes	yes	142



# CLIMATE ACTION PLAN

**TABLE 3-3** *continued*

County Government Operations Measures Analyzed for this Plan\*

Sector	Name	Description	County Lead Dept.	Analysis Inputs and Results									
				Alternative Plans**					#	Impl. Date	Financed	County General Fund	Annual GHG Reduction (MT CO <sub>2</sub> e) in 2020
				A	B	C	D	E					
Buildings and Facilities	Efficient Lighting Retrofit: Main Jail	Upgrade the lighting in the day rooms of the Main Jail with longer lasting, more energy-efficient lighting.	General Services		•	•	•	•	16	2014	yes	yes	75
Buildings and Facilities	Utility Power Surge (UPS) Retrofit: Dept of Technology Bldg.	Replace Utility Power Surge (UPS) equipment with a smaller, more energy-efficient model.	General Services		•	•	•	•	17	2014	yes	yes	92
Buildings and Facilities	Chiller Plant Waterside Economizer: Dept. of Technology Bldg.	Add a heat exchanger to the chilled water system to use the cold water from the cooling tower to provide chilled water when the outside air conditions are optimal.	General Services		•	•	•	•	18	2014	yes	yes	11
Buildings and Facilities	Chiller Plant Smart Controls: Dept. of Technology Bldg.	Upgrade the chilled water system controls, including optimized equipment settings, to improve the chiller plant efficiency and save energy.	General Services		•	•	•	•	19	2014	yes	yes	98
Buildings and Facilities	Chiller Plant Pump Efficiency Upgrade: Dept. of Technology Bldg.	Upgrade chilled water system pumps to operate in variable speed mode in order to reduce energy usage and costs. For every 10% reduction in speed there is a 30% reduction in energy usage.	General Services		•	•	•	•	20	2014	yes	yes	28
Buildings and Facilities	Energy Conserving Duct Isolation Dampers: Dept. of Technology Bldg.	Modify the main HVAC duct dampers to isolate non-occupied floors during nights and weekends, to reduce the amount of air the main air-handling unit delivers (thereby saving energy).	General Services		•	•	•	•	21	2014	yes	yes	13
Buildings and Facilities	Turning Off Computer Monitors at Night	Implement program to turn off computer monitors at night when not in use.	Technology		•	•	•	•	22	2014	no	yes	38
Buildings and Facilities	Installation of High Efficiency Toilets at County Offices	Replace remaining pre-1992 toilets (3.5-7 gal/flush) in County buildings with high-efficiency toilets (HET; 1.28 gal/flush)	General Services					•	23	2012	yes	yes	7



**TABLE 3-3** *continued*

Sector	Name	Description	County Lead Dept.	Analysis Inputs and Results									
				Alternative Plans**					#	Impl. Date	Financed	County General Fund	Annual GHG Reduction (MT CO2e) in 2020
				A	B	C	D	E					
Buildings and Facilities	Large Turf Landscape Irrigation Audits at County Facilities	Conduct water audits to evaluate irrigation practices in large turf landscapes around County facilities and modify irrigation practices and equipment accordingly (timers, sprinkler heads, etc) . Coordinate with appropriate water conservation coordinator with applicable water purveyor. (In Sacramento, turf requires about 57 inches of water/year and typically overwatering on the order of 30%-50% occurs over what is needed.)	General Svcs and/or Water Resources			•	•	•	24	2014	no	yes	3
Buildings and Facilities	Replacement of Water-Wasting Equipment Related to County Operations	Replace water-wasting equipment with more efficient equipment when grant funds are available from local water purveyors. (For example, replace hoses used to clean surfaces – such as at the County animal care facility – with water brooms).	General Svcs and/or Water Resources				•	•	25	2014	no	yes	0
Buildings and Facilities	Water Booster System Replacement: Main Jail	Replace the current water booster system, which ensures adequate water supply and pressure on all floors of the Main Jail, with an updated, more energy-efficient pump system. The current system is at the end of its serviceable life and difficult to maintain.	General Services				•	•	26	2014	yes	yes	21
Buildings and Facilities	HVAC Energy Modifications: County Administration Building	Change the HVAC fans for the office areas from constant volume air-flow to variable air-flow to reduce energy usage and costs. For every 10% reduction in speed there is a 30% reduction in energy usage.	General Services					•	27	2014	yes	yes	213
Buildings and Facilities	Green Building Policy for Leased County Buildings	Adopt a “Leased Green Building” Policy that establishes criteria for County lease agreements, where the County will only enter into new leases when buildings meet specified energy efficiency or other green building standards.	General Svcs		•	•	•	•	29	2014	no	yes	546
Buildings and Facilities	Solar Power (PV) Option 1	PV 5.25MW PPA (no location specified) (Power Purchase Agreement)	General Services		•	•	•	•	35	2014	no	yes	1,895

# CLIMATE ACTION PLAN

**TABLE 3-3** *continued*

County Government Operations Measures Analyzed for this Plan\*

Sector	Name	Description	County Lead Dept.	Analysis Inputs and Results									
				Alternative Plans**					#	Impl. Date	Financed	County General Fund	Annual GHG Reduction (MT CO <sub>2</sub> e) in 2020
				A	B	C	D	E					
Buildings and Facilities	Solar Power (PV) Option 2	PV 1MW (no location specified)	General Ser-vices						36	2012	yes	yes	361
Buildings and Facilities	Solar Power (PV) Option 4	PV 500kW (no location specified)	General Ser-vices						37	2014	yes	yes	180
Buildings and Facilities	Solar Power (PV) Option 5	PV 100kW (no location specified)	General Ser-vices						38	2014	yes	yes	36
Vehicle Fleet	Increased Rate of Replacement of SCAS Standard Vehicles with Electric Ones	Increase rate of replacement of small gas utility vehicles with electric utility vehicles.	SCAS		•	•	•	•	6	2014	no	no	8
Vehicle Fleet	Fleet Replacement 1	Replace small and mid-size sedans with small and mid-size hybrid sedans, and one large sedan type with mid-size (total of 328 replacements)	General Ser-vices/ Fleets		•				30	2014	yes	yes	674
Vehicle Fleet	Fleet Replacement 2	Fleet Replacement 1 scenario Plus: Replace light duty pickups with gasoline hybrid pickups, and replace two types large trucks (F350/450) with CNG trucks (total of 552 replacements)	General Ser-vices/ Fleets			•			31	2014	yes	yes	962
Vehicle Fleet	Fleet Replacement 3	Replace small and mid-size sedans with small and mid-size hybrid sedans, replace large sedans with mid-size, replace light duty pickups with hybrid pickups, and replace large trucks with CNG (total of 839 replacements)	General Ser-vices/ Fleets				•		32	2014	yes	yes	1,354
Vehicle Fleet	Fleet Replacement 4	Same description as previous scenario #3, but total of 1,237 replacements.	General Ser-vices/ Fleets						33	2014	yes	yes	2,147
Vehicle Fleet	Fleet Replacement 5	Same description as previous scenario #3, but total of 1,250 replacements.	General Ser-vices/ Fleets					•	34	2014	yes	yes	2,175

TABLE 3-3 *continued*

Sector	Name	Description	County Lead Dept.	Analysis Inputs and Results									
				Alternative Plans**					#	Impl. Date	Financed	County General Fund	Annual GHG Reduction (MT CO <sub>2</sub> e) in 2020
				A	B	C	D	E					
Airport Facilities	Energy-Efficient Taxiway Lighting	Retrofit taxiway lighting with LED technology in phases and during major taxiway renovation/upgrade.	SCAS		•	•	•	•	7	2014	no	no	19
Street-lights and Traffic Signals	Countywide Streetlight Conversion Project (HPS & MV to LED)	Replace half of the County's 22,374 high-pressure sodium (HPS) and mercury-vapor (MV) streetlights with energy saving LED technology.	SAC-DOT		•	•	•	•	28	2014	no	no	1,453
Water Delivery Facilities	Rehabilitate Groundwater Wells with Efficient Pumps and Motors	Each year Sacramento County Water Agency (SCWA) rehabilitates some of its groundwater wells to restore production levels to near new conditions; new efficient pumps are installed and the motor is replaced or rebuilt for efficiency. Between 2005 and 2010, SCWA rehabilitated over 20 wells, 15 extensively.	SCWA		•	•	•	•	4	2014	no	no	80
Water Delivery Facilities	Use of the Most Efficient Water Production Sources	Sacramento County Water Agency (SCWA) prioritizes what water production sources to use for water delivery, considering energy-efficiency/cost (as well as the need to not deplete any of the sources). Direct feed wells are the least expensive and energy-intensive form of production (pumping the water once versus 2 or 3 times for treated groundwater or surface water, respectively). This measure entails installation of about 7 direct feed-wells to offset the use of treated groundwater wells during the cooler months.	SCWA		•	•	•	•	5	2014	no	no	559

Notes:

\*See Appendix B for summary sheets providing additional information for the measures included in this table.

\*\*For comparative descriptions of the five alternative plans, see Chapter 3 and Appendix A.

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## CHAPTER 4

# Preferred Action Plan

### Selection of the Preferred Action Plan

The County's ultimate goal is to simultaneously reduce GHG emissions and save money, and this can be achieved in a variety of ways. County Sustainability Program staff has identified Alternative Action Plan B (introduced in Table 3-1 in the previous chapter) as the preferred strategy to achieve the County's goal because it represents the best balance between saving money and achieving the target GHG emission reductions. Plan B includes the 27 completed measures included in all of the alternative plans and an additional 25 future measures.

Implementing this Plan will be a dynamic process. The County fully anticipates that this Plan and associated measures will be re-evaluated and adjusted over time as more data and information becomes available, as County department managers and staff become more engaged, as technologies evolve and advance, and as protocols, quantitative techniques and tools are developed and refined by the regulators. Though this dynamic implementation process, measures may be revised, deleted or added as needed to maximize the County's opportunity to save money, increase efficiencies, create jobs and reduce GHG emissions. For example, if other measures not included in the preferred action plan are found to better achieve the balance between GHG emissions and cost reduction, the County will reevaluate and modify the plan as necessary. Additionally, since implementation of future actions will rely on the County's ability to secure funding for them (grants, low-interest financing, etc.) the plan will be implemented and/or adjusted based on future funding realities.

In addition to the measures included in the preferred plan as described in this chapter, the County has completed, is implementing, or is considering various qualitative measures (presented in Chapter 5). Data does not exist to perform quantitative cost-benefit analysis on the qualitative measures, but implementation of those measures is expected to result in additional GHG emissions reductions above and beyond what is estimated for the preferred action plan. As such, the GHG emissions reductions of Plan B described in this chapter are likely understated.

Many of the measures in the preferred action plan will reduce County consumption of fuel, electricity and natural gas. This is important because fuel and utility costs represent a significant portion of the County budget, and the potential volatility and escalation of these costs in the future represents a threat beyond the County's control.

# CLIMATE ACTION PLAN

## Preferred Action Plan Benefits

This section describes the community economic benefits and carbon reduction expected due to implementation of the 54 quantitative measures in the preferred action plan. Table 4-1 provides a quick summary of the data.



**TABLE 4-1**  
Summary of Preferred Action Plan Benefits

Energy Cost and GHG Reduction Plan B			
Strategy:	Attains 15% GHG Reduction with Least Capital Cost	20,327 Tons CO <sub>2</sub> e Avoided	15.1% GHG Reduction
Community Benefit (over 25 year life of plan)		Capital Cost	\$10,247,000
\$\$\$ Avoided Utility Company Payments	\$26,289,500	Jobs	578
\$\$\$ Avoided Fuel Purchases	\$1,747,800	MIRR	9.9%
\$\$\$ Invested Locally in GHG Projects	\$34,959,900	NPV	\$1,660,100

## Economic Benefits

The County's investment in the specific measures in the preferred action plan will have economic benefits for the community, as outlined in Table 4-1. The following explains the factors in the table:

- **\$\$\$ Avoided Utility Company Payments:** This is the Net Present Value (NPV) of the County's avoided electricity and natural gas payments over the 25 year period of the analysis.
- **\$\$\$ Avoided Fuel Payments:** The NPV of the County's avoided gasoline and diesel fuel payments over the 25 year period of the analysis.
- **\$\$\$ Invested Locally in GHG Projects:** This is the total capital cost of the 52 measures included in the preferred action plan. This analysis does not attempt to separate labor, material, overhead or profit to more accurately identify the percentage of these investments likely to

remain local. The inherent overstatement of this result is balanced to a significant degree by discounting the well-documented economic multiplier effect of local investment (no multiplier is used). Bio-diesel purchase is considered 100% local. In practice, this will depend on the supplier. Ethanol is not considered to be a local purchase.

- **Jobs Created:** The estimated number of jobs created was calculated using the methodology defined in the County's 2009 Federal Stimulus Package application (\$1.0 Million in Capital Expenditure = 10.87 jobs created). This does not incorporate timing of the expenditure or duration of the position.

Table 4-2 presents the results of the cash flow analysis for years 2012-2025 for the preferred action plan. As mentioned previously in this Plan, the negative cash flow in Year 2014 is due to artificially assigning 2014 as the implementation year for many measures where the actual implementation date was not known.



**TABLE 4-2**  
Projected Investment Results for Preferred Action Plan

Plan B Cash Flow				
Year	Cash Flow (gross)	Annual Debt Service Payments	Net Cash Flow	Outstanding Principal
2012	\$0	\$0	\$0	\$0
2013	\$600	\$0	\$600	\$0
2014	(\$33,100)	\$0	(\$33,100)	\$10,211,400
2015	\$1,378,100	(\$1,537,700)	(\$159,600)	\$8,989,400
2016	\$1,445,600	(\$1,537,700)	(\$92,100)	\$7,741,100
2017	\$1,515,200	(\$1,537,700)	(\$22,500)	\$6,465,400
2018	\$1,587,000	(\$1,537,700)	\$49,300	\$5,161,200
2019	\$1,661,000	(\$983,000)	\$678,100	\$4,382,100
2020	\$1,737,500	(\$983,000)	\$754,500	\$3,572,200
2021	\$1,816,300	(\$983,000)	\$833,400	\$2,730,400
2022	\$1,897,700	(\$983,000)	\$914,700	\$1,855,300
2023	\$1,981,600	(\$983,000)	\$998,600	\$945,600
2024	\$2,068,200	(\$983,000)	\$1,085,300	\$0
2025	\$2,157,600	\$0	\$2,157,600	\$0





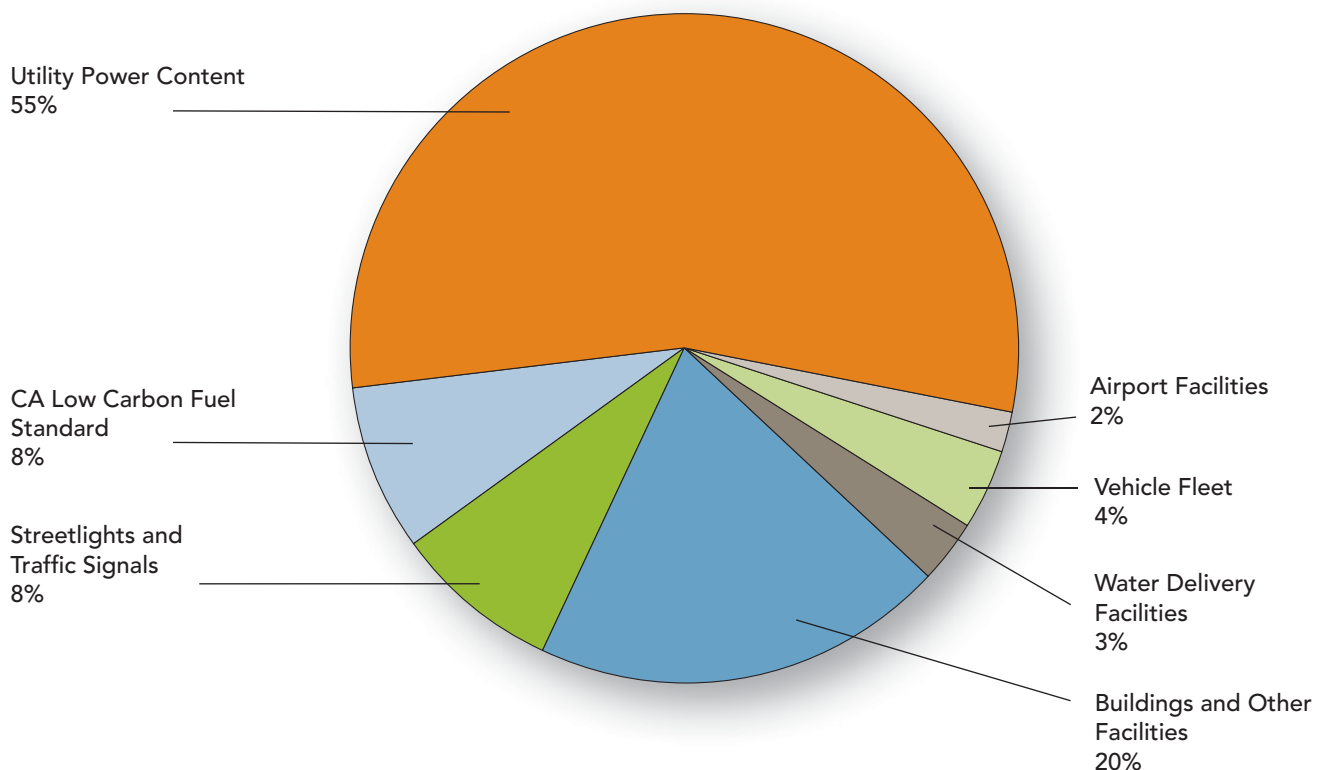
# CLIMATE ACTION PLAN

## Carbon Reduction Benefits

Figure 4-1 illustrates the estimated GHG emissions reductions that can be achieved through implementation of the preferred action plan, by sector. In this scenario, the County is responsible for implementing actions to address about 37% of the emission reductions and the two statewide measures account for the rest. For the County's portion, actions taken related to buildings and facilities (20%) and streetlights and signals (8%) are expected to accomplish most of the reductions. The relatively smaller reductions resulting from actions related to vehicle fleet, airport facilities and water delivery systems are due to a variety of factors. First, the County has already proactively implemented a number of projects and programs (many pre-2005) that greatly increased the efficiency of these sectors (that is true

for streetlights/traffic signals too), so the incremental benefit of future projects is relatively smaller (i.e. the lowest hanging fruit has already been picked). For the airport facilities sector, the GHG reduction benefits of future actions is somewhat offset by increased emissions associated with the new Terminal B facility. Although the new terminal is modern and energy efficient (certified LEED Silver) it is much larger than the terminal it replaced in order to accommodate projected growth in air travel. The reductions associated with the water delivery facilities sector are based on implementation of only a handful of water supply infrastructure measures due to limited available/suitable data; no stormwater/drainage or flood control infrastructure measures were included.

**FIGURE 4-1**  
Estimated 2020 GHG Emissions Reduction by Sector for Preferred Action Plan



## Preferred Action Plan Measure Descriptions

This section describes 52 quantifiable measures included in preferred Action Plan B (27 completed/underway and 25 future measures). The measures are organized by the following LGOP sectors: Buildings and Other Facilities, Vehicle Fleet, Airport Facilities, Streetlights and Signals, and Water Delivery Facilities.

### Buildings and Other Facilities

Sacramento County owns four million square feet of facilities and leases another two million square feet of space to house and support County operations such as corrections (for adults and juveniles), medical and social services, animal care, and offices. The County also owns four airports, as described in a separate section later in this chapter. The Sacramento County Main Courthouse is owned by the State. All County-owned facilities are managed and maintained by the County's Department of General Services (DGS), including the airport facilities, which are managed by DGS under contract to the Sacramento County Airport Systems (SCAS). The County's Energy Program Manager in DGS is responsible for planning, coordinating and administering the development, implementation, and evaluation of energy conservation and management programs for all County owned and leased facilities and equipment.



This section describes measures related to energy used in County-owned buildings and facilities for heating, cooling and lighting. As previously explained (see Chapter 2), GHG emissions associated with energy use depend both on the amount and type of energy used. The Strategy and Framework Document articulated two goals, which together address both aspects of GHG emissions from County building energy use:

- Improve energy efficiency of County buildings, facilities and infrastructure operations
- Decrease use of fossil fuels by transitioning to renewable energy sources

Energy used to operate County buildings and facilities in 2005 accounted for 27% of County government emissions (35,870 MT CO<sub>2</sub>e). This number increased to 39,340 MT CO<sub>2</sub>e by 2009 due to construction of new facilities and additions to leased space for County services. The emissions are expected to continue to rise unless more is done to curb energy consumption and utilize cleaner forms of energy. At the same time, steps are needed to ensure a reliable energy supply and lower the County's vulnerability to escalating utility costs. Accordingly, more than half of the measures in this Plan (30) are intended to reduce energy use in buildings and facilities, and in the process reduce GHG emissions and save money.

# CLIMATE ACTION PLAN

Over one-quarter (27%) of the 2005 GHG emissions from County government operations were associated with energy used in buildings and facilities, and this sector presents one of the greatest opportunities for physical improvements and conservation measures to save energy and money while reducing GHG emissions. Accordingly, more than half of the quantitative measures included in the preferred action plan are designed to reduce energy use in County buildings and facilities. This includes measures related to water conservation in buildings and landscapes, since the energy used to collect, treat and distribute the water creates GHG emissions.

Measures related to operation and maintenance of roadway facilities (other than streetlights and signals, addressed later in this section) are not addressed in this Plan because data was not available or of sufficient quality to warrant inclusion in the analysis. Future updates to this Plan will address this if data becomes available.

Table 4-3 presents a comprehensive list of measures evaluated for this CAP related to the Buildings and Other Facilities sector, sorted by lead implementing department. The list is further sorted to show completed measures (all of which are included in the preferred action plan), future measures included in the preferred action plan, and future measures not included in the preferred action plan. The table also summarizes key analysis results (note that financial analyses were not performed on completed measures). Refer to Appendix B for summary sheets providing additional details for each of the measures.



In 2011, the County Dept of Technology completed conversion of physical servers to virtual servers. This action is estimated to save the County \$55,000 annually.

**TABLE 4-3**

**Preferred Action Plan Measures: Buildings and Other Facilities\***

			Analysis Inputs and Results					
County Lead Dept.	Name	Description	No. **	Impl. Date	Annual Cost Savings	IRR ***	Net Present Value ***	Annual GHG Reduction in 2020 (MT CO2e)
COMPLETED/COMMITTED (11)								
General Svcs	Energy Efficiency Retrofits: Gibson Ranch Park	Installed energy-efficient heating, ventilation, and air conditioning (HVAC) at Gibson Ranch Park.	41	2011	\$1,905	–	–	4.8
General Svcs	Energy Efficiency Upgrades: J. Harvie Community Center & Caretaker House	Installed energy-efficiency upgrades (including energy efficient roof/insulation, electrical system and appliances) when renovating the J Harvey Community Center & Caretaker house.	42	2011	\$1,345	–	–	3.4

**TABLE 4-3** (continued)**Preferred Action Plan Measures: Buildings and Other Facilities\***

County Lead Dept.	Name	Description	Analysis Inputs and Results					
			No. **	Impl. Date	Annual Cost Savings	IRR ***	Net Present Value ***	Annual GHG Reduction in 2020 (MT CO <sub>2</sub> e)
General Svcs	Energy Audits and Improvements Using Financial Incentive Revolving Fund	Performed energy audits of 35% of square footage of County facilities and implement cost-effective and short-payback energy efficiency improvements to reduce energy use by 5%. To ensure a sustainable funding source, capital and staff costs, were paid by the financial incentive revolving fund, which will be reimbursed by money saved through ongoing energy savings.	43	2011	\$235,362	–	–	586.8
Technology	Replacement of CRT Monitors with Energy Efficient Flat Panel Monitors	Since 2005, replaced CRT monitors with flat panel monitors at virtually all County workstations.	45	2010	\$808	–	–	2
General Svcs	Sheriff Administration Bldg. Cooling Source Replacement	Provided a new source of energy-efficient cooling for the Sheriff Administration building. Its chiller used an outdated refrigerant which had to be replaced or converted when needing major repairs. This facility was connected to the County Dept. of Technology chillers to supply chilled water for cooling.	56	2010	\$78,454	–	–	195.6
General Svcs	Energy Efficient Improvements Mechanical Systems: Mental Health Treatment Center	Modernized building systems at the Mental Health Treatment Center (built in 1991); provide high efficiency lighting technologies and more efficient HVAC systems. This project was an Energy Services Company (ESCO) process enabled under California Government Code 4217.10.	60	2010	\$165,711	–	–	525.9
General Svcs	Energy Efficient Upgrades: John Price DA Building	Installed new HVAC controls (meeting current standard for interfacing with downtown central plant), including converting to a variable air volume (VAV) system. The improvements increased HVAC efficiency and alleviated heating/cooling problems.	61	2011	\$28,859	–	–	76.2
General Svcs	County Administration Bldg Central Plant Improvements	Replaced outdated equipment at the Downtown District heating and cooling plant (700 H Street; circa 1978-2008) with more efficient environmentally-compliant models. Replaced chillers, heating boilers, variable speed air handlers, and energy efficient pumping systems. Reused existing infrastructure in the rebuilding of the plant.	62	2011	\$368,433	–	–	1,024.9

# CLIMATE ACTION PLAN

**TABLE 4-3** (continued)

**Preferred Action Plan Measures: Buildings and Other Facilities\***

County Lead Dept.	Name	Description	Analysis Inputs and Results					
			No. **	Impl. Date	Annual Cost Savings	IRR ***	Net Present Value ***	Annual GHG Reduction in 2020 (MT CO2e)
General Svcs	Energy Efficient Improvements to Lighting and Mechanical Systems: Building Inspection Facility	Upgraded lighting and mechanical system to be energy-efficient when other improvements (e.g., roofing) were made to the Building Inspection Facility.	63	2010	\$33,128	–	–	108.5
Technology	Department of Technology Virtual Server Consolidation	Virtualized 421 servers on to a platform of 10 physical servers.	64	2012	\$100,931	–	–	251.6
General Svcs	Solar Power (PV) Option 3	PV 1MW (located at Vineyard Surface Water Treatment Plant) (Power Purchase Agreement)	65	2011	\$144,769	–	–	360.9
<b>FUTURE – INCLUDED IN PREFERRED PLAN (19)</b>								
General Svcs and/or Water Resources	Water Audits and Implementation of Conservation Measures at County Institutions	Conduct audits of County institutions (e.g., Corrections) and implement necessary water conservation measures.	1	2012	\$566	NA	\$4,600	1
General Svcs and/or Water Resources	Landscape Audit and Installation of River Friendly Landscaping at County Buildings	Conduct landscape audit and install River-Friendly Landscaping in Public Spaces in-lieu of turf. "River-Friendly Landscape" embodies the value of reduced resource use (water, energy and nutrients) and practices the guidelines developed in the local "River Friendly Landscape Program" by the Sacramento Stormwater Quality Partnership.	3	2014	\$1,820	NA	\$14,600	5
SCAS/ General Svcs	Energy Efficient Lighting at Sacramento International Airport Parking Garage	Replace the high-pressure sodium lights at the parking garage at the Sacramento International Airport with energy efficient lighting.	8	2014	\$146,300	11.4%	\$296,500	365
SCAS/ General Svcs	HVAC System Efficiency Upgrades: SCAS	Replace 10 old and inefficient package AC units with new high efficiency systems at older airport facilities	9	2014	\$3,790	-7.2%	(\$110,300)	9
General Svcs	Water Heater Replacement: Main Jail	Replace the current potable water heaters with more energy-efficient models; current heaters are at the end of their serviceable life and are difficult to maintain.	10	2014	\$13,650	-12.7%	(\$829,200)	103
General Svcs	Energy Efficiency Retrofits: Rio Cosumnes Correctional Center	Modernize building systems at the RCCC (built in 1960); install high efficiency lighting technologies and upgrade or replace HVAC systems. This project is an Energy Services Company (ESCO) process enabled under California Government Code 4217.10.	11	2012	\$86,150	-7.4%	(\$2,592,600)	282

**TABLE 4-3** (continued)**Preferred Action Plan Measures: Buildings and Other Facilities\***

County Lead Dept.	Name	Description	Analysis Inputs and Results					
			No. **	Impl. Date	Annual Cost Savings	IRR ***	Net Present Value ***	Annual GHG Reduction in 2020 (MT CO <sub>2</sub> e)
General Svcs	Laundry System Efficiency Upgrades: Rio Cosumnes Correctional Center	At the RCCC, change out the conventional laundry methods that rely on hot water and chemicals to a more energy-efficient method that uses ozone (oxygen and electricity) and cold water.	12	2014	\$16,660	20.2%	\$87,300	127
General Svcs	Chiller Efficiency Improvements: Juvenile Hall Central Plant	Upgrade chilled water system equipment at Juvenile Hall to operate in variable speed mode in order to reduce energy usage and costs. For every 10% reduction in speed there is a 30% reduction in energy usage.	13	2014	\$22,400	19.4%	\$113,100	56
General Svcs	Improved HVAC Controls: Coroner's Building	Upgrade the existing obsolete HVAC control system at the Coroner's Building by providing more stable, reliable and efficient Direct Digital Controls (DDC).	14	2014	\$18,010	8.5%	\$4,300	70
General Svcs	Laundry System Efficiency Upgrades: Main Jail	At the Main Jail, change out conventional laundry methods that rely on hot water and chemicals to more energy-efficient ones that use ozone (oxygen and electricity) and cold water.	15	2014	\$18,740	21.6%	\$104,100	142
General Svcs	Efficient Lighting Retrofit: Main Jail	Upgrade the lighting in the day rooms of the Main Jail with longer lasting, more energy-efficient lighting.	16	2014	\$30,260	-0.2%	(\$300,800)	75
General Svcs	Utility Power Surge (UPS) Retrofit: Dept of Technology Bldg.	Replace Utility Power Surge (UPS) equipment with a smaller, more energy-efficient model.	17	2014	\$36,990	0%	(\$153,400)	92
General Svcs	Chiller Plant Waterside Economizer: Dept. of Technology Bldg.	Add a heat exchanger to the chilled water system to use the cold water from the cooling tower to provide chilled water when the outside air conditions are optimal.	18	2014	\$4,480	3.8%	(\$18,300)	11
General Svcs	Chiller Plant Smart Controls: Dept. of Technology Bldg.	Upgrade the chilled water system controls, including optimized equipment settings, to improve the chiller plant efficiency and save energy.	19	2014	\$39,230	4.0%	(\$153,400)	98
General Svcs	Chiller Plant Pump Efficiency Upgrade: Dept. of Technology Bldg.	Upgrade chilled water system pumps to operate in variable speed mode in order to reduce energy usage and costs. For every 10% reduction in speed there is a 30% reduction in energy usage.	20	2014	\$11,210	18.1%	\$52,800	28
General Svcs	Energy Conserving Duct Isolation Dampers: Dept. of Technology Bldg.	Modify the main HVAC duct dampers to isolate non-occupied floors during nights and weekends, to reduce the amount of air the main air-handling unit delivers (thereby saving energy).	21	2014	\$5,040	10.2%	\$6,800	13



# CLIMATE ACTION PLAN

**TABLE 4-3** (continued)

**Preferred Action Plan Measures: Buildings and Other Facilities\***

County Lead Dept.	Name	Description	Analysis Inputs and Results					
			No. **	Impl. Date	Annual Cost Savings	IRR ***	Net Present Value ***	Annual GHG Reduction in 2020 (MT CO2e)
Technology	Turning Off Computer Monitors at Night	Implement program to turn off computer monitors at night when not in use.	22	2014	\$15,060	NA	\$121,400	38
General Svcs	Green Building Policy for Leased County Buildings	Adopt a "Leased Green Building" Policy that establishes criteria for County lease agreements, where the County will only enter into new leases when buildings meet specified energy efficiency or other green building standards.	29	2014	\$184,910	67.5	\$1,471,700	546
General Svcs	Solar Power (PV) Option 1	PV 5.25MW PPA (no location specified) (Power Purchase Agreement)	35	2014	\$760,037	100.7%	\$5,374,600	1,895
<b>FUTURE – NOT INCLUDED IN PREFERRED PLAN (11)</b>								
General Svcs	Efficient Toilet-Flushing Systems: Main Jail	Install prison-grade high efficiency toilet flushing systems ("Flushometer") to replace the current inefficient models.	2	2014	\$870	-39.5%	(\$2,340,800)	2
General Svcs	Installation of High Efficiency Toilets at County Offices	Replace remaining pre-1992 toilets (3.5-7 gal/flush) in County buildings with high-efficiency toilets (HET; 1.28 gal/flush)	23	2012	\$2,832	-15.99%	(\$258,900)	7
Water Resources and/or General Svcs	Large Turf Landscape Irrigation Audits at County Facilities	Conduct water audits to evaluate irrigation practices in large turf landscapes around County facilities and modify irrigation practices and equipment accordingly (timers, sprinkler heads, etc) . Coordinate with appropriate water conservation coordinator with applicable water purveyor. (In Sacramento, turf requires about 57 inches of water/year and typically overwatering on the order of 30%-50% occurs over what is needed.)	24	2014	\$1,250	NA	\$10,100	3
General Svcs and/or Water Resources	Replacement of Water-Wasting Equipment Related to County Operations	Replace water-wasting equipment with more efficient equipment when grant funds are available from local water purveyors. (For example, replace hoses used to clean surfaces -- such as at the County animal care facility -- with water brooms).	25	2014	\$25	NA	\$200	0
General Svcs	Water Booster System Replacement: Main Jail	Replace the current water booster system, which ensures adequate water supply and pressure on all floors of the Main Jail, with an updated, more energy-efficient pump system. The current system is at the end of its serviceable life and difficult to maintain.	26	2014	\$8,290	-11.0%	(\$402,700)	21



**TABLE 4-3** (continued)**Preferred Action Plan Measures: Buildings and Other Facilities\***

County Lead Dept.	Name	Description	Analysis Inputs and Results					
			No. **	Impl. Date	Annual Cost Savings	IRR ***	Net Present Value ***	Annual GHG Reduction in 2020 (MT CO <sub>2</sub> e)
General Svcs	HVAC Energy Modifications: County Administration Building	Change the HVAC fans for the office areas from constant volume air-flow to variable air-flow to reduce energy usage and costs. For every 10% reduction in speed there is a 30% reduction in energy usage.	27	2014	\$77,050	-2.7%	(\$1,163,300)	213
General Svcs	Solar Power (PV) Option 2	PV 1MW (no location specified)	36	2012	\$144,700	-10.2%	(\$5,550,900)	361
General Svcs	Solar Power (PV) Option 4	PV 500kW (no location specified)	37	2014	\$72,380	-10.2%	(\$2,776,800)	180
General Svcs	Solar Power (PV) Option 5	PV 100kW (no location specified)	38	2014	\$14,480	-10.2%	(\$557,500)	36

## Notes:

\*See Appendix B for summary sheets providing additional information for the measures included in this table.

\*\* Number assigned to the measure in the TEAA analysis (see Appendix A)

\*\*\*Certain financial metrics were not calculated in the analysis for measures that have been completed, are in progress, or for which the County has already committed resources.

NA: Not applicable

# CLIMATE ACTION PLAN

## Vehicle Fleet

County DGS maintains over 3,200 vehicles (2011 data) used mainly to provide direct services to the community, including light-duty cars and trucks, Sheriff's patrol cars and motorcycles, animal control, and heavier-duty maintenance and construction-related vehicles. Collectively the vehicles service over 50 departments.

The analysis conducted for this Plan also included airport fleet operations and solid waste collection trucks in the vehicle fleet category. SCAS maintains a large fleet of various vehicle types, including light-duty cars and trucks, heavy-duty trucks, electric vehicles, fire-suppression vehicles, street sweepers, and CNG-fueled buses. The Department of Waste Management and Recycling (DWMR) operates a fleet of 120 waste collection trucks that service residents and businesses in the unincorporated county.

Existing actions to date by DGS, SCAS and DWMR to lower vehicle fleet operational costs, fuel consumption and GHG emissions (described below) demonstrate the County's commitment to sustainability. The Strategy and Framework Document articulated two goals related to further reducing those emissions:

- Increase the average fuel efficiency of County-owned vehicles powered by gasoline and diesel (and encourage increased fuel efficiency in community vehicles)
- Increase use of alternative and lower carbon fuels in the County vehicle fleet (and facilitate their use in the community)

In 2005, 28% of the GHG emissions from County government operations (37,720 MT CO<sub>2</sub>e) were associated with operation of the County fleet. Due to significant reductions already achieved by the County in this sector through 2009, less emphasis is placed on additional vehicle fleet actions for this Plan than for other sectors such as buildings and facilities. This Plan includes 5 measures related to vehicle fleet.



In 2009, the County Dept. of Waste Management and Recycling adjusted the routes of its collections fleet to reduce the number of direct waste haul trips needed to Kiefer Landfill. This action saved the County almost \$60,000 a year and reduced GHG emissions by over 200 metric tons (equivalent to planting about 10,000 trees or taking 40 cars off the road).

In 2005, 28% of the GHG emissions from County government operations (37,720 MT CO<sub>2</sub>e) were associated with operation of the County fleet. As discussed in Chapter 2 and illustrated on Figure 2-4, significant reductions in these emissions were achieved between 2005 and 2009 (emissions were lowered to 30,630 MT CO<sub>2</sub>e.) This was influenced by various factors:

- the reduction in full-time County employees during that period (resulting in fewer vehicle miles traveled for work and commuting)
- market availability of more fuel-efficient vehicles
- vehicle replacements made by DGS since 2005 which have resulted in hybrids making up almost ten percent of the light duty vehicle fleet in 2009 as compared to one percent in 2005 and 5% of the heavy fleet being powered by alternative fuels
- proactive actions taken by SCAS to increase the efficiency of its fleet, including operating CNG buses and acquiring several low speed electric trucks and global electric motorcars (<25 mph) for airfield and landside maintenance equipment
- conversion of the County's fleet of 120+ waste collection vehicles to LNG
- carpool and transit subsidies and incentives provided by the County and Regional Transit
- availability of more natural gas fueling stations and electric charging stations, several of which are operated by the County at the Sacramento International Airport, downtown Sacramento and at the Bradshaw Complex

For this reason, less action is required related to the vehicle fleet sector and the measures in the preferred plan are less aggressive than those related to the buildings and other facilities or streetlights and signals sectors.

Table 4-4 presents a comprehensive list of measures evaluated for this CAP related to the Vehicle Fleet sector, sorted by lead implementing department. The list is

further sorted to show completed measures (all of which are included in the preferred action plan), future measures included in the preferred action plan, and future measures not included in the preferred action plan. The table also summarizes key analysis results (note that financial analyses were not performed on completed measures). Refer to Appendix B for summary sheets providing additional details for each of the measures.

**TABLE 4-4****Preferred Action Plan Measures: Vehicle Fleet\***

Referenced Action Plan Measures: Vehicle Fleet			Analysis Inputs and Results					
County Lead Dept.	Name	Description	No. **	Impl. Date	Annual Cost Savings	IRR ***	Net Present Value ***	Annual GHG Reduction in 2020 (MT CO2e)
COMPLETED/COMMITTED (3)								
Waste Mgmt & Recycling	Routing Efficiencies for Waste Collection Trucks	In 2009, the County Dept. of Waste Management and Recycling (DWMR) adjusted the routes of its collections fleet to reduce the number of direct waste haul trips need to Kiefer Landfill. More trucks now take waste to the intermediary North Area Recovery Station (NARS) where various waste streams are combined into larger trucks for delivery to the landfill, thus resulting in a net decrease in vehicle trip miles.	49	2010	\$58,608	–	–	209.6
Airports	Improved Landscape Maintenance Efficiencies at SCAS Facilities: Larger Mowers	Utilize large mowers, 6 to 11 ft wide, which cut twice as much grass as a typical mower, to maintain SCAS landscapes. Though the larger mowers consume more fuel, an aggregate savings is realized by using fewer tractors/mowers.	58	2010	\$3,671	–	–	13.3
Airports	Improved Landscape Maintenance Efficiencies at SCAS Facilities: Swather Mowers	Utilize a swather that cuts 22 feet per pass to maintain airport landscapes. The swather is more fuel efficient than tractor/mowers and cuts at twice the speed of a traditional tractor/mower.	59	2010	\$4,194	–	–	15.2
FUTURE – INCLUDED IN PREFERRED PLAN (2)								
Airports	Increased Rate of Replacement of SCAS Standard Vehicles with Electric Ones	Increased rate of replacement of SCAS standard vehicles with electric vehicles.	6	2014	\$2,540	46.1%	\$19,500	8
General Services/ Fleets	Fleet Replacement 1	Replace small and mid-size sedans with small and mid-size hybrid sedans, and one large sedan type with mid-size (total of 328 replacements)	30	2014	\$216,850	8.1%	(\$8,200)	674

# CLIMATE ACTION PLAN

**TABLE 4-4** (continued)

**Preferred Action Plan Measures: Vehicle Fleet\***

Preferred Action Plan Measures: Vehicle Fleet			Analysis Inputs and Results					
County Lead Dept.	Name	Description	No. **	Impl. Date	Annual Cost Savings	IRR ***	Net Present Value ***	Annual GHG Reduction in 2020 (MT CO2e)
FUTURE – NOT INCLUDED IN PREFERRED PLAN (4)								
General Services/ Fleets	Fleet Replacement 2	Fleet Replacement 1 scenario Plus: Replace light duty pickups with gasoline hybrid pickups, and replace two types large trucks (F350/450) with CNG trucks (total of 552 replacements)	31	2014	\$337,980	2.8%	(\$1,815,400)	962
General Services/ Fleets	Fleet Replacement 3	Replace small and mid-size sedans with small and mid-size hybrid sedans, replace large sedans with mid-size, replace light duty pickups with hybrid pickups, and replace large trucks with CNG (total of 839 replacements)	32	2014	\$484,780	2.0%	(\$3,128,000)	1,354
General Services/ Fleets	Fleet Replacement 4	Same description as previous scenario #3, but total of 1,237 replacements.	33	2014	\$741,920	5.1%	(\$2,009,400)	2,147
General Services/ Fleets	Fleet Replacement 5	Same description as previous scenario #3, but total of 1,250 replacements.	34	2014	\$751,110	5.0%	(\$2,097,300)	2,175

**Notes:**

\*See Appendix B for summary sheets providing additional information for the measures included in this table.

\*\* Number assigned to the measure in the TEAA analysis (see Appendix A)

\*\*\*Certain financial metrics were not calculated in the analysis for measures that have been completed, are in progress, or for which the County has already committed resources.

NA: Not applicable

## Airport Facilities

SCAS operates four airports in the county, including Sacramento International Airport, which services about ten million passengers annually, and Mather, Franklin Field and Executive Airport satellite airfields. SCAS also manages the aviation activities at McClellan Airport on behalf of the County's Economic Development Department. The analysis conducted for this Plan addressed building and ground operations (most described in this section), fleet operations (addressed by the previous Vehicle Fleet sector) and SCAS employee commute (discussed later in this chapter). Activities and emissions associated with the airlines (in 2011 there were 11) are not included. SCAS has no control over the actions of the individual airlines, which are regulated by the Federal Aviation Administration. However, SCAS works with the airlines to encourage actions on the ground to minimize environmental impacts.

SCAS has been taking steps to become more efficient and reduce environmental impacts for many years. In April 2008, SCAS became one of the first 15 airport systems in the U.S. to sign the "Aviation Industry Commitment to Action on Climate Change" declaration. Since then, many sustainability projects have been successfully implemented. The preferred action plan includes an impressive amount of measures that are already completed or underway since 2009 and one future measure.

In 2005, operation of the four airports in the Sacramento County Airport System (excluding aircraft, airport fleet, and employee commute) contributed about 11% of the GHG emissions from government operations (14,980 MT CO<sub>2</sub>e). By 2009, the emissions were reduced to 12,020 MT CO<sub>2</sub>e due to proactive steps taken by SCAS in its commitment to become a sustainable leader in the aviation industry. This Plan, therefore, includes 10 measures that are already completed or underway and one measure for the future.

The operation of the four airports in the Sacramento County's Airport System (excluding aircraft, Airports fleet and Airports employee commute) contributes about 11% of the government operations GHG emissions, according to the 2005 inventory results summarized in Chapter 2. As illustrated in Figure 2-4, the Airports Facilities sector experienced a reduction in GHG emissions between 2005 and 2009, due to increased energy efficiency of buildings

and operations and other sustainability projects implemented by SCAS. However, airports energy consumption is expected to increase due to the opening of the new Terminal B in fall 2011. Although the new terminal is modern and energy efficient (LEED Silver certified) it is much larger than the terminal it replaced in order to accommodate projected growth in air travel.



In 2008, SCAS became one of the first 15 airport systems in the U.S. to sign the "Aviation Industry Commitment to Action on Climate Change" declaration. Since then, many sustainability projects have been successfully implemented.

# CLIMATE ACTION PLAN

Table 4-5 presents a comprehensive list of measures evaluated for this CAP related to the Airport Facilities sector, sorted by lead implementing department. The list is further sorted to show completed measures (all of which are included in the preferred action plan), future measures included in the preferred action plan, and future measures not included in the preferred action plan. The table also summarizes key analysis results (note that financial analyses were not performed on completed measures). Refer to Appendix B for summary sheets providing additional details for each of the measures.



Sacramento International Airport's new Terminal B is certified LEED Silver and exceeds state energy code requirements by more than 25%. Energy efficiency measures in place will use 1/3 less energy than a traditional (non-LEED) building, saving more than 1,000,000 kilowatt-hours per year.

**TABLE 4-5**

**Preferred Action Plan Measures: Airport Facilities\***

Preferred Action Plan Measures: Airport Facilities			Analysis Inputs and Results					
County Lead Dept.	Name	Description	No. **	Impl. Date	Annual Cost Savings	IRR ***	Net Present Value ***	Annual GHG Reduction in 2020 (MT CO2e)
COMPLETED/COMMITTED (9)								
SCAS	Cogeneration Facility for Terminal B - Sacramento International	Purchased and installed a 1 MW cogeneration facility for the new Central Terminal B complex at Sacramento International Airport.	40	2011	\$568,527	-	-	214.6
SCAS	Green Building Features in Terminal B – Sacramento International	Incorporated energy and water efficiency green building features in construction of Central Terminal B (certified LEED Silver), opened in October 2011 at Sacramento International Airport.	46	2011	-\$228,744	-	-	-570.3
SCAS	Terminal B Underground Hydrant Fueling –Sacramento International	Constructed a hydrant fueling system at the new Central Terminal B. This will eliminate the need for fuel trucks at Terminal B, enhancing safety and eliminating air pollution, including GHGs.	47	2011	\$0	-	-	0
SCAS	Reduce Interior Lighting at Terminal A – Sacramento International	Reduced the interior lighting levels (and associated energy consumption) in Terminal A through use of automatic lighting controls (lighting software) set to run on a modified schedule.	51	2010	\$49,812	-	-	124.2



**TABLE 4-5** (continued)**Preferred Action Plan Measures: Airport Facilities\***

County Lead Dept.	Name	Description	Analysis Inputs and Results					
			No. **	Impl. Date	Annual Cost Savings	IRR ***	Net Present Value ***	Annual GHG Reduction in 2020 (MT CO <sub>2</sub> e)
SCAS	Energy Efficient Retrofit at Airport Terminal A Cooling Towers	SCAS renovated Terminal A Cooling Towers, increasing efficiency and reducing energy consumption.	52	2010	\$28,324	-	-	70.6
SCAS	Energy Efficient HVAC Management Systems for Terminal A Central Utilities Plant	Converted central plant to an all-variable speed system and utilized HVAC management system to decrease energy use by optimizing plant operations, scheduling equipment (e.g., equipment is turned off during non-occupied hours), utilizing free cooling, etc.	53	2010	\$105,821	-	-	263.8
SCAS	Energy Efficiency Improvements for Air Handlers at SCAS Facilities	Adjusted economizer operations and programming on existing Direct Digital Control (DDC) constant volume air handlers to full utilize free cooling.	54	2010	\$13,325	-	-	33.2
SCAS	Shutting Off Airport Escalators After Hours	Seven escalators at the Sacramento International Airport are shut off from midnight to 6 a.m. (saving energy and extending equipment life).	55	2011	\$2,454	-	-	6.1
SCAS	Shutting Off Computer Monitors at Night	Implement policy to shut off computer monitors at night, reducing electricity and extending the life of monitors.	57	2010	\$15,062	-	-	37.6
<b>FUTURE – INCLUDED IN PREFERRED PLAN (1)</b>								
SCAS	Energy-Efficient Taxiway Lighting	Retrofit taxiway lighting with LED technology in phases and during major taxiway renovation/upgrade.	7	2014	\$7,630	-9%	(\$286,000)	19

## Notes:

\*See Appendix B for summary sheets providing additional information for the measures included in this table.

\*\* Number assigned to the measure in the TEAA analysis (see Appendix A)

\*\*\*Certain financial metrics were not calculated in the analysis for measures that have been completed, are in progress, or for which the County has already committed resources.

NA: Not applicable



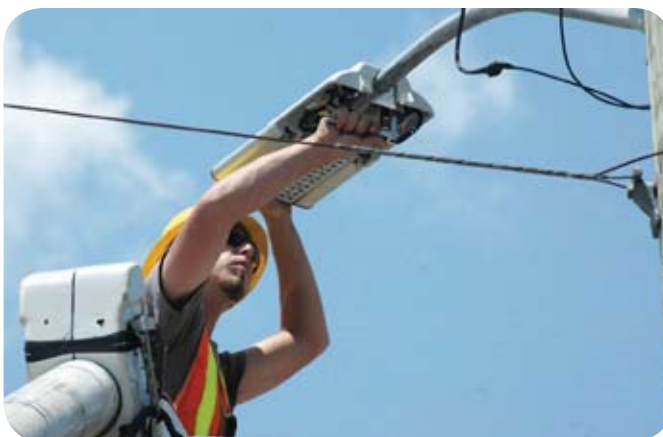
# CLIMATE ACTION PLAN

## Streetlights and Traffic Signals

The Sacramento County Department of Transportation (SACDOT) is responsible for operating and maintaining over 22,300 streetlights (17,738 High Pressure Sodium and 4,636 Mercury Vapor) and traffic signals at 442 signalized intersections throughout the unincorporated County (2011 data). The generation and distribution of the electricity used to power these systems creates GHG emissions. Also, operation of the traffic signal systems directly affect traffic congestion and traffic flow, which in turn impact fuel efficiency and GHG emissions.

Streetlights and traffic signal energy use accounted for a small percentage (7%) of the County's overall government operations GHG emissions in 2005, and as shown on Figure 2-4, the County successfully reduced these emissions further through 2009. This was likely due to modernization and energy conservation measures. But despite the relatively low percentage of emissions associated with this sector, there is a high potential for energy cost savings. For example, the sole measure included in the preferred action plan for future implementation (the additional Countywide streetlight conversion project ) is anticipated to reduce over 1400 metric tons of CO<sub>2</sub>e. Completed measures, including retrofitting some of the older streetlights with LEDs, also contributed significant reductions.

Table 4-6 presents a comprehensive list of measures evaluated for this CAP related to the Streetlights and Traffic Signals sector, sorted by lead implementing department. The list is further sorted to show completed measures (all of which are included in the preferred action plan), future measures included in the preferred action plan, and future measures not included in the preferred action plan. The table also summarizes key analysis results (note that financial analyses were not performed on completed measures). Refer to Appendix B for summary sheets providing additional details for each of the measures.



Streetlights and traffic signal energy use accounted for a small percentage (7%) of the County's overall government operations GHG emissions in 2005 (8,810 MT CO<sub>2</sub>e), and the County successfully reduced these emissions further to 7,120 MT CO<sub>2</sub>e through 2009 by implementing energy conservation projects. This Plan describes three measures that are already completed or underway and one future measure which is expected to contribute greatly to the overall 2020 emission reductions.

**TABLE 4-6****Preferred Action Plan Measures: Streetlights and Traffic Signals\***

			Analysis Inputs and Results					
County Lead Dept.	Name	Description	No. **	Impl. Date	Annual Cost Savings	IRR ***	Net Present Value ***	Annual GHG Reduction in 2020 (MT CO2e)
COMPLETED/COMMITTED (3)								
SAC-DOT	Countywide Streetlight Conversion Project (MV to LED)	Converted 1,800 existing mercury-vapor streetlights in the unincorporated county to energy-saving LED lighting technology (ARRA funded project)	39	2011	\$112,974	-	-	281.7
SAC-DOT	Traffic Signal System Upgrade (Energy Efficient LED Bulbs)	Converted all 589 traffic signals in the County from incandescent light bulbs to LED.	44	2010	\$779,042	-	-	1,942.2
SCAS	Reduce Landscape Lighting at Sacramento International Airport	Turned off three of six 1,000 W lights on 100 ft. tall light masts in landslide areas of Sacramento International Airport.	50	2010	\$156,908	-	-	391.2
FUTURE – INCLUDED IN PREFERRED PLAN (1)								
SAC-DOT	Countywide Streetlight Conversion Project (HPS & MV to LED)	Replace half of the County's 22,374 high-pressure sodium (HPS) and mercury-vapor (MV) streetlights with energy saving LED technology.	28	2014	\$582,802	0.6%	(3,611,300)	1,453

## Notes:

\*See Appendix B for summary sheets providing additional information for the measures included in this table.

\*\* Number assigned to the measure in the TEAA analysis (see Appendix A)

\*\*\*Certain financial metrics were not calculated in the analysis for measures that have been completed, are in progress, or for which the County has already committed resources.

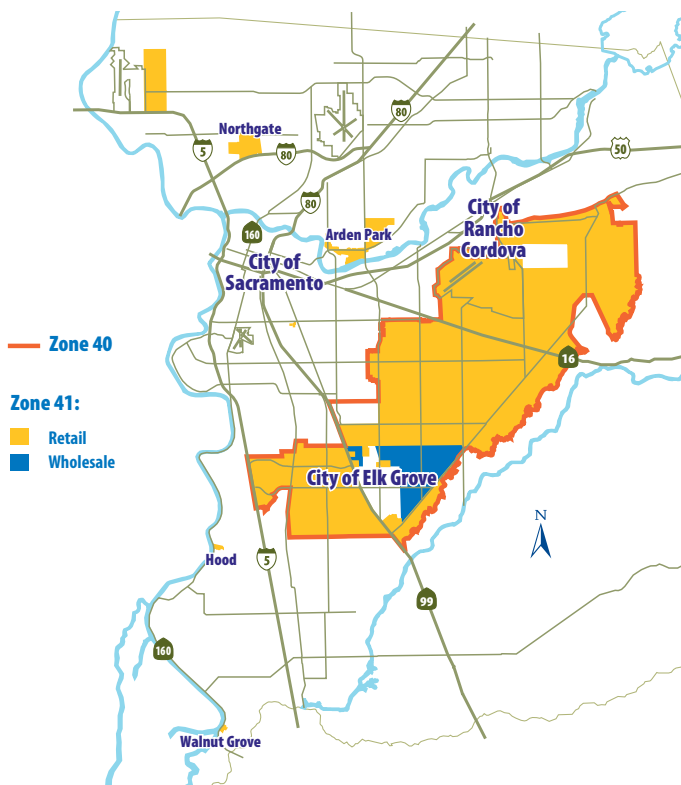
NA: Not applicable

# CLIMATE ACTION PLAN

## Water Delivery Facilities

The Sacramento County Water Agency (SCWA) operates and maintains water supply and delivery infrastructure in its service district in the county (see Figure 4-2).

**FIGURE 4-2**  
Service District Map



The preferred action plan includes 3 measures (one completed and two future measures) designed to reduce energy use associated with these operations. This Plan does not address operation of infrastructure and associated GHG emissions by other water purveyors in Sacramento County, including those that service various owned and leased County buildings and facilities (e.g., the City of Sacramento provides water to the downtown County Administration Building).

The cost-benefit analysis conducted for this Plan did not address operation and maintenance of stormwater/drainage and flood control systems in the unincorporated county by the County Department of Water Resources due to lack of

data. Future updates to this Plan will address that gap if the data becomes available. However, various qualitative measures conducted by County DWR (for which GHG reductions cannot be estimated) are described in Chapter 5.

The 2005 inventory results (discussed in Chapter 2) indicate that the energy use associated with operation of the SCWA water delivery facilities generates about 4% of the total County government emissions. The emissions increased slightly between 2005 and 2009 (see Figure 2-4) presumably

In 2005, the energy use associated with operation of the SCWA water delivery facilities generated about 4% (5,580 MT CO<sub>2</sub>e) of the total County government emissions. The emissions increased slightly between 2005 and 2009 to 6,010 MT CO<sub>2</sub>e, presumably due to expansion of the SCWA infrastructure to service projected growth. The economic downturn has put a temporary halt on that expansion, but it is expected to pick up again when market conditions allow. Measures put in place now will help curb future emissions. In addition, there are opportunities to increase energy efficiency (which reduces GHG emissions) when aging infrastructure is being upgraded or replaced. For these reasons, this Plan includes 3 measures intended to reduce GHG emissions related to water delivery in the SCWA service area.

**Note:** This Plan describes work conducted by the Sacramento County Dept of Water Resources, a municipal government agency, and the Sacramento County Water Agency, a separate legal entity and public utility. For the purposes of this Plan, activities related to internal operations of both entities are simply referred to as “government operations”.

due to expansion of the SCWA infrastructure to service projected growth. Although data is not available to verify, it is expected the emissions are not increasing at this time due to market conditions and lack of population growth. But as with the airport and the new terminal, the water delivery facilities sector is one that will experience increases in GHG emissions in the future as infrastructure is put in place to serve anticipated future population when market conditions allow.

Table 4-7 presents a comprehensive list of measures evaluated for this CAP related to the Water Delivery Facilities sector, sorted by lead implementing department. The list is further sorted to show completed measures (all of which are included in the preferred action plan), future measures included in the preferred action plan, and future measures not included in the preferred action plan. The table also summarizes key analysis results (note that financial analyses were not performed on completed measures). Refer to Appendix B for summary sheets providing additional details for each of the measures.

**TABLE 4-7****Preferred Action Plan Measures: Water Delivery Facilities\***

Preferred Action Plan Measures: Water Delivery Facilities*			Analysis Inputs and Results					
County Lead Dept.	Name	Description	No. **	Impl. Date	Annual Cost Savings	IRR ***	Net Present Value ***	Annual GHG Reduction in 2020 (MT CO2e)
COMPLETED/COMMITTED (1)								
SCWA	Fixed Base Water Meter Reading System (Pilot Study)	SCWA conducted a successful pilot study with establishment of a fixed base water meter reading system for 4000 customer accounts. The computer-based system uses radios and saves fuel and labor by eliminating the need for people and vehicles to read meters and also helps identify water leaks. This tool will aid SCWA in meeting the State’s mandate for 20% reduction in per capita water use by 2020.	48	2010	\$34	-	-	0.1
FUTURE – INCLUDED IN PREFERRED PLAN (2)								
SCWA	Rehabilitate Groundwater Wells with Efficient Pumps and Motors	Each year Sacramento County Water Agency (SCWA) rehabilitates some of its groundwater wells to restore production levels to near new conditions; new efficient pumps are installed and the motor is replaced or rebuilt for efficiency. Between 2005 and 2010, SCWA rehabilitated over 20 wells, 15 extensively.	4	2014	\$32,000	NA	\$258,100	80
SCWA	Use of the Most Efficient Water Production Sources	Sacramento County Water Agency (SCWA) prioritizes what water production sources to use for water delivery, considering energy-efficiency/ cost (as well as the need to not deplete any of the sources). Direct feed wells are the least expensive and energy-intensive form of production (pumping the water once versus 2 or 3 times for treated groundwater or surface water, respectively). This measure entails installation of about 7 direct feed-wells to offset the use of treated groundwater wells during the cooler months.	5	2014	\$224,200	NA	\$1,806,800	559

Notes:

\*See Appendix B for summary sheets providing additional information for the measures included in this table.

\*\* Number assigned to the measure in the TEAA analysis (see Appendix A)

\*\*\*Certain financial metrics were not calculated in the analysis for measures that have been completed, are in progress, or for which the County has already committed resources.

NA: Not applicable

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## CHAPTER 5

# Additional County Measures

This chapter describes measures that were completed prior to 2005 as well as measures that can't be precisely quantified.



At Sacramento International Airport, the County replaced its fleet of almost 40 diesel buses with buses powered by compressed natural gas (CNG). (Photo: SCAS)

This chapter describes additional completed and future County measures as follows:

- Quantitative measures completed prior to the 2005 baseline inventory are described here to demonstrate the County's commitment to sustainability; however, the GHG emission reductions associated with the measures are already reflected in the 2005 inventory described in Chapter 2.
- Measures that are qualitative in nature (i.e., do not lend themselves to quantitative GHG emissions reduction analysis) but are nonetheless important. Although GHG emissions reductions cannot be calculated, implementation of the measures would be expected to result in additional reductions above-and-beyond those previously described in Chapter 4. In the future if data becomes available, it might be possible to quantify the carbon reduction benefits of some of these measures.

The additional measures are presented according to the sectors in Chapter 4, along with a new "multi-sector" category for measures that relate to and benefit one or more sectors/County departments (e.g., employee commute.) Note that certain measures are not included in this Plan because they are considered community-wide measures rather than government operations. For example, the Landfill Gas-to-Energy plant at Kiefer Landfill is a significant accomplishment made by the County prior to 2005 which has contributed a great deal to reducing GHG emissions. Those kinds of measures are expected to be addressed later in a community-wide climate action plan.

# CLIMATE ACTION PLAN

## Buildings and Other Facilities

### Completed Measures

- County Energy Program Manager – Since 1992, the County has employed an Energy Program Manager to help reduce the County's consumption of electricity and natural gas.
- County Building Energy Conservation Policy – In 1973, the County created its first Energy Conservation Policy, which was updated in 2001. The Energy Conservation Policy calls for modified building heating, ventilation, and air conditioning (HVAC) settings and lighting levels to reduce energy usage in all County owned and leased buildings (see Appendix D).
- County Building Energy Efficiency Upgrades – Starting in 2005 and completed in 2008, ten of the County's buildings (representing 11% of the County's total building square footage) were upgraded to improve their energy efficiency and reduce the County's GHG emissions by over 2,500 metric tons of CO<sub>2</sub>e per year. These improvements included more efficient HVAC equipment, controls, lighting and a 100 kilowatt solar array installed at Building OB3 at the County's Bradshaw Branch Center complex. Buildings with high energy usage relative to similar County buildings were prioritized for upgrades.
- Employee Green Building Training and Certifications – The County's Sustainability Program Manager, Energy Program Manager and several other building and planning employees are Leadership in Energy and Environmental Design (LEED) Accredited Professionals and/or Certified Green Building Professionals. The County subsidizes training or reimburses costs to the extent possible, for qualifying candidates.

### Potential Future Measures

- Adopt a County renewable energy policy (to specify a percentage of the County's electricity purchases come from renewable sources)
- Develop and implement a water use efficiency policy for County facilities
- Study the feasibility of sub-metering for County-owned facilities as a method to promote water conservation
- Until such time that a new green building policy/ordinance is available, continue to require all new County building designs to achieve LEED silver or appropriate alternative standard.
- Based on recommendations made in the final report by the Sacramento Green Building Task Force (December 2010), consider adopting and implementing a "New Green Building" Policy for County buildings proposed for future construction. Develop any necessary guidance for engineers and designers and revise standard County design procedures and specifications to ensure compliance.
- Following adoption of a new County green building policy/program, develop and begin implementing a plan for conducting audits of County-owned buildings for compliance with the policy. Additionally, ensure compliance with BERC's Sustainable Business Recognition Program, and through the process, recommend enhancements to the BERC program as warranted.



## Vehicle Fleet

### Completed Measures

- **Light Duty Vehicle Fleet Conversion:** DGS adopted a Light Duty Vehicle Acquisition policy and by 2011 had converted 10% of the light duty vehicles in its fleet to fuel-efficient and alternative-fuel vehicles.
- **Fuel Efficient Solid Waste Fleet** – The County’s Department of Waste Management and Recycling (DWMR) has converted its fleet of approximately 127 waste collection vehicles to liquefied natural gas (LNG). This action is estimated to reduce GHG emissions by 3800 metric tons per year.
- **Alternative Fuel Stations** – County DGS operates a LNG station in North Highlands and a mobile LNG fueling truck at the Bradshaw Branch Center complex. SCAS operates a CNG fuel station at Sacramento International Airport that services the Airport’s bus fleet, airport shuttle companies and the local school district.
- **Charging Stations for Electric Vehicles** – County DGS operates and maintains chargers for electric vehicles with designated “electric vehicle only” parking spaces at the downtown parking garage and at the Bradshaw complex.
- **Updated Fleets Maintenance Facility** – In 2007, the County completed construction of its new fleet maintenance facility at the Bradshaw Branch Complex, designed to maintain and repair all types of energy efficient vehicles, including hybrids and LNG-fueled vehicles, trucks and equipment.



The County provides several public accessible electric car charging stations in County-owned parking lots, such as this EV charger at the Branch Center complex (Photo: James Collins)

### Potential Future Measures

- Use GPS to minimize travel distances on County-owned vehicles
- Increase designated parking for alternative fuel vehicles in County-owned parking lots (for use by employees as well as visitors)
- Promote and expand the use of teleconferencing and other virtual meeting tools
- Train employees about driving methods (related to idling, braking, coasting, starting and stopping) intended to reduce GHG emissions (in particular, target employees that operate trucks and equipment most subject to start-and-stop operations).
- Provide carpool-at-work incentives (incentives to encourage employees in all departments to carpool between County offices, to off-site meetings and to field activities)
- Create an employee shuttle system (between County offices and other agencies frequently visited by employees)

# CLIMATE ACTION PLAN

## Airport Facilities

### Completed Measures

- Conversion of Airports fleet - SCAS was one of ten airports in the country that received a grant from the Federal Aviation Administration in September 2001 to expand the use of clean fuel vehicles and associated infrastructure. By 2005, SCAS replaced its fleet of diesel buses with 39 buses powered by compressed natural gas (CNG) and has acquired various electric vehicles for use at Sacramento International Airport.
- Aircraft Fuel Facility - SCAS opened an onsite aircraft fuel facility at Sacramento International Airport, which eliminated the need for approximately 20 daily trips by heavy-duty tanker trucks that delivered jet fuel to the airport. This fuel farm eliminates 8,000 diesel-powered tanker truck trips per year and reduces vehicle miles traveled by 254,775 miles. This voluntary effort was recognized by the Sacramento Environmental Commission with an Environmental Recognition Award and by the SMAQMD with an Emission Reduction Credit certificate.
- Electrified Jet Bridges to Reduce Aircraft Power Needs - In 2003, SCAS completed installation of 400 hertz (Hz) power and preconditioned air on all 28 jet bridges at the Sacramento International Airport. The electrified jet bridges provide power and air conditioning to parked aircraft, thereby eliminating the need for aircraft to generate power from onboard auxiliary power units that generate aircraft emissions while in use.
- Electrical Charging Stations - At Sacramento International Airport, SCAS performed a power upgrade that included installing electrical charging stations for electric ground service equipment vehicles.

No future qualitative measures related to the airport facilities sector have been identified. Refer to Chapter 4 for the future quantitative measures.



The Airport operates several low speed electric trucks and global electric motorcars (< 25 mph) which are ideal for short trips around the facility. (Photo: SCAS) (page 35 Oct 2011 CAP)

## Streetlights and Traffic Signals

### Completed Measures

- Traffic Signal Conversion Program (early phases) - Sacramento County began the conversion of traffic signals associated with County roads from incandescent light bulbs to light emitting diode (LED) technology in 1997. By 2010, the County had converted all 589 traffic signals in the County to LED. LEDs are more energy efficient, consuming approximately 10% of the electrical power required to light an incandescent traffic signal. They also have a longer life expectancy – about five times longer than incandescents. The County has saved approximately \$480,000 each year in energy costs through these efforts.
- SACDOT's Traffic Operations Center (TOC) – The TOC enables operators to improve signal timing, identify incidents and congestion, and provide information back out to the traveling public through cooperation with Caltrans, California Highway Patrol, and the media. In addition, partnering with Regional Transit allows for traffic data sharing and also provides transit signal priority to RT buses on several key corridors. The TOC function is integral in minimizing congestion and thereby reducing vehicle emissions.

No future qualitative measures related to the streetlights and traffic signals sector have been identified. Refer to Chapter 4 for the future quantitative measures.

## Water Delivery Facilities

### Completed Measures

- SCWA's water well rehabilitation program retrofits its system of over 50 water wells with efficient pumps and motors. Although this project was started to replace mineral-lubricated pumps with water-lubricated types (due to bacteria and health problems), it is also expected to reduce energy use. About six wells are retrofitted annually. A computerized Supervisory Control and Data Acquisition (SCADA) system also allows for remote operation and adjustment of pumps and valves to maximize system efficiency.

### Potential Future Measures

- Audit the energy and water efficiency of SCWA and County DWR field operations
- Based on audit results, develop a policy for conservation of both energy and water during operation of water supply infrastructure - looking for a sample
- Based on audit results, develop a policy for conservation of both energy and water during operation of stormwater/drainage/flood control infrastructure - looking for a sample

Water-related actions taken by the County such as construction of the Vineyard Conjunctive Use Plant and implementation of the Water Recycling Program are significant accomplishments made by the County, but relate better to community-wide emissions, rather than government operations emissions. Those kinds of measures will likely be addressed later in a community-wide climate action plan.



## Multi-Sector

Various qualitative measures have or can be taken by the County related to government operations where benefits cut across multiple emission categories and benefit multiple departments, as described in this section. This includes employee and customer commute, purchasing, waste reduction/recycling in County facilities, employee training/incentives, and carbon sequestration and offsets. Note that information technology-related measures to reduce GHG emissions (also known as "green IT") are for the most part quantifiable and were addressed in Chapter 4 in the buildings and other facilities sector.

### Employee Commute

Employee commutes represent a relatively large fraction (24%) of 2005 GHG emissions associated with County government operations. In addition, despite the County's alternative transportation incentive programs (described below) the 2010 employee commute survey (discussed in Chapter 2 and Appendix C) indicated that the vast majority of employees are still commuting solo in their cars to and from their homes and places of work. That survey was useful in quantifying the commute GHG emissions but not in determining to what extent the County's incentives or other actions led to the quantified employee carpooling/transit use. While employee commute is related to local government operations, the County ultimately has no control over their employees' transportation choices and behavior. Regardless, as a major employer in the Sacramento region, the County recognizes its responsibility to continue to provide and enhance incentives for carpooling, transit use, bicycling and walking, and in doing so, provide an example to the community.

# CLIMATE ACTION PLAN

County efforts to promote employee carpooling, transit use, and bicycling all set a good example to the community as well as reduce GHG emissions associated with its own operations.

## Completed Measures

The County's existing actions to reduce GHG emission from employee commutes include the following qualitative measures:

- County Employee Carpool Incentives - Incentives include a reduced monthly parking rate for carpools and giving carpools priority on the parking lot waiting list.
- County Employee Transportation Program - In addition to the carpool incentive, the County works with Regional Transit to provide discounted passes for employees using transit to get to work.
- Bike Lockers and Other Secure Bike Storage -- Many County facilities provide bike lockers to support bike travel, which range from caged areas that are electronically-controlled or box-type lockers.
- Flexible Employee Work Schedules -- The County allows employees to work 9/80 shifts, where employees complete 80 hours of work in a 9-day period and have the 10th day off; this eliminates one roundtrip commute every two weeks.
- General Plan Policy To Reduce Emissions -- In November 2011, the Board of Supervisors adopted the 2030 General Plan. The air quality element includes the following policy AQ-7: *"Implement a model trip reduction program for County employees which may include, but not be limited to, flexible and compressed work schedules, commuter matching services, telecommuting, preferential carpool/vanpool parking, carpool/vanpool and transit subsidies, and all other commute alternative incentives."* The air quality element also contains implementation measures applicable to County operations and private enterprise.

## Potential Future Measures

- For future commute surveys, expand the list of questions to solicit information that will help determine to what extent the County's incentives or other actions are influencing GHG emission reductions. Expand the use of telecommuting and associated teleconferencing and other virtual meeting tools for employees working from home
- Provide additional convenient, covered and secured bike storage at all County facilities (for use by employees and customers)
- Promote and encourage employee participation in regional and national bike-to-work days/months
- Conduct implementation measures related to reducing emissions associated with employee commutes, as described in the 2030 General Plan air quality element, adopted November 2011.

## Employee Business Travel

The County's travel policy states that public transit should be the first option for employees traveling on out-of-town business, instead of rental car use. While this was set up for monetary reasons, the policy has the added benefit of encouraging alternative modes of transportation which can reduce GHG emissions.



Bike lockers in the County downtown garage provide secure storage for employees who bike to work. (Photo: Sonia Saini)

### Customer Commute

GHG emissions associated with County customer commutes have not been estimated and would require a time-consuming survey of representative customers visiting the various County facilities. Furthermore, it would not be possible to assess the GHG reduction benefits attributed to any given action by the County to influence customers' behavior about transportation. However, certain County actions have likely made a difference. For example, starting in 2006, the County began establishing and offering customers conveniently located satellite community service centers in the north and east areas of the county, and this action has likely reduced vehicle mile trips and associated GHG emissions for customers. These service centers offer many services that were formally only available in downtown Sacramento, including help with: building permits; business and pet licensing; property tax and utility bill payments; fire inspection; and other planning, transportation and neighborhood services. Decentralizing these services brings them closer to the end user, thereby reducing travel times and distances for residents.

### Sustainable Purchasing and Contracted Services

"Sustainable purchasing" has come to mean the procurement of goods and services that have a less harmful effect on human health and environment than competing goods or services that serve the same purpose. Sustainable purchasing decisions take into consideration criteria such as raw materials acquisition, production, manufacturing, packaging, distribution, operation, maintenance, reuse, disposal, energy efficiency, performance, durability, and safety, as well as needs of the purchaser and cost.

Various County agencies have adopted policies and/or procedures related to sustainable purchasing. For example, in January 2001 the Public Works Agency (now Municipal Services Agency) adopted an Environmental Purchasing Policy. The purpose of the policy is to support the purchase of recycled and environmentally preferred products (which perform well at a reasonably competitive price) in order to minimize environmental impacts relating to County work. The policy is consistent with the requirements of Assembly Bill 939, requiring a 50% reduction of material going to landfills. However, in its current form it is limited and could benefit from updating to address more actions related to

sustainability. The County will also consider adopting a countywide sustainable purchasing policy similar to that adopted by the City of Sacramento (see next page).

### Waste Reduction, Recycling and Reuse at County Facilities and Events

In 2006, the County established recycling programs at certain high-volume generating County-owned facilities. These programs are managed by DGS and were established with the assistance of DWMR. The DWMR also assists to implement waste diversion programs at large County events and venues, such as the Sacramento International Airport and the California Capital Airshow held at Mather Field, in accordance with the State requirement under Assembly Bill 2176.

### Water Conservation at County Facilities

Sacramento County adopted Title 14 of the County Code for "Water Use and Conservation". The purpose of this ordinance is to ensure skillful planting and irrigation design, appropriate use of plants, and intelligent landscape management to promote landscape development that avoids excessive water demands and is less vulnerable to periods of severe drought. In addition to applying to all commercial, industrial and multifamily residential projects, the ordinance applies to County parks, road medians and landscape corridors. Two County buildings that have xeriscaping features in accordance with the code include the new Sacramento International Airport Terminal B and the Animal Care Facility on Bradshaw Road.



# CLIMATE ACTION PLAN

## Carbon Sequestration and Offsets

Carbon sequestration refers to natural or man-made processes that remove carbon from the atmosphere and store it for long periods or permanently. When more biomass is conserved and allowed to grow than is removed (through harvest or decay), the amount of carbon stored in trees increases, and thus carbon is sequestered.

### Increased trees and landscaping

The following are potential future measures to increase carbon sequestration associated with vegetation:

- Plant additional trees in County Rights of way and at County facilities and promote a healthy, long lasting canopy by taking the following steps: select and plant trees well suited for the soils and location that will perform well for a long period of time, design underground, overhead and street/sidewalk infrastructure in a manner that will allow trees to grow to their full potential, maintain trees appropriately, and naturally eradicate invasive vegetation and pests.
- Increase landscaping in County rights-of-way and at County facilities. When planning new landscaping, utilize River Friendly Landscaping principles to minimize environmental impacts and integrate low impact development (LID) stormwater/runoff reduction techniques to naturally filter and reduce runoff in new and expanded landscape areas.

### Kiefer Landfill and Bufferlands

Landfills are one means by which carbon is removed from the atmosphere through carbon sequestration, offsetting methane emissions. Landfill carbon stocks increase over time because much of the disposed organic matter (e.g. wood, paper products) placed in landfills does not decompose for a long time, especially if the landfill is located in an arid area (EPA, 2002). Landfilled paper, yard trimmings, and food wastes accounted for approximately 1 percent of the total US carbon sequestration in 2004.

The DWMR owns approximately 2,000 acres of Kiefer Bufferlands surrounding Kiefer Landfill, including part of the Deer Creek Watershed, oak woodlands, the Sloughouse agricultural area and acres of vernal pool habitat areas, which are home to many threatened or endangered species of flora and fauna such as the Vernal Pool Tadpole Shrimp, the Vernal



Pool Fairy Shrimp, the Swainson's Hawk and Orcutt Grass. The area also includes the 243-acres Kiefer Wetland Preserve, established in 2007. Long term planning efforts for the Kiefer Bufferlands are underway through pursuit of a Special Planning Area (SPA). Land use alternatives to be allowed in the SPA include: establishment of additional preserves, renewable energy development (e.g. waste transformation and solar), and advanced recycling industries.

Not only is DWMR a good steward of their land, they are also constantly exploring creative solutions to reduce operating costs and emissions. For instance, as an alternative to mowing the slopes of the closed sections of the landfill, DWMR recently contracted with a grazing company to graze sheep over the areas to "mow" the grass. This is a lower cost and lower emission alternative to power mowing.

### Carbon Offsets

In the future the County could explore investment in verified carbon offsets for government-generated GHG emissions. A carbon offset represents a reduction in emissions somewhere else – like a renewable energy or a reforestation project – to balance out the emissions that cannot be reduced locally. In addition to purchasing from a reputable provider that offers third party verifications of offsets, every effort should be made to find a provider that retires the offsets. That is, rather than re-selling the offset credits as mitigation for other projects, the offsets are taken out of circulation forever.

## CHAPTER 6

# Implementation and Evaluation of this Plan

Each Sacramento County agency, department and employee has a role to play in fulfilling the County's commitment to a sustainable future.



### Implementation Roles and Responsibilities

Implementing this Plan is a County-wide responsibility. The County's Sustainability Program staff will oversee the process, coordinate with departments, evaluate and report progress and success to elected officials and the public, and update the Climate Action Plan as needed. However, each agency, department and employee also has a role to play in fulfilling the County's commitment to a sustainable future. In addition to the specific actions required by the various departments to implement the measures outlined previously in this Plan, the following actions should be taken:

- Continue to require double-sided printing for all printed materials and work products (internally and externally produced) and set printers and copy machines to default to double-sided printing
- Continue to provide and maintain convenient recycling receptacles on each floor of County buildings (owned and leased space)
- Switch lighting to the most energy efficient form (and equip with occupancy sensors when possible) and post signs reminding occupants to turn off lights when not in use
- Post signs near sinks and hose spigots reminding staff to conserve water

In order to ensure success, the County will assign responsibility for internal communications about sustainability and climate action efforts and develop a regular pattern of keeping employees informed and engaged. The focus will be on changing behaviors and identifying ways for staff to take action to reduce GHG emissions, save money and set an example of environmental stewardship for fellow staff and the greater community. Key areas to address include conserving energy and water, reducing material consumption (e.g., paper), recycling and driving. Because of the different



# CLIMATE ACTION PLAN

departmental structures and cultures, more than one method is needed; here are some strategies that will be considered:

- Update the County's sustainability web site frequently and encourage employees to visit the site and share with family and friends
- Create a sustainability column and write articles for distribution to employees via the intranet and employee newsletters; create community and encourage dialogue about issues and events
- Distribute educational messages with paychecks
- Make sustainability a standing agenda item for all department and staff meetings and request that every group assign one lead staff person to periodically report back to the Sustainability Program
- Post signs (particularly near copy machines and waste/recycling collection areas) to remind employees of sustainable actions they can take in the workplace
- Provide a means for employees to make suggestions and share actions taken in response to suggestions
- Sponsor interdepartmental contests to motivate action and solicit new ideas
- Conduct surveys (such as the successful 2010 employee commute survey) to collect data and generate awareness
- Highlight and share what the County and its employees are doing for the community, using the County web site, news media, utility inserts, County fleet vehicle signs (e.g., hybrid, natural gas, biodiesel), etc.



Segregated and labeled disposal containers for recyclables encourage visitors and employees at the County downtown administration building to recycle their waste.

## Implementation Schedule

Actual or projected implementation dates have been assigned to each of the measures presented in this Plan, and for many of the measures, 2014 was used as a placeholder. This will be updated as more information becomes available, and this in turn will change the parameters for the analysis. While implementation of future actions will rely on the County's ability to secure funding for them, the general strategy will be to implement actions with the greatest payback/NPV first.

## Coordination and Progress Reporting

Regular and ongoing coordination between the Sustainability Program and affected County agencies and departments will be required to implement this Plan. Meetings are also anticipated as follows:

- at least quarterly progress meetings with Department heads,
- strategic planning meeting each year when the Capital Improvement Plan (CIP) is being developed,
- an annual report to the Board of Supervisors regarding progress and discussing potential revisions/updates to the Climate Action Plan

## Evaluating and Updating the Climate Action Plan

Implementing the measures described in this Plan will be a dynamic process. If other measures not included in the preferred action plan (Chapter 4) are found to better achieve the balance between GHG emissions and cost reduction, the County will re-evaluate and modify the plan. To this end, the County fully anticipates that this Plan and associated measures will be re-evaluated and adjusted over time as more data and information becomes available, as County department managers and staff become more engaged, as technologies evolve and advance, and as protocols, quantitative techniques and tools are developed and refined by the regulators. Through this dynamic implementation process, measures may be revised, deleted or added as needed to maximize the County's opportunity to save money, increase efficiencies, create jobs and reduce GHG emissions.

As underlying data and assumptions are updated and refined for the various measures and as new measures are identified, further cost-benefit analyses will be performed and implementation priorities will be adjusted.

The County Sustainability Program Manager will work with department managers to develop metrics for assessing effectiveness of the Plan in making progress towards meeting the County's GHG reduction target and demonstrating accountability. Metrics may be assigned for individual measures, for sectors, for implementing departments and/or on some other basis. Various scales of progress metrics may be defined, for example:

- System-level metric: These measure the overall impact of a combination of strategies (e.g., total building energy use, which is dependent on physical settings for heating and cooling and individual behavior for lighting and computer use)
- Program-level metric: These measure impact of a specific activity/program (e.g., energy audit, building retrofit)
- Milestones/Status Updates: These illustrate whether or not a specific action has been taken (yes/no)

Finally, metrics can be normalized to illustrate relationships between two variables (e.g., tracking municipal energy consumption by building square foot).

Major updates to the plan will be contingent on funding, but minor updates will likely occur as necessary to ensure the list of projects to be implemented reflects best information and resources available. Updates will first be discussed at the staff level, then elevated to the department head meetings, and finally conveyed via the annual update to the Board of Supervisors.

Updates to the County government operations GHG emissions inventory will be conducted periodically during implementation of the Plan depending on available funding. As encouraged by ARB, the County will use the LGOP protocol (utilized for the refined 2005 inventory presented in Chapter 2) as a consistent basis to track progress in achieving reductions from municipal operations over time.

## Funding

The most critical aspect of Plan implementation will be securing sustainable funding to manage the County's Sustainability Program and complete the myriad measures, and this will be a key focus of the County Sustainability Program staff. Most funding to prepare the Plan and implement early actions was provided by federal grants. Continuation of this work in future years will require a more diverse and reliable funding base from a variety of sources, such as: additional grant funding, low-interest loans, third party financing with power purchase agreements, cost-share agreements, and public-private partnerships.



## GLOSSARY

ADA	Americans with Disabilities Act	NARS	North Area Recovery Station
BERC	Business Environmental Resource Center	NPV	Net Present Value
BMP	Best Management Practice	PV	Photovoltaic
BRT	Bus Rapid Transit	RT	Sacramento Regional Transit District
CACP	Clean Air and Climate Protection	SACDOT	Sacramento County Department of Transportation
Cal EPA	California Environmental Protection Agency	SACOG	Sacramento Area Council of Governments
CalTrans	California Department of Transportation	SAGP	Sacramento Area Green Partnership
CAP	Climate Action Plan	SASD	Sacramento Area Sewer District
CARB	California Air Resources Board	SCADA	Supervisory Control and Data Acquisition
CCAR	California Climate Action Registry	SCAS	Sacramento County Airport System
CEC	California Energy Commission	SCWA	Sacramento County Water Agency
CEQA	California Environmental Quality Act	SEC	Sacramento Environmental Commission
CNG	Compressed Natural Gas	SMAQMD	Sacramento Metropolitan Air Quality Management District
DERA	Sacramento County Department of Environmental Review and Assessment	SMUD	Sacramento Municipal Utilities District
DWMR	Sacramento County Department of Waste Management and Recycling	SPB	Simple Pay Back
DWR	Sacramento County Department of Water Resources or State of California Dept. of Water Resources (will be used with prefix "County" or "State")	SPA	Special Planning Area
EIR	Environmental Impact Report	SR2S	Safe Routes to School (State)
FAA	Federal Aviation Administration	SRCSD	Sacramento Regional County Sanitation District
FRWP	Freeport Regional Water Project	SRTS	Safe Routes To School (Federal)
GHG	Greenhouse Gas	SRWTP	Sacramento Regional Wastewater Treatment Plant
GPS	Global Positioning System	SSB	Sacramento Sustainable Business
Green IT	Green Information Technology	SSHCP	South Sacramento Habitat Conservation Plan
GWP	Global Warming Potential	SWA	Solid Waste Authority
HPS	High Pressure Sodium	TOD	Transit Oriented Development
Hz	hertz (unit of frequency)	US	United States
ICLEI	Local Governments for Sustainability	US EPA	United States Environmental Protection Agency
ILEAV	Inherently Low Emission Airport Vehicle	USDA	United States Department of Agriculture
IPCC	Intergovernmental Panel on Climate Change	VMPG	Vehicle Miles traveled Per Gallon
IPM	Integrated Pest Management	VMT	Vehicle Miles Traveled
IRWMP	Integrated Regional Water Management Plan		
ITS	Intelligent Transportation Systems		
LED	Light Emitting Diode		
LFG	Landfill Gas		
LID	Low Impact Development		
LNG	Liquefied Natural Gas		
LOS	Level of Service		
M	Million		
MGD	Million Gallons per Day		
MIRR	Modified Internal Rate of Return		
MPG	Miles Per Gallon		

This glossary contains definitions for terms and abbreviations used in the *Sacramento County Climate Action Plan* - for Government Operations. These definitions were adapted from a number of sources, including the U.S. Environmental Protection Agency, StopWaste.Org, the California Environmental Protection Agency, the California Climate Change Portal, the Bio-integral Resource Center, the State of Oregon Department of Environmental Quality, the Municipal Research and Services Center of Washington, the Canadian Department of Industry, Merriam-Webster Online, Wikipedia, and Wiktionary.

## GLOSSARY (continued)

**9/80 Schedule:** A compressed work week schedule in which employees work 80 hours over nine days with one day off. This frequently consists of eight nine-hour days, one eight-hour day, and the last Friday of the pay period off.

**AB32:** See Assembly Bill 32, the *Global Warming Solutions Act of 2006*.

**Actions:** The primary component of the Climate Action Plan. The measures are specific short and long-term policies, programs, and actions that the County can carry out to reduce its greenhouse gas emissions.

**Adaptation:** The ability of a system to adjust to, or minimize, the potential impacts of climate change or other environmental disturbances.

**Alternative Fuels:** Substitutes for traditional fossil-fuel-derived liquid motor vehicle fuels like gasoline and diesel. Includes biodiesel, hydrogen, electricity, compressed natural gas, methanol, ethanol, and mixtures of alcohol-based fuels with gasoline.

**Alternative Fuel Vehicle:** A vehicle powered by an alternative fuel as opposed to traditional gasoline or diesel.

**Assembly Bill 32 (AB32):** The *Global Warming Solutions Act of 2006* is the law that set the State of California's 2020 greenhouse gas emissions reduction target of reducing greenhouse gas emissions to 1990 levels. It also directed the California Air Resources Board to develop a Scoping Plan to outline how best to reach the 2020 target.

**Assembly Bill 811 (AB811):** Law passed in Sep 2008 to assist municipalities with retrofitting residential and commercial properties by providing low interest loans for energy efficient installations that are paid for using tax assessments.

**Atmosphere:** The blanket of air surrounding the earth that supports life. The atmosphere absorbs energy from the sun and retains heat. It also recycles water and other chemicals and protects the Earth from high-energy radiation and the frigid vacuum of space. The Earth's atmosphere consists of approximately 79% nitrogen (by volume), 20% oxygen, 0.036% carbon dioxide, and trace amounts of other gases.

**Baseline Emissions/Level/Inventory:** The amount of greenhouse gas emissions released in a designated year against which future changes in emissions levels are measured. For Sacramento County, the baseline year is 2005. Baseline estimates are needed to determine the effectiveness of emissions reduction programs by providing a basis for comparison.

**Biodiesel:** a form of diesel fuel manufactured from vegetable oils (used or new) or animal fats. Biodiesel can be used in its pure form (B100) or blended with petroleum diesel in varying proportions (e.g., B20 is 20% biodiesel, 80% petroleum diesel).

**C&D:** Construction and Demolition, usually used in reference to the waste produced in building projects.

**CAFE:** See Corporate Average Fuel Economy

**Capital Improvement Plan:** A Sacramento County planning document which identifies capital projects, major equipment purchases, and financing options. The plan is the link between comprehensive and strategic plans and the annual budget. It is developed to assist the Board of Supervisors with identifying long-range funding needs to support County programs, improvements, and infrastructure. This plan is updated annually.

**Carbon Dioxide (CO<sub>2</sub>):** The greenhouse gas whose concentration is being most affected by human activities. CO<sub>2</sub> also serves as the reference to compare all other greenhouse gases (see Carbon Dioxide Equivalencies). The major source of CO<sub>2</sub> emissions is fossil fuel combustion. CO<sub>2</sub> emissions are also a product of forest clearing, biomass burning, and non-energy production processes such as cement production. Atmospheric concentrations of CO<sub>2</sub> have been increasing at a rate of about 0.5% per year and are now about 30% above preindustrial levels.

**Carbon Dioxide Equivalent (CO<sub>2</sub>e):** Emissions from different types of greenhouse gases (carbon dioxide [CO<sub>2</sub>], methane [CH<sub>4</sub>], and nitrogen dioxide [N<sub>2</sub>O]) are reported in terms of equivalent carbon dioxide units based on their ability to trap heat in the atmosphere. For example one ton of methane traps 21 times the heat of a ton of carbon dioxide, therefore, 1 ton CH<sub>4</sub> = 21 tons CO<sub>2</sub>e. Similarly, 1 tons N<sub>2</sub>O = 310 tons CO<sub>2</sub>e.

**Carbon Footprint:** The total set of greenhouse gas emissions caused directly and indirectly by an individual, organization, event, or product.

**Carbon Sequestration:** See Sequestration

**CEC:** California Energy Commission, the primary energy policy and planning agency for the State.

**Climate:** The average weather (usually taken over a 30-year time period) for a particular region and time period. Climate is not the same as weather. It is the average pattern of weather for a particular region. Climatic elements include average annual temperature, humidity, sunshine, wind speed, precipitation, and other measures of atmospheric conditions.

**Climate Change:** A significant change in climatic conditions (such as temperature, precipitation, or wind) that lasts for an extended period (decades or longer). Climate change should not be confused with weather, which is the short-term fluctuation in these conditions. A change in the climate effectively means that there is a new set of expected atmospheric conditions.

**CO<sub>2</sub>:** See Carbon Dioxide

**CO<sub>2</sub>e:** See Carbon Dioxide Equivalent

**Co-Benefits:** Additional benefits that occur as a result of greenhouse gas reduction measures. These include financial savings, improved air quality, increased health or safety, better communications, improved employee morale, and natural resource concentration.

**Composting:** The controlled breakdown of organic material (e.g., plant trimmings, kitchen scraps, paper) through natural decomposition processes into a nutrient rich soil.

**Compressed Work Week:** An alternative work schedule that combines longer workdays with a day off. For example, a standard 40-hour work week is completed in 4 days rather than 5 days, or 80 hours of work are completed in 9 days rather than 10 days.

**Corporate Average Fuel Economy (CAFE):** Regulations in the United States that specify the overall fuel efficiency of cars and light trucks (pick-up trucks, vans, and sport utility vehicles) sold in the United States. These regulations require that the overall average fuel efficiency of all vehicles a manufacturer sells exceeds a minimum level, measured in terms of miles per gallon.



## GLOSSARY (continued)

**Decomposition:** The process by which organic material (plants, animals, and items derived from them such as paper and wood products) breaks down into simpler forms of matter. Also commonly known as rotting.

**Ecosystem:** An ecological community of interdependent plant and animal species and their physical environment.

**Electric vehicle:** A vehicle that operates on an electric motor, powered by batteries, that is recharged by connecting it (plugging in) to an external electricity source.

**Emissions Forecast:** The emissions that would occur in a future year if no action were taken to change those levels. This is also called a business-as-usual scenario.

**Energy Conservation:** Reducing energy consumption. Energy conservation can be achieved through energy efficiency (getting the most productivity from each unit of energy) or by reduced use of energy such as turning off appliances when not in use.

**Energy Efficiency:** Using less energy to provide the same level of service or complete the same task. For example, a more efficient light will use less electricity to provide the same amount of illumination.

**Energy Star:** An international program, developed by the U.S. Environmental Protection Agency and the U.S. Department of Energy, which identifies energy-efficient consumer products. Energy Star rates a diverse range of items, including computers and peripherals, kitchen appliances, and even buildings. These items generally use 20% to 30% less energy than required by federal standards.

**Environmentally Preferable Purchasing:** See Sustainable Purchasing

**EPA:** See U.S. Environmental Protection Agency

**Forecast:** See Emissions Forecast

**Fossil Fuel:** A general term for combustible geologic deposits of carbon, including coal, oil, natural gas, oil shale, and tar sands. These fuels emit carbon dioxide into the atmosphere when burned, thus significantly contributing to the enhanced greenhouse effect.

**Fuel Cell:** A device that converts a source of fuel into electricity through a chemical reaction that does not involve burning the fuel. These chemical processes are similar to those occurring in a battery, but with a continual input of fuel and output of electricity. Most commercial fuel cells use natural gas-derived hydrogen as the fuel source.

**Fuel Efficiency:** The distance a vehicle can travel on an amount of fuel. This is most often measured in miles traveled per gallon of fuel. A higher-efficiency vehicle travels farther on a gallon of fuel than similar vehicles.

**General Plan:** A long-range policy document to guide land use decisions about physical, economic, and environmental growth. California State law requires counties and cities to have a General Plan which contains seven elements: Land Use; Transportation; Housing; Open Space; Conservation; Safety; and Noise. County general plans cover unincorporated areas.

**GHG:** See Greenhouse Gas

**Global Positioning System (GPS):** In the context of the Climate Action Plan, a system that provides information on a vehicle's location, speed, and condition.

**Global Warming:** An increase in the near surface temperature of the Earth. Global warming has occurred in the distant past as the result of natural influences, but the term is most often used to refer to the warming predicted to occur as a result of increased emissions of greenhouse gases due to human activity.

**GPS:** see Global Positioning System

**Green(ing):** An environmentally preferable version of something (transforming something into a more environmentally friendly version of itself).

**Green Building:** A structure constructed using materials and building practices that reduce its impact on the environment throughout its entire life (siting, design, construction, operations, and deconstruction). Green buildings are resource efficient, using less energy, water, and other materials.

**Green Infrastructure:** The network of trees, plants, and natural ecosystems in a community. These provide services to a community, such as decreasing rainwater runoff, providing healthy soils, removing air pollutants and greenhouse gases from atmosphere, and providing shade and beautification.

**Greenhouse Effect:** Carbon dioxide and other atmospheric gases warm the surface of the planet by trapping heat close to the surface of the Earth. In a natural state, the greenhouse effect warms the planet, making it habitable by humans. However, human activities have dramatically increased the amount of carbon dioxide and other greenhouse gases in the atmosphere. Higher levels of greenhouse gases trap more heat, causing temperatures to rise.

**Greenhouse Gas:** A gas, including water vapor, carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O), which traps heat close to the surface of the Earth, contributing to global warming and climate change.

**Greenhouse Gas Reduction Measures:** see Measures or Actions

**HVAC:** Heating, Ventilation, and Air Conditioning systems.

**Hybrid Vehicle:** See Hybrid-Electric Vehicle

**Hybrid-Electric Vehicle:** A vehicle that uses both a conventional gasoline-powered internal combustion engine and an electric motor to achieve better fuel efficiency than a traditional vehicle. The vehicles have a battery pack that is recharged when the gasoline engine is producing more power than the vehicle needs to operate, therefore the vehicle does not need to be charged by an external electricity source (unlike a plug-in hybrid-electric vehicle or electric vehicle).

**Infrastructure:** The basic shared physical structures needed for an urban area to function in an efficient, safe manner. The term typically refers to items such as roads, drinking water systems, sewers, energy systems, and telecommunication systems in a community.

**IT:** Information Technology, systems and areas of expertise related to computer-based information systems, such as software applications and computer hardware.

## GLOSSARY (continued)

**Jurisdiction:** In general, a legal authority. The County is the governing body that oversees the unincorporated areas within its boundaries, therefore it has jurisdiction over those areas. The areas within the County's geographic boundaries can also be referred to as its jurisdiction. Similarly, other cities and counties are often referred to as other jurisdictions.

**Kilowatt (KW):** One thousand watts.

**Kilowatt-hour (KWh):** an amount of electricity equivalent to the use of one kilowatt for one hour. A hundred watt light bulb that is on for 10 hours uses one kilowatt-hour of electricity (100 watts x 10 hours = 1,000 watt-hours = 1 kilowatt-hour). Electricity production or consumption is often expressed as kilowatt- or megawatt-hours produced or consumed during a period of time. Residential energy bills usually charge users by cents per kilowatt-hour. A U.S. household might consume 10,000 kilowatt-hours per year.

**Leadership in Energy and Environmental Design (LEED®):** A set of green building standards developed for the U.S. Green Building Council. They provide a set of criteria against which the environmental sustainability of a building's design and construction or operations can be measured. Buildings can be LEED Certified, Silver, Gold, or Platinum depending on the number of criteria they fulfill.

**LEED®:** See Leadership in Energy and Environmental Design

**Lifecycle assessment/lifecycle analysis:** The evaluation of a product or service's impacts (environmental, financial, etc.) from production through use to disposal. A greenhouse gas lifecycle analysis of a product would include the emissions associated with the extraction and processing of raw material, manufacture, transportation to the County, use, and disposal (e.g., in a landfill, transfer to a reuse facility) at the end of its life. A lifecycle financial analysis would consider the costs to purchase, operate, and dispose of a product. This is often compared to an end user greenhouse gas analysis, which only considers the emissions associated with using a product, or a traditional financial analysis which focuses on the cost to purchase a product. Also known as a cradle-to-grave analysis.

**Megawatt (MW):** One million watts.

**Methane (CH<sub>4</sub>):** A greenhouse gas that traps 21 times the amount of heat as carbon dioxide. (Recent research indicates this might be as high as 25 times; however, the U.S. EPA uses a factor of 21 when calculating methane's impact on global warming). Methane is produced through the decomposition of waste in landfills, animal digestion, decomposition of animal wastes, incomplete fossil fuel combustion, and the production and distribution of natural gas, oil, and coal.

**Metric Ton:** Common international measurement for the quantity of greenhouse gas emissions. A metric ton is equal to 2,205 lbs or 1.1 short tons (the common form of ton used in the United States).

**Mitigation:** A human intervention to either reduce the amount of greenhouse gases being emitted into the atmosphere or remove previously emitted gases from the atmosphere.

**MIRR (Modified Internal Rate of Return):** A budgeting metric used to decide whether to make an investment or not. It is an indicator of the efficiency of an investment. A larger MIRR is a stronger investment.

**N<sub>2</sub>O:** See Nitrous Oxide

**Nitrous Oxide (N<sub>2</sub>O):** A powerful greenhouse gas with the ability to trap 320 times the amount of heat as a molecule of CO<sub>2</sub>. Major sources of nitrous oxide include soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.

**Non-Motorized Transport:** Any form of transportation that relies on human power as opposed to an external power source (e.g., walking, biking, skateboarding).

**NPV (Net Present Value):** A standard method for the financial appraisal of long-term projects. It measures the excess or shortfalls of cash flows, in present value terms, once financing charges are met. NPV indicated how much value an investment or project adds to the value of the business or firm.

**Ozone (O<sub>3</sub>):** An important greenhouse gas that is responsible for global warming, contributes to the formation of smog, and has harmful effects on human health and the environment.

**Pacific Gas & Electric Company (PG&E):** The utility company that is the primary provider of natural gas in Sacramento County.

**Parts Per Million (ppm):** A unit commonly used to express concentration. In the same way that 1% refers to 1 part out of 100, 1 ppm means that one part of a given substance is present in every million total parts examined.

**PG&E:** See Pacific Gas & Electric Company

**Photosynthesis:** The process by which green plants use light to synthesize organic compounds from carbon dioxide and water. In this process, carbon dioxide is absorbed from the air and oxygen and water are released. Through this process, plants become a very important reservoir for storing carbon dioxide in the form of carbon.

**PV (Photovoltaic):** Cells that convert light energy from the sun into electricity.

**Plug-in Hybrid-Electric Vehicle:** A hybrid vehicle with batteries that can be recharged from an external electric power source. Unlike a hybrid vehicle, it has a larger battery pack and a plug that connects to the electric grid in order to recharge. This external power source provides the vehicle with a much longer range per gallon of gasoline.

**Pollutant:** An air pollutant is a substance in the atmosphere that causes adverse effects to human health, property, or the environment.

**Recycled-Content Products:** Products made totally or partially from materials contained in items that would otherwise have been discarded, such as aluminum cans or paper. Recycled content products also include rebuilt or re-manufactured items, such as toner cartridges.

**Recycling:** A process that minimizes waste generation by recovering and reprocessing products that might otherwise be sent to a landfill. For example, recycling aluminum cans, paper, and bottles entails reprocessing them into new products that are made with fewer raw materials.



## GLOSSARY (continued)

**Renewable Energy/Power:** Energy generated from sources that are naturally replenished or not used up in the course of providing power (e.g., wind, solar, biomass, and geothermal). This is in contrast to the burning of fossil fuels, which destroys the fuel source and thereby depletes the overall amount of fuel available. **Renewables Portfolio Standard (RPS):** A regulation, typically found at the state level in the U.S., that requires an increased amount of energy to be generated from renewable energy sources. For example, a 33% RPS requires that 33% of the electricity a utility company delivers to customers be produced from wind, solar, biomass, or another renewable source.

**Retro-Commissioning:** A process in which specialists inspect major building systems (e.g., HVAC, lighting) and interview maintenance staff and building occupants to assess a building's performance and identify opportunities to improve the efficiency of its operations and to restore them to optimal performance.

**Retrofit:** The addition of new technology or features to older systems. For example, adding new energy-efficient lamps to existing lighting fixtures.

**River Friendly Landscaping (RFL):** A program run by Sacramento County and the RFL Coalition that provides tools and information on creating landscaping adapted to the natural conditions of the Sacramento Region. Techniques include using mulch, permeable pavement, smart irrigation controllers, and planting with native vegetation. These practices foster soil health and conserve water and other natural resources, while reducing waste, preventing pollution, and providing natural habitats.

**RPS:** see Renewables Portfolio Standard

**Sacramento Air Quality Management District (SAQMD):** The public agency that regulates sources of air pollution in the five-county Sacramento region.

**Sacramento Municipal Utility District (SMUD):** The utility company that is the primary provider of electricity in Sacramento County.

**Scoping Plan:** The document, adopted by the California Air Resources Board, that outlines the actions the State of California will take to reduce greenhouse gas emissions in the state. **Sequestration:** The uptake and storage of carbon from the atmosphere. Most commonly refers to trees and plants absorbing carbon dioxide through photosynthesis (see Photosynthesis).

**SPB (Simple Pay Back):** Determined by dividing the net capital cost by the annual cost savings for an investment. While not effective in determining the value of the investment, it does provide the length of time before the initial investment is repaid.

**Senate Bill 375 (SB375):** This law established the process for developing regional GHG emission targets aimed at reducing VMT. It also requires government organizations to align regional transportation, housing and land use to conform with the regional GHG targets.

**Smart Grid:** An electricity system that utilizes two-way communication between power suppliers and consumers. This allows for adjustments to a facility's operations to save energy, reduce cost, and increase the reliability of the power supply. A smart grid includes a monitoring system at facilities that can turn off or adjust systems to reduce demand at peak times when power is more expensive. For example, a smart grid could temporarily turn off selected appliances, such as washing machines, or adjust a building temperature by a few degrees to save power.

**Smart Meter:** An electrical meter that tracks power consumption in real-time, communicates with the local utility company for monitoring and billing purposes, and (if connected to a smart grid) can adjust a building's energy use automatically to reduce demand on the power grid at peak use times.

**SMAQMD:** See Sacramento Air Quality Management District

**Smog:** A type of air pollution that forms in the atmosphere when vehicular and industrial emissions react with one another and sunlight.

**Snowpack:** The naturally formed, packed snow that accumulates during the cold season and melts during warmer months. Many areas of California depend on Sierra Nevada winter snowpack melt for their drinking water.

**Source:** Any process or activity that releases a greenhouse gas into the atmosphere.

**Sustainable Purchasing:** The procurement of goods and services that have a less harmful effect on human health and environment than competing goods or services that serve the same purpose. Sustainable purchasing decisions take into consideration criteria such as raw materials acquisition, production, manufacturing, packaging, distribution, operation, maintenance, reuse, disposal, energy efficiency, performance, durability, and safety, as well as needs of the purchaser and cost.

**Sustainability:** In a broad sense, the capacity to endure. In ecology, the word describes how biological systems remain diverse and productive over time. For human society, it is the potential for long-term maintenance of well-being, which in turn depends on the well-being of the natural world and the responsible use of natural resources. Sustainability has multiple facets: environmental, economic, and social. The UN defines sustainability as the ability of the present generation to meet their needs without compromising the ability of future generations to meet theirs.

**Telecommute:** A system that allows employees to work from home or locations other than their assigned office. Telecommuting usually involves having remote access to the business computer network and the office phone system.

**Therm(s):** A unit of measurement of natural gas. It is approximately the energy equivalent of burning 100 cubic feet of natural gas. It is equivalent to 100,000 British thermal units (BTU) or about 29.3 kilowatt-hours of electrical energy.

## GLOSSARY (continued)

**Unincorporated Area:** A region that is not part of a municipality (city). To incorporate means to form a municipal corporation – a city or town with its own government. Thus, an unincorporated community does not have its own municipal government and is administered by another authority, such as the county government. In Sacramento County, these communities include (but are not limited to) Arden, Carmichael, Orangevale, parts of Natomas and Wilton. In the unincorporated County, Rancho Murieta is governed by the County, but infrastructure and utilities are provided by the Rancho Murieta Community Services District.

**U.S. Environmental Protection Agency (EPA):** The federal environmental science, research, education, assessment, and regulatory agency. The mission of the Environmental Protection Agency is to protect human health and the environment.

**Waste Diversion:** A waste reduction strategy focused on the recycling or composting of materials, diverting what would otherwise have been sent to a landfill for use in new products.

**Waste Reduction:** Techniques such as source reduction, recycling, or composting that reduce waste generation or prevent waste from being created at all.

**Waste Stream:** The total flow of solid waste from homes, businesses, institutions and manufacturing plants that is recycled, composted, burned, or disposed of in landfills.

**Watt:** The standard measure of an amount of energy, usually electricity. For example, a 60 watt light bulb requires 60 watts of electricity to turn on. Energy use is measured in terms of the number of watts used over a period of time (see Kilowatt-hour).

**Weather:** The specific condition of the atmosphere at a particular place and time. It is measured in terms of such factors as wind, temperature, humidity, atmospheric pressure, cloudiness, and precipitation. In most places, weather changes from hour to hour, day to day, and season to season. Climate is the average of weather over time and space. A simple way of remembering the difference is that climate is what you expect (e.g., cold winters) and weather is what happens (e.g., a blizzard).

## APPENDIX A

### Sacramento County Climate Action Plan for Internal Operations - Data Analysis Report

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THE ENERGY ALLIANCE ASSOCIATION  
Sustainability Services

# **Sacramento County Climate Action Plan for Internal Operations**

## **Data Analysis Report**

**May 18, 2012**

**Prepared by Eros Blankenbecler, TEAA  
Under the direction of Sam Pierce, PE**

Disclaimer: The Energy Alliance Association (TEAA) does not imply any guarantees. The information contained in this report is intended to support the County of Sacramento in its efforts to understand the greenhouse gas emissions trend and opportunities for internal operations. All results are approximations using standard engineering methodologies, based on historical energy usage and best available information.

## **Definition of Terms**

**California Low Carbon Fuel Standard** Established by Executive Order in 2007 this regulation requires a reduction of 10% in emissions (lbs. CO<sub>2</sub>e/gal) from vehicle fuels by 2020.<sup>1</sup>

**CEC (California Energy Commission)** The CEC is California's primary energy policy agency. They are responsible for forecasting future energy needs, promoting energy efficiency through appliance and building standards, and supporting renewable energy technologies.

**CNG (Compressed Natural Gas)** Compressed Natural Gas is a substitute to gasoline, diesel, or propane fuel. It is made by compressed natural gas, mainly methane (CH<sub>4</sub>).

**CO<sub>2</sub>e (Equivalent Carbon Dioxide)** Equivalent Carbon Dioxide is the concentration of carbon dioxide that would cause the same level of radiative forcing as a given type and concentration of greenhouse gas such as methane, perfluorocarbons, and nitrous oxide.

**GHG (Greenhouse Gas)** Greenhouse gases are the gases in the atmosphere, which reduce the loss of heat into space and therefore increase global temperatures. Greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, ozone, and chlorofluorocarbons.

**MIRR (Modified Internal Rate of Return)** MIRR is a budgeting metric used to decide whether to make an investment or not. It is an indicator of the efficiency of an investment. A larger MIRR is a stronger investment.

**kWh (kilowatt-hour)** A kilowatt-hour is used to express amounts of energy delivered by electric utilities. One watt hour is the amount of energy expended by a one-watt load drawing power for one hour.

**Metric Ton** A metric ton equals 2,204.6 lbs. A short ton equals 2000 lbs.

**Net Capital Cost** The net capital cost is the capital cost of a project minus incentives and rebates.

**NPV (Net Present Value)** Net present value is a standard method for the financial appraisal of long-term projects. It measures the excess or shortfalls of cash flows, in present value terms, once financing charges are met. NPV indicated how much value an investment or project adds to the value of the business or firm.

**O&M (Operations and Maintenance)** Operations and maintenance refers to the maintenance and fuel cost incurred by a unit of equipment. The O&M costs in this analysis are the additional operation costs associated with the efficiency measure.

**PV (Photovoltaic)** Photovoltaic cells convert light energy from the sun into electricity.

**RPS (Renewable Portfolio Standard)** Established in 2002 under Senate Bill 1078 and accelerated in 2006 under Senate Bill 107, California's Renewables Portfolio Standard (RPS) is one of the most ambitious renewable energy standards in the country. The RPS program requires electric corporations to increase procurement from eligible renewable energy resources by at least 1% of their retail sales annually, until they reach 33% by 2020<sup>2</sup>.

**SPB (Simple pay back)** SPB is determined by dividing the net capital cost by the annual cost savings for an investment. While not effective in determining the value of the investment, it does provide the length of time before the initial investment is repaid.

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<sup>1</sup> California EPA Air Resources Board <http://www.arb.ca.gov/fuels/lcfs/lcfs-background.htm>

<sup>2</sup> California Public Utilities Commission, <http://www.cpuc.ca.gov/PUC/energy/Renewables/>



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## 1.0 Executive Summary

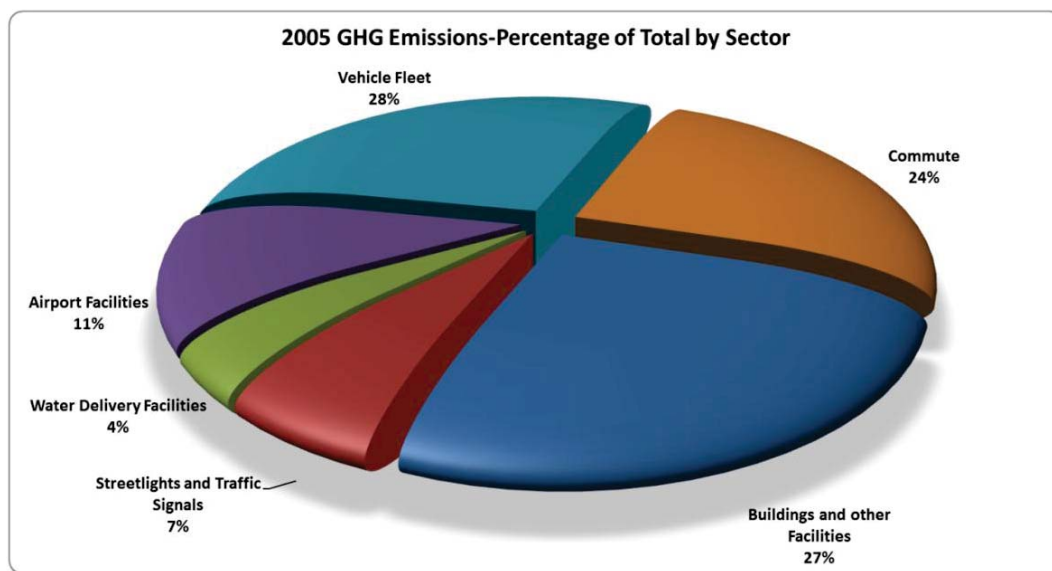
Sacramento County is creating a Climate Action Plan for the unincorporated county. The first step was the preparation of the *County CAP Strategy and Framework document*. The next step is the completion of the County CAP for Internal Operations. This report provides the technical documentation for the results contained in that document.

The energy consumption patterns for the unincorporated county's internal operations were evaluated to determine the estimated greenhouse gas emissions baseline for 2005. This effort provided new GHG emissions data to replace the original estimates presented in the *County CAP Strategy and Framework document*. The refined 2005 GHG emissions by sector are provided below.<sup>3</sup>

Sector	GHG Emissions (CO <sub>2</sub> e metric tons)
Building and other Facilities	35,870
Streetlights and Traffic Signals	8,810
Water Delivery Facilities	5,580
Airport Facilities	14,980
Vehicle Fleet	37,720
Commute	31,970
Total	134,930

**Table 1: 2005 Baseline Emissions by Sector**

The figure below provides the percentage of emission by sector. The county vehicular fleet is the largest contributor, followed by county buildings and facilities and county employee commuting.



**Figure 1: Sacramento County GHG inventory as a percentage of the 2005 total (internal operations)**

<sup>3</sup> The GHG baseline differs from the original due to the inclusion of employee commute, allocation of solid waste emissions to the Community Climate Action Plan, revised streetlighting and traffic signal and vehicular fleet data.

This baseline includes all energy use data for vehicles and facilities as well as the estimated fuel consumption by employees commuting to work.<sup>4</sup> The list of accounts contributing to the baseline is provided in Attachment 8.1. All solid waste emissions are excluded from this analysis due to the unavailability of data for county operations. These emissions will be accounted in the Community Climate Action Plan.

Figure 2 below provides the change in GHG emissions between 2005 and 2009 by sector. Building and other Facilities and Water Delivery were the only sectors to increase emissions over this period. The net or total GHG emissions declined from 134,932 metric tons CO<sub>2</sub>e in 2005 to 122,107 metric tons in 2009. This is a reduction of 12,824 metric tons.

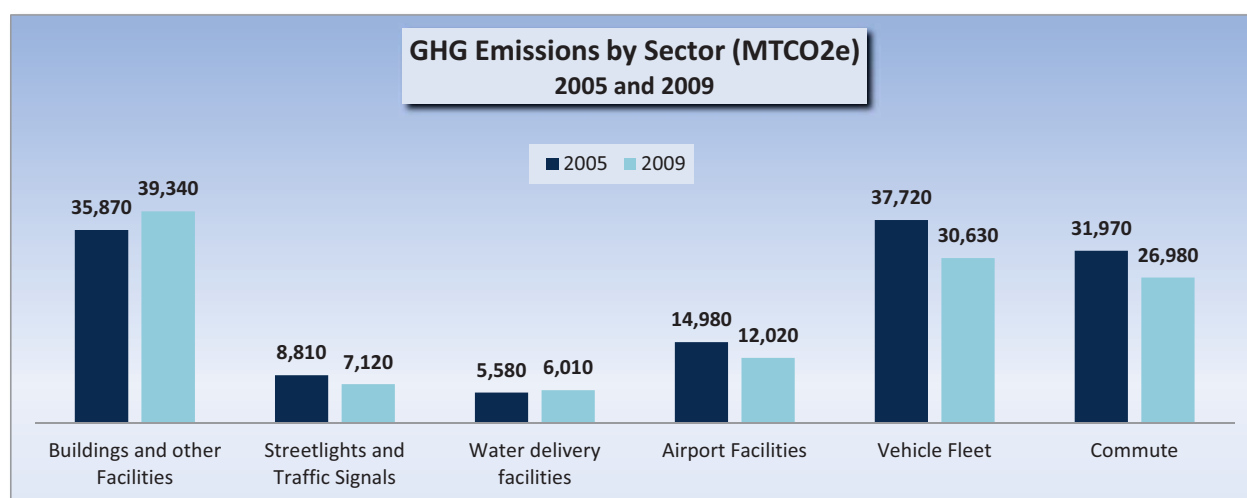


Figure 2: GHG Emissions by Sector for Years 2005 and 2009

### GHG Emissions Reduction

Reducing GHG emissions requires the implementation of energy efficiency strategies for county buildings, equipment and operations. The costs and benefits of these actions have been organized into action plans to communicate the options for moving forward with energy cost and GHG reduction projects.

The GHG emissions reduction plans detailed in this report incorporate numerous opportunities identified by the county staff utilizing the best available information at the time of research. The results provide an emissions impact estimate, job creation estimate<sup>5</sup>, and corresponding financial analysis reflecting costs and benefits to the county. The results are presented in Table 2 below.

<sup>4</sup> The source data included utility data for electricity and natural gas annual usage, county vehicle fuel consumption records and employee commute patterns including vehicle miles traveled and vehicle efficiency derived from an employee survey.

<sup>5</sup> Jobs Created: 2009 Federal Stimulus Package application procedures per County Staff, \$1.0 Million in Capital Expenditure = 10.87 jobs created. This methodology does not incorporate timing of the expenditure or duration of the position.

GHG Action Plan Summary					
Financial Results					
Analysis	Plan A	Plan B	Plan C	Plan D	Plan E
Metric Tons Saved in 2020	14,519	20,327	20,571	20,929	21,858
GHG 2005 Baseline (MTCO <sub>2e</sub> )	134,939	134,939	134,939	134,939	134,939
Reduction Target (MTCO <sub>2e</sub> ) (15% below 2005 by 2020)	20,241	20,241	20,241	20,241	20,241
Net Reduction below 2005	10.8%	15.1%	15.2%	15.5%	16.2%
Jobs Created	0	580	610	640	710
Net Capital Cost	\$0	\$10,247,000	\$12,862,100	\$17,510,400	\$24,473,700
Internal Rate of Return (IRR)	0.0%	9.9%	8.3%	6.1%	4.5%
Net Present Value (NPV)	\$0	\$1,660,100	\$190,600	(\$2,924,500)	(\$6,666,400)
Annual Net Cash Flow					
2012	\$0	\$0	\$0	\$0	\$0
2013	\$0	\$600	\$600	\$600	(\$37,400)
2014	\$0	(\$33,100)	(\$33,100)	(\$33,100)	(\$71,000)
2015	\$0	(\$159,600)	(\$686,700)	(\$1,612,900)	(\$2,288,900)
2016	\$0	(\$92,100)	(\$614,800)	(\$1,535,300)	(\$2,198,800)
2017	\$0	(\$22,500)	(\$540,600)	(\$1,455,300)	(\$2,105,800)
2018	\$0	\$49,300	(\$464,000)	(\$1,372,700)	(\$2,009,700)
2019	\$0	\$678,100	\$823,400	\$934,700	\$664,200
2020	\$0	\$754,500	\$905,000	\$1,022,700	\$766,600
2021	\$0	\$833,400	\$989,100	\$1,113,400	\$872,300
2022	\$0	\$914,700	\$1,075,900	\$1,207,200	\$981,500
2023	\$0	\$998,600	\$1,165,400	\$1,303,900	\$1,135,100
2024	\$0	\$1,085,300	\$1,257,900	\$1,403,700	\$1,251,500
2025	\$0	\$2,157,600	\$2,336,300	\$2,562,700	\$3,069,800

Table 2: Action Plan Results

The plans are arranged from the least aggressive (Plan A) which includes only completed measures<sup>6</sup>, to the most aggressive (Plan E) which includes all measures identified by county staff that have sufficient information to allow for analysis.<sup>7</sup> All plans include the impacts of statewide requirements of the Renewable Portfolio Standard<sup>8</sup> and the CA Low Carbon Fuels Standard<sup>9</sup>. Both of these requirements will reduce the emissions from county operations and are responsible for 7.4% of the emissions reduction in all plans including Plan A. The financial evaluation results of MIRR<sup>10</sup> and NPV<sup>11</sup> provide information on the investment value of the plans.

## GHG Reduction Planning

The measures included in the analysis include a wide range of projects applicable to building and equipment energy efficiency, fuel efficiency, alternative fuel options, water conservation and distributed energy generation (such as solar photovoltaic installations). These were identified and quantified based on best available information from county staff. The measures were grouped to create five potential GHG emissions reduction plans. Measure-specific data such as capital cost, year of implementation, financing, energy and cost savings were processed to provide the following information for each plan:

- GHG emissions reduction in metric tons of carbon dioxide equivalent (CO<sub>2</sub>e) avoided
- GHG emissions reduction as a percentage of the 2005 baseline
- GHG emissions reduction by sector
- Annual Cash Flow including debt service, replacement cost and incremental O&M<sup>12</sup> costs
- Simple Payback (SPB)
- Modified Internal Rate of Return (MIRR)
- Net Present Value (NPV)
- Avoided utility company payments (NPV over life of plan)
- Avoided fuel purchases (NPV over life of plan)
- Value invested locally in GHG emission reduction projects

---

<sup>6</sup> “Completed measures” includes measures completed or funded and in progress.

<sup>7</sup> The default implementation date for future projects is 2014 where actual implementation dates are not available. This assumption applies to a large percentage of measures and creates a large negative cash flow for that year.

<sup>8</sup> Renewables Portfolio Standard: State requirement reducing carbon emissions from utility supplied electricity, “Renewables Portfolio Standards (RPS) Proceeding Docket #11-RPS-01 and 03-RPS-1078”, California Energy Commission, April 22, 2011.

<sup>9</sup> CA Low Carbon Fuel Standard: Statewide requirement reducing the carbon emissions from vehicular fuel. “Low Carbon Fuel Standard Program”, CA Air Resources Board, January 12, 2010.

<sup>10</sup> MIRR: The Modified Internal Rate of Return is based on the total investment and energy cost savings over the life of the investment. “Circular No. A-94 Guidelines and Discount Rates for Benefit-Cost Analysis”, US Office of Management and Budget, October 29, 1992

<sup>11</sup> NPV: Net Present Value is the current (2011) value of future costs and benefits associated with an investment under consideration. “Circular No. A-94 Guidelines and Discount Rates for Benefit-Cost Analysis”, US Office of Management and Budget, October 29, 1992.

<sup>12</sup> Operation and Maintenance costs do not include fuel and energy costs which are handled separately.

## Action Plan Alternatives

### Plan A: Completed measures

This plan consists of 27 projects that have already been completed or are funded and in the process of being completed. Given that the decision to fund and implement these projects has already been made, these projects are not included in the cost benefit analysis.

Energy Cost and GHG Reduction Plan A				
Strategy: Completed Measures	14,519	Tons CO <sub>2</sub> e Avoided	10.8%	GHG Reduction
<u>Community Benefit (over 25 year life of plan)</u>			Capital Cost	\$0
\$\$\$ Avoided Utility Company Payments	\$10,040,000		Jobs	0.0
\$\$\$ Avoided Fuel Purchases	\$0		MIRR	0.0%
\$\$\$ Invested Locally in GHG Projects	\$0		NPV	\$0

### Plan B: Least cost plan meeting 15% GHG reduction below 2005 baseline GHG emissions

This plan includes the 27 completed projects in Plan A and an additional 25 potential future projects including building energy efficiency, water conservation, streetlighting upgrades, and vehicle fleet replacement strategies. The table below provides investment results for the measures implemented.

Energy Cost and GHG Reduction Plan B				
Strategy: Attains 15% GHG Reduction with Least Capital Cost	20,327	Tons CO <sub>2</sub> e Avoided	15.1%	GHG Reduction
<u>Community Benefit (over 25 year life of plan)</u>			Capital Cost	\$10,247,000
\$\$\$ Avoided Utility Company Payments	\$26,289,500		Jobs	578
\$\$\$ Avoided Fuel Purchases	\$1,747,800		MIRR	9.9%
\$\$\$ Invested Locally in GHG Projects	\$34,959,900		NPV	\$1,660,100



**Plan C: GHG reduction exceeding 15%**

This plan includes the 27 completed projects and an additional 26 projects including building energy efficiency, water conservation, streetlighting upgrades, and more aggressive fleet replacement strategies.

Energy Cost and GHG Reduction Plan C				
Strategy:	Exceeds 15% GHG Reduction	20,571	Tons CO <sub>2</sub> e Avoided	15.2% GHG Reduction
<u>Community Benefit (over 25 year life of plan)</u>			Capital Cost	\$12,862,100
\$\$\$ Avoided Utility Company Payments			Jobs	610
\$\$\$ Avoided Fuel Purchases			MIRR	8.3%
\$\$\$ Invested Locally in GHG Projects			NPV	\$190,600

**Plan D: GHG reduction of 15.5%**

This plan includes the 27 completed projects in Plan A and an additional 28 potential future projects including building energy efficiency, additional water conservation strategies, streetlighting upgrades, and more aggressive vehicle fleet replacement strategies.

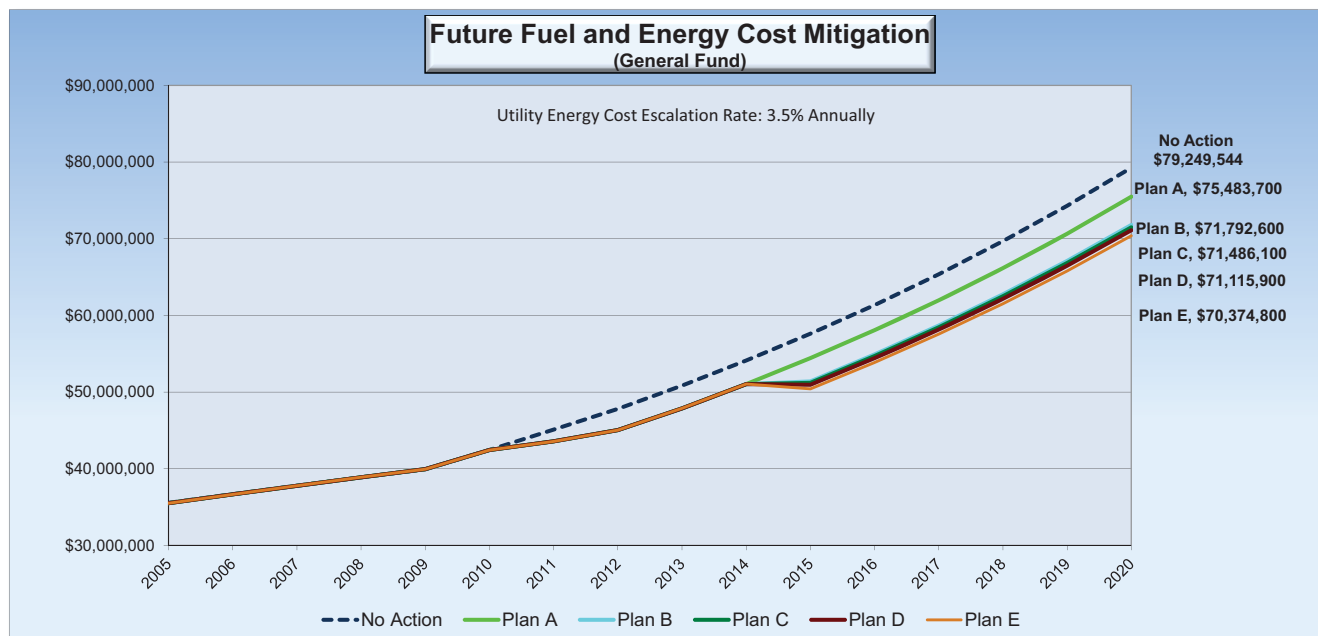
Energy Cost and GHG Reduction Plan D				
Strategy:	Attains 15.5% GHG Reduction	20,929	Tons CO <sub>2</sub> Avoided	15.5% GHG Reduction
<u>Community Benefit (over 25 year life of plan)</u>			Capital Cost	\$17,510,400
\$\$\$ Avoided Utility Company Payments			Jobs	645
\$\$\$ Avoided Fuel Purchases			MIRR	6.1%
\$\$\$ Invested Locally in GHG Projects			NPV	(\$2,924,500)

**Plan E: GHG reduction of 16.2%**

This plan includes the 27 completed projects in Plan A and an additional 31 potential future projects including building energy efficiency, streetlighting upgrades, additional water conservation, additional HVAC projects and the more aggressive vehicle fleet replacement strategies.

Energy Cost and GHG Reduction Plan E				
Strategy:	Includes Most Measures and Positive MIRR	21,858	Tons CO <sub>2</sub> e Avoided	16.2% GHG Reduction
<u>Community Benefit (over 25 year life of plan)</u>			Capital Cost	\$24,473,700
\$\$\$ Avoided Utility Company Payments			Jobs	709
\$\$\$ Avoided Fuel Purchases			MIRR	4.5%
\$\$\$ Invested Locally in GHG Projects			NPV	(\$6,666,400)

Many of the measures available to reduce GHG emissions also will reduce the county fuel, electricity and natural gas costs. These costs are a significant element of the county budget, and the potential volatility of these costs in the future represents a threat beyond the control of county staff. The fuel, electricity and natural gas-related measures contained in this analysis would reduce the county's vulnerability to utility price increases.



**Figure 3: Action Plan Energy Cost Projections**

The total list of energy efficiency measures originally identified by county staff exceeded 300 measures (Attachment 8.10). The majority of these have yet to be developed to the level necessary for inclusion into this analysis. The potential energy cost savings available from these additional measures represent a significant financial opportunity for the county beyond the savings indicated in the graph above.

## Summary

The target GHG emissions reduction of 15% below 2005 levels by 2020 can be achieved by four of the five action plans outlined above. The utility Renewable Portfolio Standard and the California Low Carbon Fuel Standard contribute a significant portion of these emissions reductions. The analysis model underpinning these results will be available for incorporating new information and technologies as they come available, as well as truing the analysis with monitored data. The comprehensive approach to addressing this goal allows the county to meet a number of related goals, including improving the long term financial health of the county, reducing the budget vulnerability to future energy cost escalation, addressing the existing maintenance demands of aging equipment, and providing the public demonstration of commitment and progress in the highly visible challenge of county cost containment and greenhouse gas emissions reduction.

## 2.0 Introduction

Many cities and counties in California have committed to developing action plans to reduce GHG emissions from government controlled sources. These detailed plans provide a roadmap for: achieving consistency with Assembly Bill 32, the Global Warming Solutions Act of 2006; creating jobs and stimulating the green economy; increasing efficiency and saving energy, fuel and money, and; providing a framework to track and verify the progress made over the life of the plan.

This report provides the results for five action plan options for Sacramento County. These results are the product of a spreadsheet-based analysis and data repository. The algorithms used were derived from the Local Government Operations Protocol (LGOP).<sup>13</sup> The analysis incorporates the available measures across the various sectors (Building Efficiency, Fleet, Commute, Water Delivery, Streetlights/Signals, and Distributed Generation), and provides an emissions impact estimate and a comprehensive financial analysis for each measure and groups of measures (organized into the plans).

### GHG Inventory

The first step in the analysis entailed creating an updated and refined 2005 baseline inventory of GHG emissions produced by the County's internal operations. This provided a context for evaluating GHG emissions reductions. Baseline emissions for 2005 were previously evaluated by ICF and reported in both ICF's *Greenhouse Gas Emissions Inventory for Sacramento County* (June 2009) and the *Sacramento County Climate Action Plan (CAP) Strategy and Framework Document* (November 2011). The data in this report differs from that previously-reported data based on the following changes in inputs and methodology:

- Emissions associated with employee commutes have been added based on employee commute data obtained from a 2010 employee survey.
- Emissions associated with generation of solid waste at County facilities and during County operations were not included in this analysis due to unavailability of data. Those emissions are considered part of the community-wide solid waste generation, collection and disposal activities and would be accounted for in a future Community Climate Action Plan.
- Revised vehicular fleet fuel consumption data including the airport fleet.
- The ICF report uses 2006 data as a proxy for 2005 emissions (utilizing CCAR GHG Inventory for Sacramento County).<sup>14</sup>

Based on this updated analysis, the County of Sacramento internal operations 2005 GHG emissions by sector are provided below.

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<sup>13</sup> Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories, Version 1.1, California Air Resources Board, May 2010.

<sup>14</sup> GHG Emissions Inventory for Incorporated and Unincorporated Sacramento County, ICF Jones & Stokes, June 2009, pg 9-9.

Sector	GHG Emissions (CO <sub>2</sub> e metric tons)
Building and other Facilities	35,870
Streetlights and Traffic Signals	8,810
Water Delivery Facilities	5,580
Airport Facilities	14,980
Vehicle Fleet	37,720
Commute	31,970
Total	134,930

Table 3: 2005 Baseline Emissions by Sector

The figure below provides the percentage of emission by sector. The county vehicular fleet is the largest contributor, followed closely by county buildings and facilities and county employee commuting. The total emissions for 2005 were 134,930 metric tons of CO<sub>2</sub>e<sup>15</sup>.

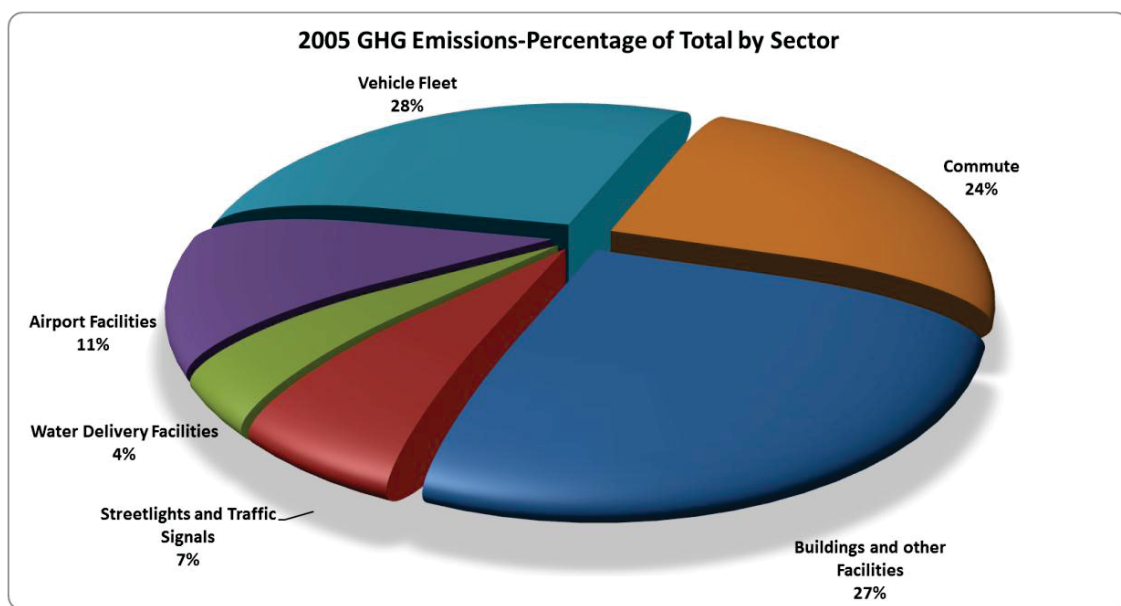


Figure 4: Sacramento County Internal Operations 2005 Baseline GHG Emissions by Sector

The changes in energy use from 2005 through 2009<sup>16</sup> were calculated from county billing and fuel use data and are provided in the table below. The largest reductions were the vehicle fleet and commute sectors. The commute emissions were impacted by the reduction in full time county employees between 2005 and 2009 resulting in significantly fewer commute vehicle miles traveled. More extensive energy use data is provided in Attachment 8.2.

<sup>15</sup> The basis for the total emissions is provided in Appendices 8.1.

<sup>16</sup> 2009 was the last year of complete fuel consumption data at the time of analysis

Increases in Annual Energy Consumption from 2005 to 2009 (Billing and Fuel Use Data)								
kWh	Therms	Gasoline (gals)	Diesel (gals)	E100 (gals)	B100 (gals)	LNG (gals)	Propane (gals)	GHG Emissions (MTCO <sub>2</sub> )
935,690	-125,680	-1,069,400	-471,530	-600	-740	412,560	-10,480	-12,830

**Table 4: Changes in Energy Consumption and GHG from 2005 through 2009<sup>17</sup>**

Figure 5 below provides the change in GHG emissions between 2005 and 2009 by sector. Building and other Facilities and Water Delivery were the only sectors to increase emissions over this period.



**Figure 5: GHG Emissions by Sector for Years 2005 and 2009**

<sup>17</sup> Fuel types: E100 = 100% Ethanol, B100 = 100% Biodiesel, LNG = Liquefied Natural Gas.

## 3.0 Methodology

### Process

County operations energy consumption data and energy efficiency project descriptions provided by county staff served as the basis of the work in this analysis. Projects related to building and equipment energy efficiency, fuel efficiency, alternative fuel options, and distributed energy generation (such as solar photovoltaic installations) were identified and quantified based on best available information at the time of this analysis.

The analysis evaluated individual measures as well as groups of measures organized into five alternative action plans. Each measure was assigned a status (completed or future) and an implementation date to enable the calculation of cash flows over the life of the plan and the creation of energy cost trend graphs. When a future measure's implementation date was unknown, staff assumed an implementation date of 2014 for purposes of this analysis.

Measure specific data such as capital cost, year of implementation, financing, energy and cost savings were processed to yield the following information for each of the five action plans:

- Emissions reduction in tons CO<sub>2</sub>e avoided and as percentage of baseline
- CO<sub>2</sub>e reduction by sector
- Annual Cash Flow including debt service, replacement cost and incremental O&M<sup>18</sup> costs
- Simple Payback (SPB)
- Modified Internal Rate of Return (MIRR)
- Net Present Value (NPV)
- Avoided utility company payments (NPV over life of plan)
- Avoided fuel purchases (NPV over life of plan)
- Value invested locally in emission reduction projects

Each measure included in this analysis has a set of inputs and assumptions as documented in Attachment 8.4. The detailed results for each measure are provided in the Measure Details section (Section 6). In addition to measure-specific assumptions, there are assumptions applied throughout the analysis, as discussed below. The generally applied assumptions, such as the discount rate, interest rate, escalation rate for the cost of utility supplied power and fuel, and the CO<sub>2</sub>e conversion factors for energy and fuel have also been reviewed and adjusted by county staff. The values are provided in Table 5. These general values can be overridden at the measure level if necessary. For example, the term of financing is set to 10 years as a default value. However, the loans are based on California Energy Commission (CEC) loans which are structured to generate a net cash flow close to zero over the life of the loan. The maximum value of the loan is 10 times the annual cost savings. Therefore, the term of the loan may be adjusted at the measure level based on the annual savings for that measure.

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<sup>18</sup> Operation and Maintenance costs do not include fuel and energy costs which are handled separately.

## Data and Measure Source Material and Models

Energy consumption, GHG baseline and measure lists have been generated from fuel records, utility data, document reviews, past experience of other jurisdictions, and a review of opportunities provided by county departments. All measures included in this analysis have been reviewed and approved for inclusion by county staff. The following sources contributed to the information in this report.

- *County of Sacramento 2009 Federal Stimulus Projects List, Metro Chamber-SACOG, Sacramento County Staff, 2010.*
- *Sacramento County Draft Phase 1 Climate Action Plan, Sacramento County, May, 2009*
- *Local Government Operations Protocol for the quantification and reporting of greenhouse gas emissions inventories, Version 1.1, May 2010, California Air Resources Board (et al).*
- *Greenhouse Gas Emissions Inventory for Sacramento County, Unincorporated Sacramento County, and cities of Citrus Heights, Elk Grove, Folsom, Galt, Isleton, Rancho Cordova, and Sacramento, ICF Jones & Stokes, Sacramento County Department of Environmental Review and Assessment, June 2009.*
- *EECBG Activity Worksheets, Sacramento County, 2009*
- *PG&E Natural Gas billing data, Sacramento County Staff, 2005-2009*
- *SMUD Electricity billing data, Sacramento County Staff, 2005-2009*
- *CCx Consumption Data rev 31, Sacramento County Staff, August 18, 2010*
- *Annual Emissions Report, County of Sacramento, Sacramento County Staff, May 13, 2010*
- *Sacramento County Fleet Annual Fuel Consumption data, Sacramento County Staff, 2009*

The following spreadsheet based models and data bases were utilized to complete this analysis.

- Greenhouse Data and Analytical Framework Sacramento County, TEAA, 2011
- Master Project Database Sacramento County, TEAA 2011
- Utility Billing Loading Template Sacramento County, TEAA 2011
- Fleet Scenario Model Sacramento County, TEAA 2011
- Photovoltaic System Scenario Model, TEAA 2011

## Measure Assumptions: General Variables

The financial analysis summarized in this report is based on the following set of general inputs as defined in Table 5:

- Term of Analysis
- Term of Finance
- Discount Rate
- Energy Inflation Rate
- Energy Cost
- Interest Rate
- Inflation Rate

The conversions in the table below are based on the best available information. The values for natural gas, gasoline, diesel and biodiesel are consistent with the Local Government Operations Protocol



(LGOP values).<sup>19</sup> The value used for CO2/kWh is based on the Sacramento Municipal Utility District (SMUD) utility fuel mix.

General Inputs					
Sacramento County Internal Operations		Baseline year:	2005	Results Year	2020
Metric of Analysis	Values Used in Analysis	Year	Power Mix Emissions Coefficient	Gasoline Emissions Coefficient	Diesel Emissions Coefficient
Term of Analysis (yrs)	25	1990	0.616	19.356	22.509
Term of Financing (yrs)	10	1991	0.616	19.356	22.509
Discount Rate (nominal)	6.48%	1992	0.616	19.356	22.509
MIRR Reinvestment Interest Rate (%)	10.00%	1993	0.616	19.356	22.509
kWh Energy Cost Escalation Rate	3.50%	1994	0.616	19.356	22.509
Nat Gas Energy Cost Escalation Rate	2.32%	1995	0.616	19.356	22.509
Vehicle Fuel Cost Inflation Rate	8.00%	1996	0.616	19.356	22.509
Interest Rate	3.95%	1997	0.616	19.356	22.509
Inflation Rate (CPI)	3.48%	1998	0.616	19.356	22.509
Term of MIRR and NPV	10	1999	0.616	19.356	22.509
<b>Emissions Factors</b>		2000	0.616	19.356	22.509
		2001	0.616	19.356	22.509
		2002	0.616	19.356	22.509
		2003	0.616	19.356	22.509
		2004	0.616	19.356	22.509
		2005	0.616	19.356	22.509
		2006	0.616	19.356	22.509
		2007	0.616	19.356	22.509
		2008	0.616	19.356	22.509
		2009	0.616	19.356	22.509
		2010	0.616	19.356	22.509
		2011	0.605	19.308	22.453
<b>Unit Cost</b>		2012	0.595	19.260	22.396
		2013	0.584	19.163	22.284
		2014	0.574	19.066	22.171
		2015	0.564	18.872	21.946
		2016	0.555	18.679	21.721
		2017	0.545	18.389	21.384
		2018	0.535	18.098	21.046
		2019	0.526	17.808	20.708
		2020	0.517	17.421	20.258
		<b>Energy Cost Basis</b>			
		Energy Price Base Year	2010	Unit	BTU/unit
		Electricity (\$/kWh)	0.116	kWh	3,413
		Natural Gas (\$/therm)	0.716	Therm	100,000
		Gasoline (\$/gal)	3.050	Gallon	125,000
		Diesel (\$/gal)	3.050	Gallon	138,690
		Biodiesel (\$/gal)	3.355	Gallon	130,000
		\$/Therm CNG Vehicles	0.570	Therm	100,000
		\$/kWh Electric Vehicles	0.116	kWh	3,413
		Ethanol (\$/gal)	3.660	Gallon	84,400
		LNG (\$/gal)	1.270	Gallon	95,475
		Propane (\$/gal)	0.716	Gallon	91,600
<b>Other</b>		PPA Initial % Increase over Utility kWh	-22.97%		
		PPA Energy Cost Escalation Rate	0.00%		
		Equivalent Passenger Cars Annual	5.48		
		GHG Reduction Percentage	15%		
		Job Creation: Jobs/\$1m	10.87		
		Conversion to tons (lbs/metric ton)	2204.60		

Table 5: Master Inputs

<sup>19</sup>Local Government Operations Protocol, for the quantification and reporting of greenhouse gas emission inventories, Version 1.1 May 2010. This is the “rulebook” for evaluating GHG emissions for local government operations.

## **Incremental Capital Cost of Efficiency Measures**

Many of the measures identified to reduce energy consumption, and thereby reduce greenhouse gas emissions, involve the replacement of old, poorly performing equipment. In many cases this equipment is at the end of its useful life and is scheduled to be replaced independently of this analysis. In these situations this analysis may include only the incremental cost for exceeding the efficiency of a standard unit or approach. Fleet measures are a common example where this issue comes into play. The cost assumed for the fleet replacement strategies are the incremental capital cost for selecting more efficient models over the standard models.

## **Measure Specific Variables**

The general inputs can be adjusted for each individual measure as appropriate. The other key individual inputs are listed below.

- Category (Building and Other Facilities, Vehicle Fleet, Water Delivery Facilities, etc.)
- Status (Completed and Future).
- Financing: The cash flow is heavily dependent on whether or not the measures are financed. This funding decision is defined for each measure independently.
- Project Implementation Date
- Net Capital Cost
- Incremental Capital Cost associated with the cost premium associated with the improved efficiency. For Example: a hybrid compact vehicle replacing an Impala is assigned a cost premium of \$6000 over an equivalent standard vehicle.
- Rebates and incentives
- Annual O&M cost associated with the efficiency measure
- Incremental Replacement Cost
- Component Life
- Time of Use factor (Photovoltaic systems)

## **Financial Analysis Results**

The analysis provides the financial information required for investment decisions. This includes the following:

- Net Cash Flow for each year
- Debt load for each year
- Simple Payback
- Modified Internal Rate of Return (MIRR)
- Net Present Value (NPV)

## Financial Definitions<sup>20</sup>

### Simple Pay Back (SPB):

Simple pay back is determined by dividing the capital cost by the annual cost savings for an investment. While not effective in determining the value of the investment, it does provide the length of time before the initial investment is repaid. Given the various implementation dates for actions analyzed in each plan, the SPB for the plans is calculated by summing the net cost for each measure regardless of implementation date and comparing this value to the sum of the positive cash flows in subsequent years.

### Net Present Value (NPV):

Net Present Value (NPV) is the difference between the present value of cash inflows and the present value of cash outflows. NPV is used in capital budgeting to analyze the profitability of an investment or project. NPV analysis is sensitive to the reliability of future cash inflows that an investment or project will yield.

$$NPV = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - C_0$$

Where

$t$  - the time of the cash flow (years)

$n$  - the total time of the project (years)

$r$  - the discount rate

$C_t$  - the net cash flow (the amount of cash) at time  $t$ .

$C_0$  - the capital outlay at the beginning of the investment time (  $t = 0$  )

### Modified Internal Rate of Return (MIRR):

The Modified Internal Rate of Return (MIRR) is the discount rate that generates a zero net present value for a series of future cash flows. MIRR assumes that positive cash flows are reinvested at the firm's cost of capital and the initial outlays are financed at the firm's financing cost. This essentially means that MIRR is the rate of return that makes the sum of present value of future cash flows and the final market value of a project (or an investment) equal its current market value.

Generally speaking, the higher a project's modified internal rate of return, the more desirable it is to undertake the project. As such, MIRR can be used to rank several prospective projects under consideration. Assuming all other factors are equal among the various projects, the project with the highest MIRR would probably be considered the best and undertaken first.

The MIRR is based on the total investment and energy cost savings over the life of the investment, independent of the financing strategy for the investment.<sup>21</sup>

<sup>20</sup><http://www.investopedia.com/terms>, <http://www.visitask.com>

<sup>21</sup> The MIRR and NPV for The Plan is calculated from the cash flows of the individual measures included in the plan, independent of the implementation date of each measure. This strategy results in a first year "investment" required for the MIRR calculation and a subsequent annual cash flow (the return on investment).

## Financing Methods

There are four basic methods of project financing utilized in this analysis. The general terms (interest rate, term of finance, etc.) for each are provided in Table 5. However specific terms for a measure may be defined at the measure level of the analysis. The funding methods are:

- 1) Standard financing at the interest rate and term defined at the general level or the measure specific level.
- 2) Power Purchase Agreement where the project is housed on city property and is owned by the vendor. The county agrees to purchase the power for the term of the contract.
- 3) Performance Contract where the vendor guarantees the savings of the measure for a specific payment financed overtime. The term of the project (years of equivalent loan) is set to yield a net zero cash flow to the county.
- 4) Grant Funding assumes the net impact on the general fund for these projects is zero. The Federal Stimulus funded projects are assumed to receive 100% of the funding from this program.

## Community Benefit

The investments in the specific measures have positive local consequences. The community benefits are quantified and presented in the following outcomes:

- 1) \$\$\$ Avoided Utility Company Payments: This is the Net Present Value (NPV) of the County's avoided electricity and natural gas payments over the 25 year period of the analysis.
- 2) \$\$\$ Avoided Fuel Payments: The NPV of the County's avoided gasoline and diesel fuel payments over the 25 year life of the analysis.
- 3) \$\$\$ Invested Locally in GHG Projects: This is the total capital cost of the measures specified for the plan. This analysis does not attempt to separate labor, material, overhead or profit to more accurately identify the percentage of these investments likely to remain local. The inherent overstatement of this result is balanced to a significant degree by discounting the well-documented economic multiplier effect of local investment (no multiplier is used). Bio-diesel purchase is considered 100% local. In practice, this will depend on the supplier. Ethanol is not considered to be a local purchase.
- 4) Jobs Created: This is a simplified calculation using the methodology defined in the County's 2009 Federal Stimulus Package application procedures.

The formula is: \$1.0 Million in Capital Expenditure = 10.87 jobs created

This methodology does not incorporate timing of the expenditure or duration of the position.

## Employee Commute Emissions

The county employee's commute to work generates considerable GHG emissions from vehicle fuel consumption. The impacts of employee commuting were quantified using data from an employee survey conducted by county staff in the fall of 2010. This survey identified the miles traveled and mode of travel for a representative sample of county staff. The survey results were used to generate annual fuel consumption and incorporated into the analysis. See Attachment 8.9 for the table of results.

## Statewide Initiatives

### California Low Carbon Fuel Standard

In January 2007 Governor Schwarzenegger asserted California's leadership in clean energy and environmental policy by establishing a Low-Carbon Fuel Standard (LCFS) by Executive Order. The target GHG reduction is 10%. This analysis assumes this goal will be met over a 12 year period. This would reduce the carbon density for gasoline from 19.356 lbs. CO<sub>2</sub>e/gallons to 17.421 lbs. CO<sub>2</sub>e/gallon with a similar reduction for Diesel.<sup>22</sup>

### Utility Electric Power Content

The sources of the energy procured by the utility determine the carbon density (lbs. CO<sub>2</sub> per kWh) of the electricity produced by the utility and used by the county. This “Power Content” is identified by the utility and reported by the CPUC on an annual basis. There is a requirement that the power content include increasing percentages of renewable resources. The California Renewable Portfolio Standard (RPS) requires utilities to increase procurement from eligible renewable energy resources. As the power content carbon density decreases the emissions associated with electrical energy use decreases. Also as the carbon density decreases, the CO<sub>2</sub> reductions per kWh displaced by photovoltaic and energy efficiency measures decreases. Therefore a kWh saved in 2010 will save more CO<sub>2</sub> than a kWh saved in 2015 if the Power Content is more “green” in 2015. This dynamic is factored into the analysis which is time dependent for both the implementation date of the measure and the reporting date for the emissions reduction.<sup>23</sup>

The Sacramento Municipal Utility District (SMUD) emissions values for 2005 to 2020 are listed in Table 6. This analysis uses the average 0.616 lbs. CO<sub>2</sub>/kWh for the years from 2005 through 2010.

Utility Supplied Electricity Emissions Factors (lbs CO <sub>2</sub> /kWh)	
2005	0.616
2006	0.616
2007	0.616
2008	0.616
2009	0.616
2010	0.616
2011	0.605
2012	0.595
2013	0.584
2014	0.574
2015	0.564
2016	0.555
2017	0.545
2018	0.535
2019	0.526
2020	0.517

**Table 6: Utility Power Content<sup>24</sup>**

<sup>22</sup> Low Carbon Fuel Standard Program, CA Air Resources Board, January 12, 2010.

<sup>23</sup> Renewables Portfolio Standards (RPS) Proceeding Docket #11-RPS-01 and 03-RPS-1078, California Energy Commission, April 22, 2011.

<sup>24</sup> Values provided by Sacramento County Staff

### Clean Car Standards – Pavley, Assembly Bill 1493

This regulation reduces the GHG emissions in new passenger vehicles sold in California through increased fuel efficiency requirements. This regulation is expected to reduce GHG emissions from California passenger cars by 22 percent in 2012, increasing to 30 percent in 2016. The impacts of the Pavley regulations are incorporated in this analysis by modifying the anticipated fuel economy of new vehicles specified in the fleet replacement strategies.<sup>25</sup>

## **Solid Waste**

The methodology to calculate solid waste GHG emissions (from landfills) continues to evolve. The allocation of responsibility between the county and other jurisdictions, as well as the community wide nature of this sector complicates its inclusion in the county internal operations climate action plan. For this reason, all solid waste emissions will be addressed in the community wide climate action plan for unincorporated Sacramento County.

## **Measure Evaluations**

The decision to include a measure in the County's Internal Operations Climate Action Plan was based on a comprehensive appraisal of that measure and its impact on the overall cost/benefits of the Action Plan. To aid in the selection process, each measure was also evaluated and scored for the ten metrics listed below. The evaluation methodology, including weights that were assigned to each of the metrics, is described in Attachment 8.7. While the scoring may be imprecise in some situations (subjective criteria), avoiding this step may effectively assign a value of zero to many criteria important to the jurisdiction.<sup>26</sup> It is equally important to note that the scoring of the measures is advisory only and not binding on the ultimate selection of measures for implementation. A relatively low score does not preclude a measure, nor should a high score guarantee inclusion of the measure in the Action Plan.

For each measure, a score was assigned for each of the following evaluation criteria and an aggregate score was calculated:<sup>27</sup>

- Annual Cost Savings
- Investment Value
- GHG Reduction
- Job Creation
- Resolution of Maintenance Problems
- Energy Cost Stabilization
- Implementation Feasibility
- Employee Co-benefits
- Community Co-benefits
- Visibility in the Community

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<sup>25</sup> Climate Change for Mobile Sources, CA Air Resources Board, October 4, 2010.

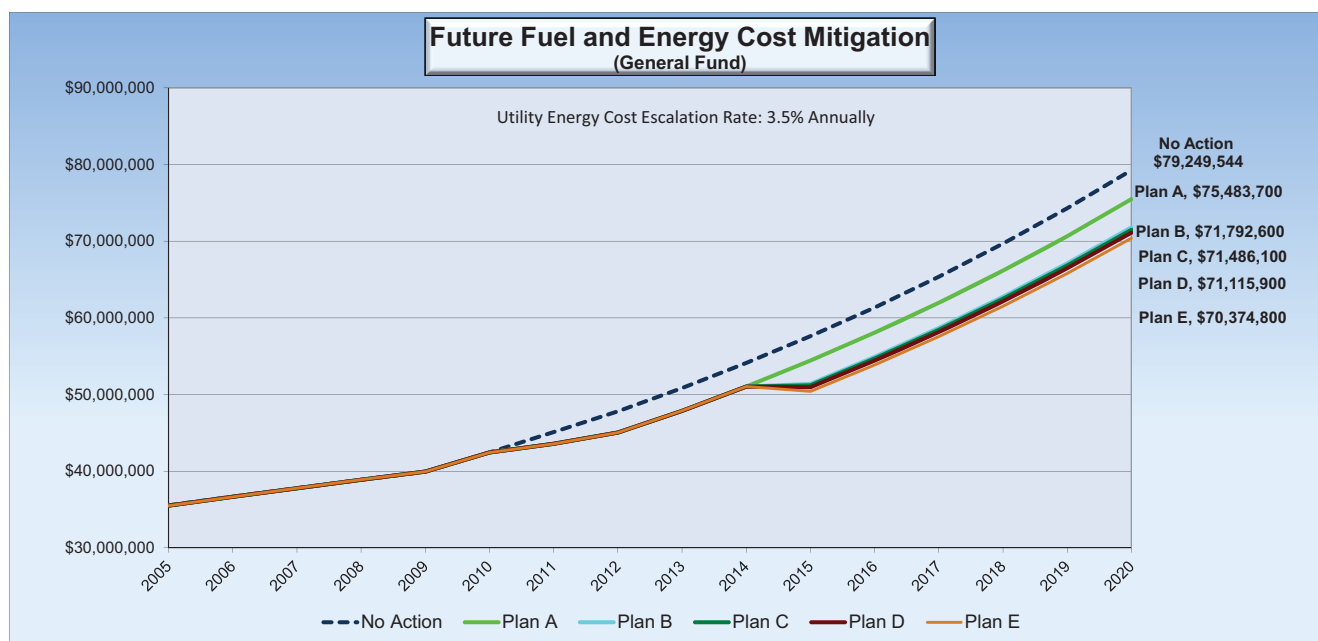
<sup>26</sup> Alternatively, the subjective metrics can be excluded in the analysis by weighting these "0" (weighting methodology described in Attachment 8.7).

<sup>27</sup> Explanation of the criteria is provided in Attachment 8.7.



## 4.0 Results

The plans consist of numerous measures to reduce GHG emissions, reduce energy costs, address equipment problems, and reduce the uncertainty of the county's future annual energy costs. Figure 6 below graphs the future county energy costs for each plan and the “no action” scenario<sup>28</sup>. These results illustrate the impact on energy costs achieved by energy efficiency and distributed generation initiatives to reduce energy consumption.



**Figure 6: Fuel and Energy Cost Mitigation**

Table 7 provides important information describing the financial investments associated with the measures in each plan. It also estimates the GHG emissions reductions and compares these values to the emissions in 2005 (baseline year). Plan A includes the reductions documented in billing data from 2005 to 2009 and expected to be achieved by the projects implemented in 2010 and 2011. All projects included in Plan A are considered “completed” for this analysis. The percentage reduction values shown under “net reduction below 2005” include the additional GHG emissions estimated to be generated by county growth from 2010 to 2020. For purposes of this analysis, we assumed an annual growth in GHG emissions of 1% from 2010 to 2020.<sup>29</sup> Plans B – E include the information in Plan A and are increasingly aggressive toward GHG reduction including specific projects to reduce energy consumption. Finally, all plans include the beneficial impacts of the statewide mandate of the California Low Carbon Fuel Standard and the Renewables Portfolio Standard.

The critical metrics of Modified Internal Rate of Return (MIRR) and Net Present Value (NPV) provide important information to evaluate the worthiness of the investment from a cash flow perspective for each measure. The large expenditure projected in 2014 for Plans B–E (and resulting negative net cash flow) is due to the assumed implementation date of 2014 for measures where more exact implementation dates were not available.

<sup>28</sup> The “no action” scenario assumed no further energy efficiency projects are implemented by the County. This cost projection is not impacted by the Low Carbon Fuel Standard or the Renewable Portfolio Standard statewide actions.

<sup>29</sup> Direction from county staff, email correspondence November 5, 2010

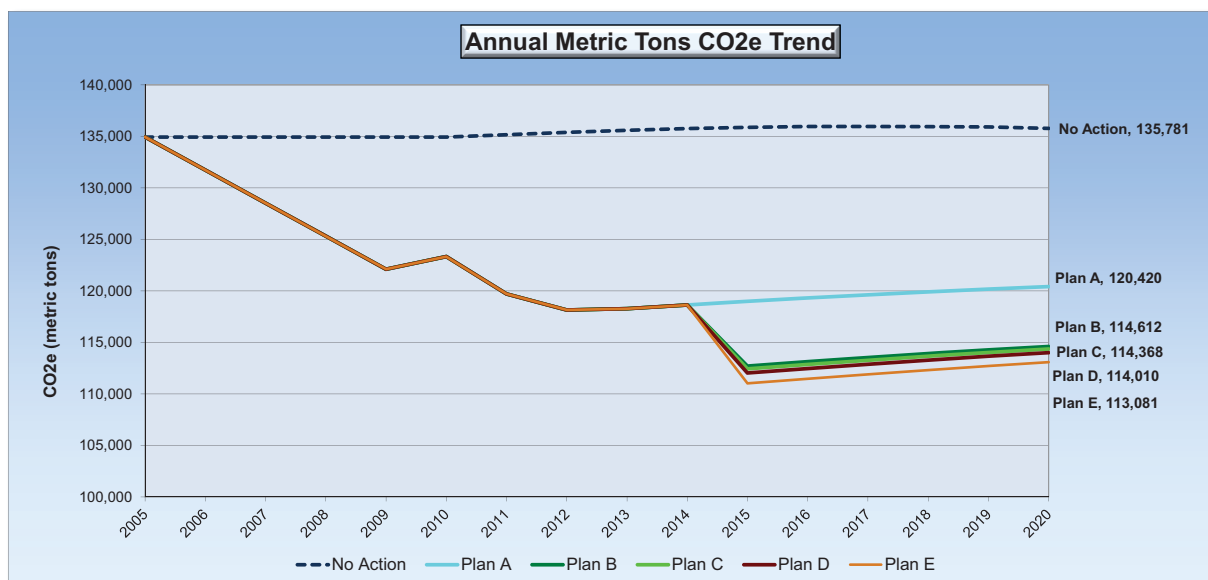


GHG Action Plan Summary					
Financial Results					
Analysis	Plan A	Plan B	Plan C	Plan D	Plan E
Metric Tons Saved in 2020	14,519	20,327	20,571	20,929	21,858
GHG 2005 Baseline (MTCO <sub>2e</sub> )	134,939	134,939	134,939	134,939	134,939
Reduction Target (MTCO <sub>2e</sub> ) (15% below 2005 by 2020)	20,241	20,241	20,241	20,241	20,241
Net Reduction below 2005	10.8%	15.1%	15.2%	15.5%	16.2%
Jobs Created	0	580	610	640	710
Net Capital Cost	\$0	\$10,247,000	\$12,862,100	\$17,510,400	\$24,473,700
Internal Rate of Return (IRR)	0.0%	9.9%	8.3%	6.1%	4.5%
Net Present Value (NPV)	\$0	\$1,660,100	\$190,600	(\$2,924,500)	(\$6,666,400)
Annual Net Cash Flow					
2012	\$0	\$0	\$0	\$0	\$0
2013	\$0	\$600	\$600	\$600	(\$37,400)
2014	\$0	(\$33,100)	(\$33,100)	(\$33,100)	(\$71,000)
2015	\$0	(\$159,600)	(\$686,700)	(\$1,612,900)	(\$2,288,900)
2016	\$0	(\$92,100)	(\$614,800)	(\$1,535,300)	(\$2,198,800)
2017	\$0	(\$22,500)	(\$540,600)	(\$1,455,300)	(\$2,105,800)
2018	\$0	\$49,300	(\$464,000)	(\$1,372,700)	(\$2,009,700)
2019	\$0	\$678,100	\$823,400	\$934,700	\$664,200
2020	\$0	\$754,500	\$905,000	\$1,022,700	\$766,600
2021	\$0	\$833,400	\$989,100	\$1,113,400	\$872,300
2022	\$0	\$914,700	\$1,075,900	\$1,207,200	\$981,500
2023	\$0	\$998,600	\$1,165,400	\$1,303,900	\$1,135,100
2024	\$0	\$1,085,300	\$1,257,900	\$1,403,700	\$1,251,500
2025	\$0	\$2,157,600	\$2,336,300	\$2,562,700	\$3,069,800

Table 7: GHG Action Plan Financial Results

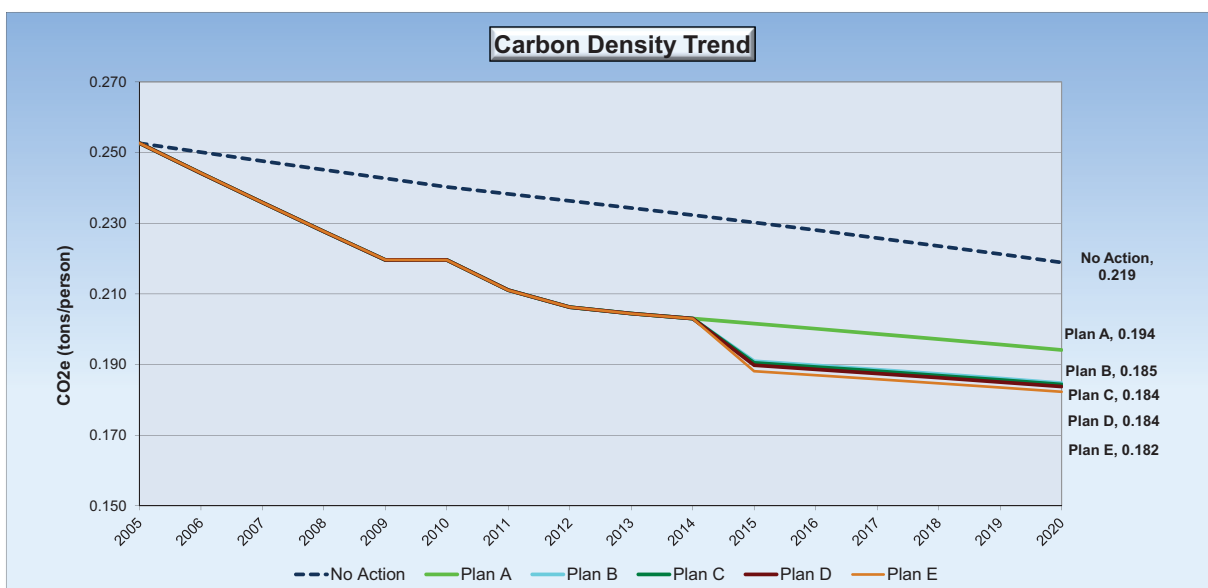
The projected reduction in GHG emissions over time as a result of implementing the alternative action plans are presented in Figure 7 below. These trends are based on the following key considerations:

- 1) Timely implementation of the action plan measures
- 2) The mix of projected power sources for the electricity provided by utilities (SMUD and PG&E) due to the requirements of the CA Renewable Portfolio Standard.
- 3) The impact of the CA Low Carbon Fuel Standard.



**Figure 7: The County's Annual Carbon Trend**

The Carbon Density Trend (tons CO2e / person) is provided in Figure 8 below, based on the past and projected unincorporated County population. These results are heavily influenced by the power mix of the electricity supplied by SMUD and PG&E and the CA Low Carbon Fuel Standard.



**Figure 8: County's Carbon Density (GHG Emissions / Unincorporated County Population)**

## 5.0 Plan Details

### Measures Available to Each Plan

There are 65 measures (38 future potential measures and 27 completed measures) available with adequate information to be included in the county's climate action planning. These measures are provided in Table 8 through Table 11 below. More information on the measures is available in the Measure Details section (Section 6) of this report. A measure's inclusion in Action Plans A – E is indicated by a “y” in the column under the Action Plans A, B, C, D and E. Only the Fleet Replacement measures are mutually exclusive. Only one fleet replacement strategy can be selected per plan. Attachment 8.6 provides details on the fleet measures.

The “Financed” column indicates the capital cost payment over time (10 years) using a source such as the California Energy Commission Energy Efficiency loans (3.95% interest). For projects not funded by the County's General Fund (e.g., funded by enterprise funds, grants or other sources), the capital cost of the project was excluded from the analysis.

Action Plan					Measure Number	Measure Name	Implementation Date	Financed (yes/no)	Funded by General Fund
A	B	C	D	E					
n	y	y	y	y	1	Water Audits and Implementation of Conservation Measures at County Institutions	2012	No	Yes
n	n	n	n	y	2	Efficient Toilet-Flushing Systems: Main Jail	2014	Yes	Yes
n	y	y	y	y	3	Landscape Audit and Installation of River-Friendly Landscaping at County Buildings	2014	No	Yes
n	y	y	y	y	4	Rehabilitate groundwater wells with energy efficient pumps and motors	2014	No	No
n	y	y	y	y	5	Use of the Most Efficient Water Production Sources	2014	No	No
n	y	y	y	y	6	Increased Rate of Replacement of SCAS Standard Vehicles with Electric Units	2014	No	No
n	y	y	y	y	7	Energy-Efficient Taxiway Lighting	2014	No	No
n	y	y	y	y	8	Energy-efficient Lighting at Sacramento International Airport Parking Garage	2014	No	No
n	y	y	y	y	9	HVAC System Efficiency Upgrades	2014	No	No
n	y	y	y	y	10	Water Heater Replacement: Main Jail	2014	Yes	Yes
n	y	y	y	y	11	Energy Efficiency Retrofits: Rio Consumnes Correctional Center (RCCC)	2012	Yes	Yes
n	y	y	y	y	12	Laundry System Efficiency Upgrades: Rio Consumnes Correctional Center (RCCC)	2014	Yes	Yes
n	y	y	y	y	13	Chiller Efficiency Improvement: Juvenile Hall Central Plant	2014	Yes	Yes
n	y	y	y	y	14	Improved HVAC Controls: Coroner's Building	2014	Yes	Yes
n	y	y	y	y	15	Laundry System Efficiency Upgrades: Main Jail	2014	Yes	Yes
n	y	y	y	y	16	Efficient Lighting Retrofit: Main Jail	2014	Yes	Yes
n	y	y	y	y	17	Utility Power Surge (UPS) Retrofit: County Dept of Technology Building	2014	Yes	Yes

**Table 8: Measures 1-17**

Action Plan					Measure Number	Measure Name	Implementation Date	Financed (yes/no)	Funded by General Fund
A	B	C	D	E					
n	y	y	y	y	18	Chiller Plant Waterside Economizer: County Dept of Technology Building	2014	Yes	Yes
n	y	y	y	y	19	Chiller Plant Smart Controls: County Dept of Technology Building	2014	Yes	Yes
n	y	y	y	y	20	Chiller Plant Pump Efficiency Upgrade: County Dept of Technology Building	2014	Yes	Yes
n	y	y	y	y	21	Energy-Conserving Duct Isolation Dampers: County Dept. of Technology Building	2014	Yes	Yes
n	y	y	y	y	22	Turning off Computer Monitors at Night	2014	No	Yes
n	n	n	n	y	23	Installation of High-Efficiency Toilets at County Offices	2012	Yes	Yes
n	n	y	y	y	24	Large Turf Landscape Irrigation Audits at County Facilities	2014	No	Yes
n	n	n	y	y	25	Replacement of Water Wasting Equipment Related to County Operations	2014	No	Yes
n	n	n	y	y	26	Water Boosted System Replacement: Main Jail	2014	Yes	Yes
n	n	n	n	y	27	HVAC Efficiency Modifications: New Administration Building	2014	Yes	Yes
n	y	y	y	y	28	Countywide Streetlight Conversion Project (HPS & MV to LED)	2014	No	No
n	y	y	y	y	29	Green Building Policy for Leased County Buildings	2014	No	Yes
n	y	n	n	n	30	Fleet Replacement 1	2014	Yes	Yes
n	n	y	n	n	31	Fleet Replacement 2	2014	Yes	Yes
n	n	n	y	n	32	Fleet Replacement 3	2014	Yes	Yes
n	n	n	n	n	33	Fleet Replacement 4	2014	Yes	Yes
n	n	n	n	y	34	Fleet Replacement 5	2014	Yes	Yes
n	y	y	y	y	35	Solar Power (PV) Option 1	2014	No	Yes
n	n	n	n	n	36	Solar Power (PV) Option 2	2012	Yes	Yes
n	n	n	n	n	37	Solar Power (PV) Option 4	2014	Yes	Yes
n	n	n	n	n	38	Solar Power (PV) Option 5	2014	Yes	Yes

Table 9: Measures 18-38

Action Plan					Measure Number	Measure Name	Implementation Date	Financed (yes/no)	Funded by General Fund
A	B	C	D	E					
y	y	y	y	y	39	Countywide Streetlight Conversion Project (MV to LED)	2011	No	No
y	y	y	y	y	40	Cogeneration Facility for Terminal B-Sacramento International Airport	2011	No	No
y	y	y	y	y	41	Energy Efficiency Retrofits: Gibson Ranch Park	2011	No	No
y	y	y	y	y	42	Energy Efficiency Upgrades: (J. Harvie Community Center & Caretaker House	2011	No	No

Table 10: Measures 39 – 42(Completed Projects)

Action Plan					Measure Number	Measure Name	Implementation Date	Financed (yes/no)	Funded by General Fund
A	B	C	D	E					
y	y	y	y	y	43	Energy Audits and Improvements using Financial Incentive Revolving Fund	2011	No	No
y	y	y	y	y	44	Traffic Signal System Upgrade (Energy Efficient LED Lamps)	2010	No	Yes
y	y	y	y	y	45	Replacement of CRT Monitors with Energy Efficient Flat Panel Monitors	2010	No	Yes
y	y	y	y	y	46	Green building features in new Central Terminal B at Sacramento International Airport	2011	No	No
y	y	y	y	y	47	Terminal B Underground Hydrant Fueling - Sacramento International Airport	2011	No	No
y	y	y	y	y	48	Fixed Base Water Meter Reading System (Pilot Study)	2010	No	No
y	y	y	y	y	49	Routing Efficiencies for Waste Collection Trucks	2010	No	No
y	y	y	y	y	50	Reduce Landside Lighting at Sacramento International Airport	2010	No	No
y	y	y	y	y	51	Reduce Interior Lighting at Terminal A (Sacramento International Airport)	2010	No	No
y	y	y	y	y	52	Energy efficiency Retrofit at Airport Terminal A Cooling Towers	2010	No	No
y	y	y	y	y	53	Energy efficient HVAC Management Systems for TA Central Utilities Plant	2010	No	No
y	y	y	y	y	54	Energy Efficiency Improvement for Air Handlers at SCAS Facilities	2010	No	No
y	y	y	y	y	55	Shutting off Airport Escalators after hours	2011	No	No
y	y	y	y	y	56	Sheriff Administration Building Cooling Source Replacement	2010	No	Yes
y	y	y	y	y	57	Shutting off Computer Monitors at Night	2010	No	No
y	y	y	y	y	58	Improved Landscape Maintenance Efficiencies at SCAS Facilities: Larger Mowers	2010	No	No
y	y	y	y	y	59	Improved Landscape Maintenance at SCAS Facilities: Swather Mowers	2010	No	No
y	y	y	y	y	60	Energy Efficient Improvements to Mechanical Systems: Mental Health Treatment Center	2010	No	No
y	y	y	y	y	61	Energy Efficient Upgrades: John Price District Attorney Building	2011	No	No
y	y	y	y	y	62	County Administration Building Central Plant Improvements	2011	No	No
y	y	y	y	y	63	Energy Efficient Improvements to Lighting and Mechanical Systems: Building Inspection Facility	2010	No	Yes
y	y	y	y	y	64	Server Virtualization Effort	2012	No	Yes
y	y	y	y	y	65	Solar Power (Photovoltaic, PV) Option 3	2011	No	Yes

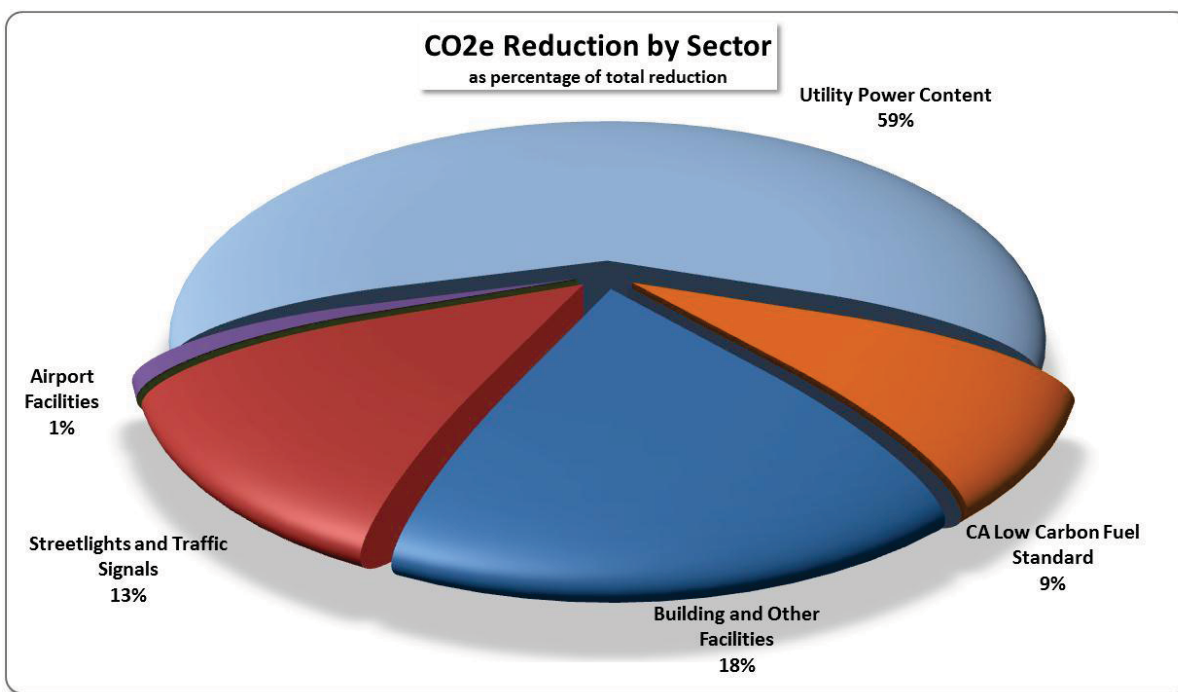
Table 11: Measures 43-65 (Completed Projects)

## Climate Action Plan Results

### Plan A: Completed measures

This plan consists of 27 projects that have already been completed or are funded and in the process of being completed. Given that the decision to fund and implement these projects has already been made, these projects are not included in the cost benefit or net cash flow analyses.

Energy Cost and GHG Reduction Plan A				
Strategy: Completed Measures	14,519	Tons CO <sub>2</sub> e Avoided	10.8%	GHG Reduction
<u>Community Benefit (over 25 year life of plan)</u>			Capital Cost	\$0
\$\$\$ Avoided Utility Company Payments	\$10,040,000		Jobs	0.0
\$\$\$ Avoided Fuel Purchases	\$0		MIRR	0.0%
\$\$\$ Invested Locally in GHG Projects	\$0		NPV	\$0



Note: The percentages in the pie chart do not include GHG emissions reductions due to projected changes due to increases in population. These are included in the overall GHG reduction results.

## Plan A Description: Completed Measures

## Plan Composition

No.	Measure Name	Implement Date	No.	Measure Name	Implement Date
39	Countywide Streetlight Conversion Project (MV to LED)	2011	53	Energy efficient HVAC Management Systems for TA Central Utilities Plant	2010
40	Cogeneration Facility for Terminal B-Sacramento International Airport	2011	54	Energy Efficiency Improvement for Air Handlers at SCAS Facilities	2010
41	Energy Efficiency Retrofits: Gibson Ranch Park	2011	55	Shutting off Airport Escalators after hours	2011
42	Energy Efficiency Upgrades: (J. Harvie Community Center & Caretaker House	2011	56	Sheriff Administration Building Cooling Source Replacement	2010
43	Energy Audits and Improvements using Financial Incentive Revolving Fund	2011	57	Shutting off Computer Monitors at Night	2010
44	Traffic Signal System Upgrade (Energy Efficient LED Lamps)	2010	58	Improved Landscape Maintenance Efficiencies at SCAS Facilities: Larger Mowers	2010
45	Replacement of CRT Monitors with Energy Efficient Flat Panel Monitors	2010	59	Improved Landscape Maintenance at SCAS Facilities: Swather Mowers	2010
46	Green building features in new Central Terminal B at Sacramento International Airport	2011	60	Energy Efficient Improvements to Mechanical Systems: Mental Health Treatment Center	2010
47	Terminal B Underground Hydrant Fueling - Sacramento International Airport	2011	61	Energy Efficient Upgrades: John Price District Attorney Building	2011
48	Fixed Base Water Meter Reading System (Pilot Study)	2010	62	County Administration Building Central Plant Improvements	2011
49	Routing Efficiencies for Waste Collection Trucks	2010	63	Energy Efficient Improvements to Lighting and Mechanical Systems: Building Inspection Facility	2010
50	Reduce Landside Lighting at Sacramento International Airport	2010	64	Server Virtualization Effort	2012
51	Reduce Interior Lighting at Terminal A (Sacramento International Airport)	2010	65	Solar Power (Photovoltaic, PV) Option 3	2011
52	Energy efficiency Retrofit at Airport Terminal A Cooling Towers	2010			

**Plan A Cash Flow Analysis:**

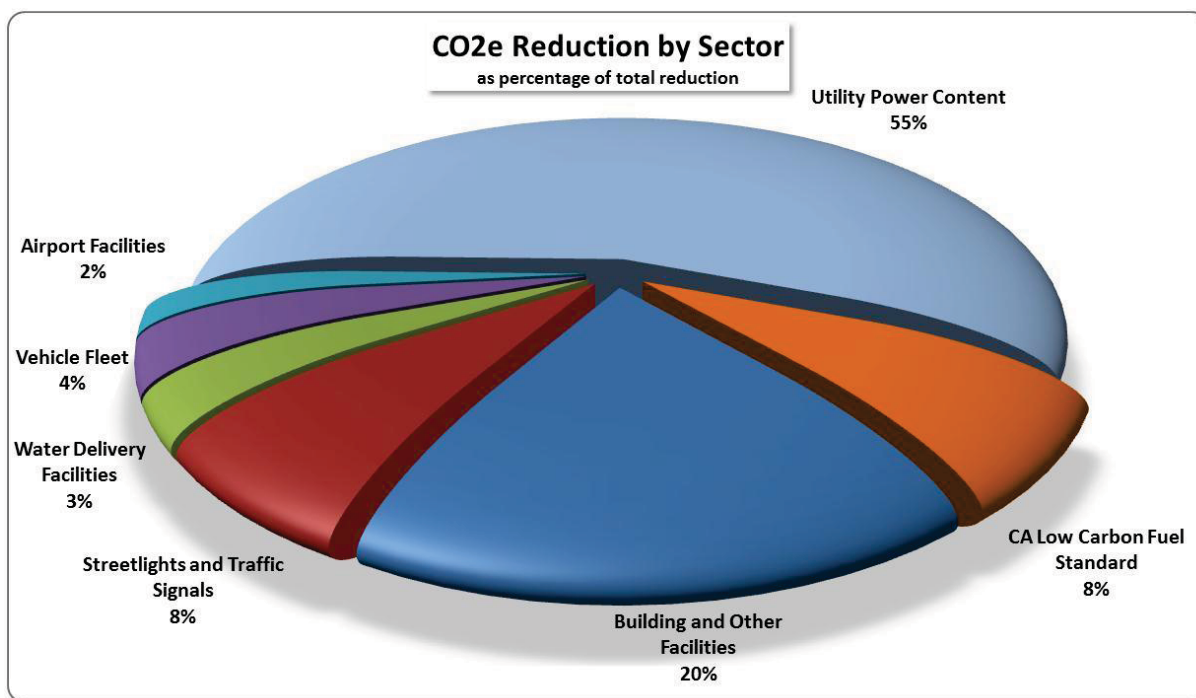
The cash flow analysis for each of these plans communicates the impacts on the General Fund by future actions associated with each plan. Plan A includes only completed measures and therefore has no cash flow and investment results.



**Plan B: Least cost plan meeting 15% GHG reduction below 2005 baseline GHG emissions**

This plan includes the 27 completed projects in Plan A and an additional 25 potential future projects including building energy efficiency, water conservation, streetlighting upgrades, and vehicle fleet replacement strategies. The table below provides investment results for the measures implemented.<sup>30</sup>

<b>Energy Cost and GHG Reduction Plan B</b>				
<b>Strategy:</b>	<b>Attains 15% GHG Reduction with Least Capital Cost</b>	<b>20,327</b>	<b>Tons CO<sub>2</sub>e Avoided</b>	<b>15.1% GHG Reduction</b>
<b><u>Community Benefit (over 25 year life of plan)</u></b>			<b>Capital Cost</b>	<b>\$10,247,000</b>
<b>\$\$\$ Avoided Utility Company Payments</b>			<b>Jobs</b>	<b>578</b>
<b>\$\$\$ Avoided Fuel Purchases</b>			<b>MIRR</b>	<b>9.9%</b>
<b>\$\$\$ Invested Locally in GHG Projects</b>			<b>NPV</b>	<b>\$1,660,100</b>



Note: The percentages in the pie chart above do not include GHG emissions reductions due to completed measures by the County, or projected changes due to increases in population. These are included in the overall GHG reduction results

<sup>30</sup> Financial analysis results include: Net cash flow (energy savings minus measure costs), investment Modified Internal Rate of Return (MIRR), Net Present Value (NPV).

Plan B Cash Flow				
Year	Cash Flow (gross)	Annual Debt Service Payments	Net Cash Flow	Outstanding Principal
2012	\$0	\$0	\$0	\$0
2013	\$600	\$0	\$600	\$0
2014	(\$33,100)	\$0	(\$33,100)	\$10,211,400
2015	\$1,378,100	(\$1,537,700)	(\$159,600)	\$8,989,400
2016	\$1,445,600	(\$1,537,700)	(\$92,100)	\$7,741,100
2017	\$1,515,200	(\$1,537,700)	(\$22,500)	\$6,465,400
2018	\$1,587,000	(\$1,537,700)	\$49,300	\$5,161,200
2019	\$1,661,000	(\$983,000)	\$678,100	\$4,382,100
2020	\$1,737,500	(\$983,000)	\$754,500	\$3,572,200
2021	\$1,816,300	(\$983,000)	\$833,400	\$2,730,400
2022	\$1,897,700	(\$983,000)	\$914,700	\$1,855,300
2023	\$1,981,600	(\$983,000)	\$998,600	\$945,600
2024	\$2,068,200	(\$983,000)	\$1,085,300	\$0
2025	\$2,157,600	\$0	\$2,157,600	\$0

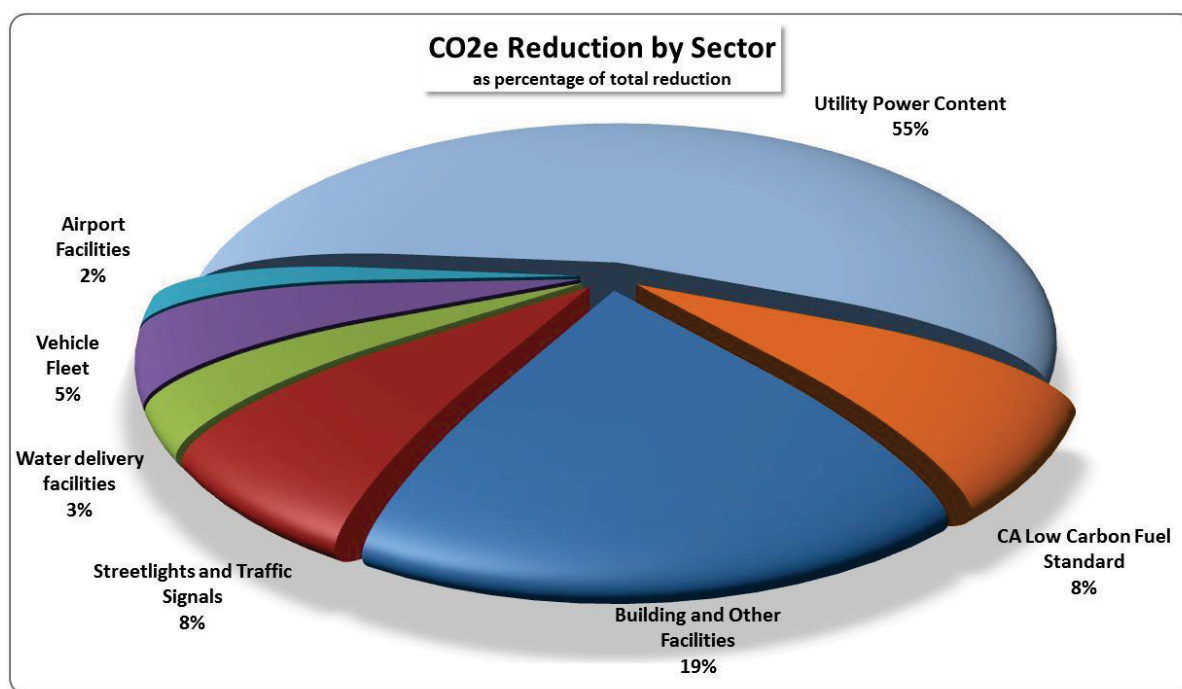
No.	Measure Name	Implement Date
1	Water Audits and Implementation of Conservation Measures at County Institutions	2012
3	Landscape Audit and Installation of River-Friendly Landscaping at County Buildings	2014
4	Rehabilitate groundwater wells with energy efficient pumps and motors	2014
5	Use of the Most Efficient Water Production Sources	2014
6	Increased Rate of Replacement of SCAS Standard Vehicles with Electric Units	2014
7	Energy-Efficient Taxiway Lighting	2014
8	Energy-efficient Lighting at Sacramento International Airport Parking Garage	2014
9	HVAC System Efficiency Upgrades	2014
10	Water Heater Replacement: Main Jail	2014
11	Energy Efficiency Retrofits: Rio Consumnes Correctional Center (RCCC)	2012
12	Laundry System Efficiency Upgrades: Rio Cosumnes Correctional Center (RCCC)	2014
13	Chiller Efficiency Improvement: Juvenile Hall Central Plant	2014
14	Improved HVAC Controls: Coroner's Building	2014
15	Laundry System Efficiency Upgrades: Main Jail	2014
16	Efficient Lighting Retrofit: Main Jail	2014

No.	Measure Name	Implement Date
17	Utility Power Surge (UPS) Retrofit: County Dept of Technology Building	2014
18	Chiller Plant Waterside Economizer: County Dept of Technology Building	2014
19	Chiller Plant Smart Controls: County Dept of Technology Building	2014
20	Chiller Plant Pump Efficiency Upgrade: County Dept of Technology Building	2014
21	Energy-Conserving Duct Isolation Dampers: County Dept. of Technology Building	2014
22	Turning off Computer Monitors at Night	2014
28	Countywide Streetlight Conversion Project (HPS & MV to LED)	2014
29	Green Building Policy for Leased County Buildings	2014
30	Fleet Replacement 1	2014
35	Solar Power (PV) Option 1	2014

**Plan C: GHG reduction exceeding 15%**

This plan includes the 27 completed projects and an additional 26 projects including building energy efficiency, water conservation, streetlighting upgrades, and more aggressive fleet replacement strategies.

Energy Cost and GHG Reduction Plan C				
Strategy:	Exceeds 15% GHG Reduction	20,571	Tons CO <sub>2</sub> e Avoided	15.2% GHG Reduction
<u>Community Benefit (over 25 year life of plan)</u>			Capital Cost	\$12,862,100
\$\$\$ Avoided Utility Company Payments		\$26,300,800	Jobs	610
\$\$\$ Avoided Fuel Purchases		\$2,694,800	MIRR	8.3%
\$\$\$ Invested Locally in GHG Projects		\$36,869,700	NPV	\$190,600



Note: The percentages in the pie chart above do not include GHG emissions reductions due to completed measures by the County, or projected changes due to increases in population. These are included in the overall GHG reduction results

Plan C Cash Flow				
Year	Cash Flow (gross)	Annual Debt Service Payments	Net Cash Flow	Outstanding Principal
2012	\$0	\$0	\$0	\$0
2013	\$600	\$0	\$600	\$0
2014	(\$33,100)	\$0	(\$33,100)	\$12,826,500
2015	\$1,504,700	(\$2,191,500)	(\$686,700)	\$10,950,800
2016	\$1,576,700	(\$2,191,500)	(\$614,800)	\$9,048,700
2017	\$1,650,900	(\$2,191,500)	(\$540,600)	\$7,119,200
2018	\$1,727,400	(\$2,191,500)	(\$464,000)	\$5,161,200
2019	\$1,806,400	(\$983,000)	\$823,400	\$4,382,100
2020	\$1,887,900	(\$983,000)	\$905,000	\$3,572,200
2021	\$1,972,000	(\$983,000)	\$989,100	\$2,730,400
2022	\$2,058,800	(\$983,000)	\$1,075,900	\$1,855,300
2023	\$2,148,400	(\$983,000)	\$1,165,400	\$945,600
2024	\$2,240,900	(\$983,000)	\$1,257,900	\$0
2025	\$2,336,300	\$0	\$2,336,300	\$0

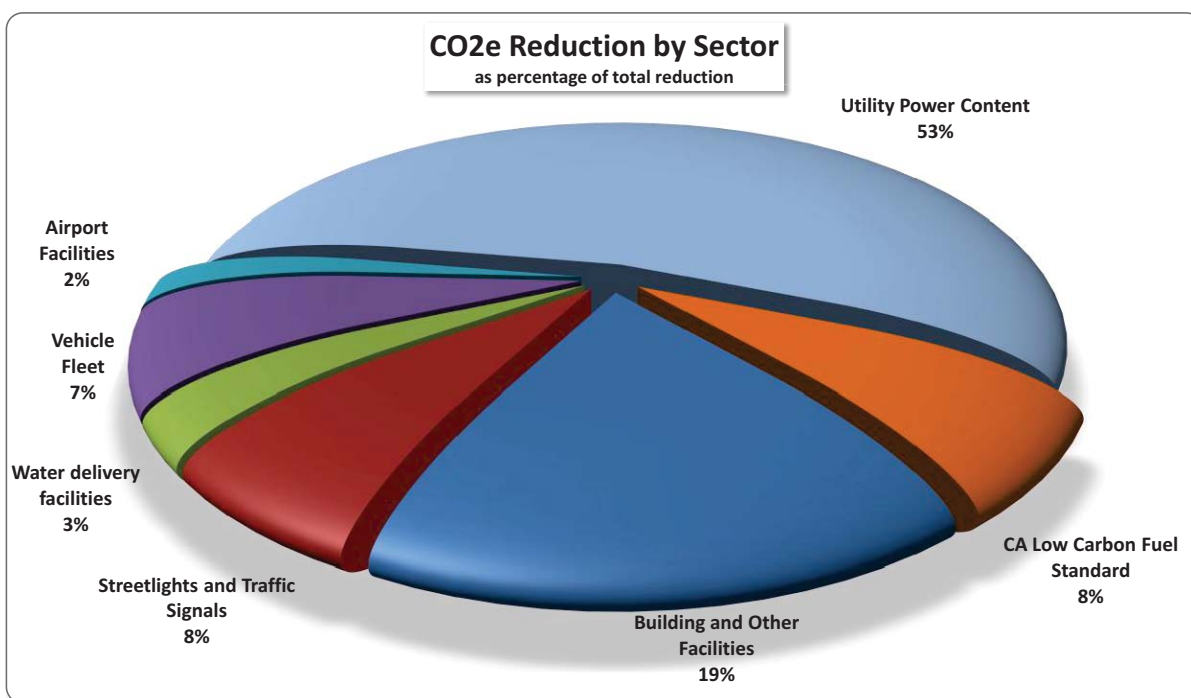
No.	Measure Name	Implement Date
1	Water Audits and Implementation of Conservation Measures at County Institutions	2012
3	Landscape Audit and Installation of River-Friendly Landscaping at County Buildings	2014
4	Rehabilitate groundwater wells with energy efficient pumps and motors	2014
5	Use of the Most Efficient Water Production Sources	2014
6	Increased Rate of Replacement of SCAS Standard Vehicles with Electric Units	2014
7	Energy-Efficient Taxiway Lighting	2014
8	Energy-efficient Lighting at Sacramento International Airport Parking Garage	2014
9	HVAC System Efficiency Upgrades	2014
10	Water Heater Replacement: Main Jail	2014
11	Energy Efficiency Retrofits: Rio Consumnes Correctional Center (RCCC)	2012
12	Laundry System Efficiency Upgrades: Rio Consumnes Correctional Center (RCCC)	2014
13	Chiller Efficiency Improvement: Juvenile Hall Central Plant	2014
14	Improved HVAC Controls: Coroner's Building	2014
15	Laundry System Efficiency Upgrades: Main Jail	2014
16	Efficient Lighting Retrofit: Main Jail	2014

No.	Measure Name	Implement Date
17	Utility Power Surge (UPS) Retrofit: County Dept of Technology Building	2014
18	Chiller Plant Waterside Economizer: County Dept of Technology Building	2014
19	Chiller Plant Smart Controls: County Dept of Technology Building	2014
20	Chiller Plant Pump Efficiency Upgrade: County Dept of Technology Building	2014
21	Energy-Conserving Duct Isolation Dampers: County Dept. of Technology Building	2014
22	Turning off Computer Monitors at Night	2014
24	Large Turf Landscape Irrigation Audits at County Facilities	2014
28	Countywide Streetlight Conversion Project (HPS & MV to LED)	2014
29	Green Building Policy for Leased County Buildings	2014
31	Fleet Replacement 2	2014
35	Solar Power (PV) Option 1	2014

**Plan D: GHG reduction of 15.5%**

This plan includes the 27 completed projects in Plan A and an additional 28 potential future projects including building energy efficiency, additional water conservation strategies, streetlighting upgrades, and more aggressive vehicle fleet replacement strategies.

Energy Cost and GHG Reduction Plan D				
Strategy:	Attains 15.5% GHG Reduction	20,929	Tons CO2 Avoided	15.5% GHG Reduction
<u>Community Benefit (over 25 year life of plan)</u>			Capital Cost	\$17,510,400
\$\$\$ Avoided Utility Company Payments		\$26,375,800	Jobs	645
\$\$\$ Avoided Fuel Purchases		\$3,852,100	MIRR	6.1%
\$\$\$ Invested Locally in GHG Projects		\$38,904,300	NPV	(\$2,924,500)



Note: The percentages in the pie chart above do not include GHG emissions reductions due to completed measures by the County, or projected changes due to increases in population. These are included in the overall GHG reduction results

Plan D Cash Flow				
Year	Cash Flow (gross)	Annual Debt Service Payments	Net Cash Flow	Outstanding Principal
2012	\$0	\$0	\$0	\$0
2013	\$600	\$0	\$600	\$0
2014	(\$33,100)	\$0	(\$33,100)	\$17,474,800
2015	\$1,665,300	(\$3,278,200)	(\$1,612,900)	\$14,535,700
2016	\$1,742,800	(\$3,278,200)	(\$1,535,300)	\$11,568,400
2017	\$1,822,800	(\$3,278,200)	(\$1,455,300)	\$8,571,600
2018	\$1,905,400	(\$3,278,200)	(\$1,372,700)	\$5,544,300
2019	\$1,990,600	(\$1,055,900)	\$934,700	\$4,707,400
2020	\$2,078,600	(\$1,055,900)	\$1,022,700	\$3,837,400
2021	\$2,169,400	(\$1,055,900)	\$1,113,400	\$2,933,100
2022	\$2,263,100	(\$1,055,900)	\$1,207,200	\$1,993,000
2023	\$2,359,800	(\$1,055,900)	\$1,303,900	\$1,015,800
2024	\$2,459,700	(\$1,055,900)	\$1,403,700	\$0
2025	\$2,562,700	\$0	\$2,562,700	\$0

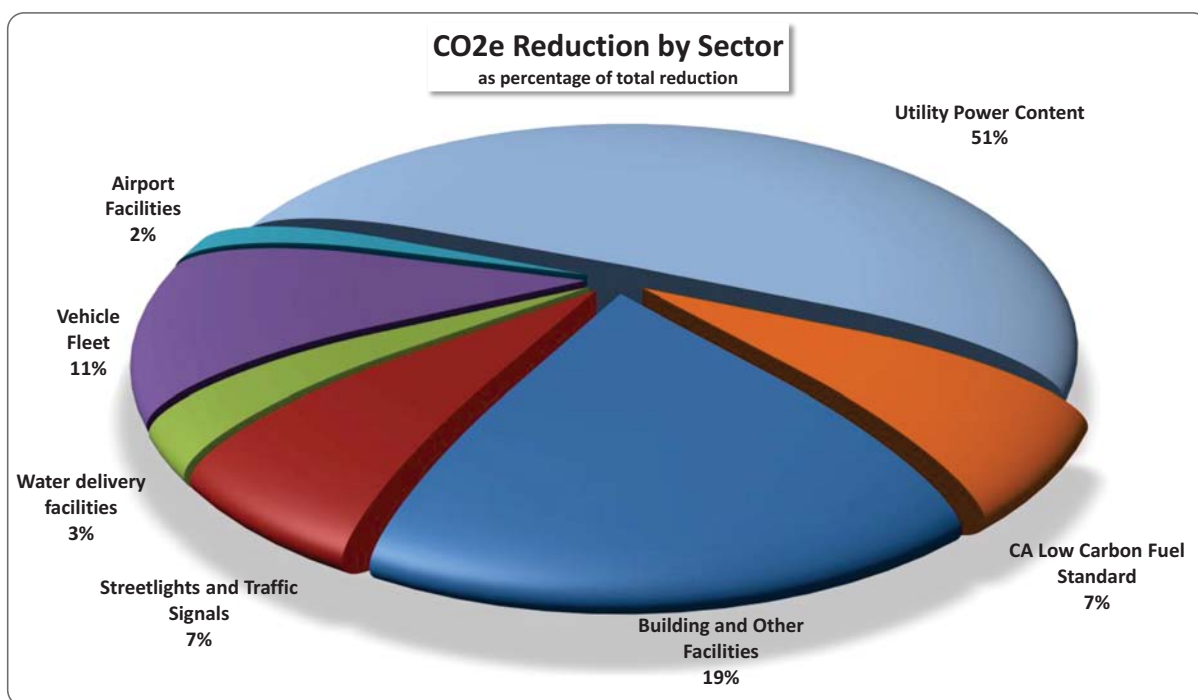
No.	Measure Name	Implement Date
1	Water Audits and Implementation of Conservation Measures at County Institutions	2012
3	Landscape Audit and Installation of River-Friendly Landscaping at County Buildings	2014
4	Rehabilitate groundwater wells with energy efficient pumps and motors	2014
5	Use of the Most Efficient Water Production Sources	2014
6	Increased Rate of Replacement of SCAS Standard Vehicles with Electric Units	2014
7	Energy-Efficient Taxiway Lighting	2014
8	Energy-efficient Lighting at Sacramento International Airport Parking Garage	2014
9	HVAC System Efficiency Upgrades	2014
10	Water Heater Replacement: Main Jail	2014
11	Energy Efficiency Retrofits: Rio Consumnes Correctional Center (RCCC)	2012
12	Laundry System Efficiency Upgrades: Rio Cosumnes Correctional Center (RCCC)	2014
13	Chiller Efficiency Improvement: Juvenile Hall Central Plant	2014
14	Improved HVAC Controls: Coroner's Building	2014
15	Laundry System Efficiency Upgrades: Main Jail	2014
16	Efficient Lighting Retrofit: Main Jail	2014

No.	Measure Name	Implement Date
17	Utility Power Surge (UPS) Retrofit: County Dept of Technology Building	2014
18	Chiller Plant Waterside Economizer: County Dept of Technology Building	2014
19	Chiller Plant Smart Controls: County Dept of Technology Building	2014
20	Chiller Plant Pump Efficiency Upgrade: County Dept of Technology Building	2014
21	Energy-Conserving Duct Isolation Dampers: County Dept. of Technology Building	2014
22	Turning off Computer Monitors at Night	2014
24	Large Turf Landscape Irrigation Audits at County Facilities	2014
25	Replacement of Water Wasting Equipment Related to County Operations	2014
26	Water Boosted System Replacement: Main Jail	2014
28	Countywide Streetlight Conversion Project (HPS & MV to LED)	2014
29	Green Building Policy for Leased County Buildings	2014
32	Fleet Replacement 3	2014
35	Solar Power (PV) Option 1	2014

**Plan E: GHG reduction of 16.2%**

This plan includes the 27 completed projects in Plan A and an additional 31 potential future projects including building energy efficiency, streetlighting upgrades, additional water conservation, additional HVAC projects and the more aggressive vehicle fleet replacement strategies.

Energy Cost and GHG Reduction Plan E				
Strategy:	Includes Most Measures and Positive MIRR	21,858	Tons CO2e Avoided	16.2% GHG Reduction
<u>Community Benefit (over 25 year life of plan)</u>			Capital Cost	\$24,473,700
\$\$\$ Avoided Utility Company Payments		\$26,388,400	Jobs	709
\$\$\$ Avoided Fuel Purchases		\$5,972,100	MIRR	4.5%
\$\$\$ Invested Locally in GHG Projects		\$42,724,400	NPV	(\$6,666,400)



Note: The percentages in the pie chart above do not include GHG emissions reductions due to completed measures by the County, or projected changes due to increases in population. These are included in the overall GHG reduction results



Plan E Cash Flow				
Year	Cash Flow (gross)	Annual Debt Service Payments	Net Cash Flow	Outstanding Principal
2012	\$0	\$0	\$0	\$332,400
2013	\$3,500	(\$40,900)	(\$37,400)	\$304,700
2014	(\$30,100)	(\$40,900)	(\$71,000)	\$24,381,600
2015	\$2,024,700	(\$4,313,700)	(\$2,288,900)	\$20,624,100
2016	\$2,114,800	(\$4,313,700)	(\$2,198,800)	\$16,820,000
2017	\$2,207,900	(\$4,313,700)	(\$2,105,800)	\$12,967,300
2018	\$2,303,900	(\$4,313,700)	(\$2,009,700)	\$9,064,200
2019	\$2,403,100	(\$1,738,900)	\$664,200	\$7,683,300
2020	\$2,505,500	(\$1,738,900)	\$766,600	\$6,248,000
2021	\$2,611,200	(\$1,738,900)	\$872,300	\$4,755,900
2022	\$2,720,400	(\$1,738,900)	\$981,500	\$3,204,900
2023	\$2,833,100	(\$1,698,000)	\$1,135,100	\$1,633,500
2024	\$2,949,500	(\$1,698,000)	\$1,251,500	\$0
2025	\$3,069,800	\$0	\$3,069,800	\$0

No.	Measure Name	Implement Date
1	Water Audits and Implementation of Conservation Measures at County Institutions	2012
2	Efficient Toilet-Flushing Systems: Main Jail	2014
3	Landscape Audit and Installation of River-Friendly Landscaping at County Buildings	2014
4	Rehabilitate groundwater wells with energy efficient pumps and motors	2014
5	Use of the Most Efficient Water Production Sources	2014
6	Increased Rate of Replacement of SCAS Standard Vehicles with Electric Units	2014
7	Energy-Efficient Taxiway Lighting	2014
8	Energy-efficient Lighting at Sacramento International Airport Parking Garage	2014
9	HVAC System Efficiency Upgrades	2014
10	Water Heater Replacement: Main Jail	2014
11	Energy Efficiency Retrofits: Rio Consumnes Correctional Center (RCCC)	2012
12	Laundry System Efficiency Upgrades: Rio Consumnes Correctional Center (RCCC)	2014
13	Chiller Efficiency Improvement: Juvenile Hall Central Plant	2014
14	Improved HVAC Controls: Coroner's Building	2014
15	Laundry System Efficiency Upgrades: Main Jail	2014
16	Efficient Lighting Retrofit: Main Jail	2014

No.	Measure Name	Implement Date
17	Utility Power Surge (UPS) Retrofit: County Dept of Technology Building	2014
18	Chiller Plant Waterside Economizer: County Dept of Technology Building	2014
19	Chiller Plant Smart Controls: County Dept of Technology Building	2014
20	Chiller Plant Pump Efficiency Upgrade: County Dept of Technology Building	2014
21	Energy-Conserving Duct Isolation Dampers: County Dept. of Technology Building	2014
22	Turning off Computer Monitors at Night	2014
23	Installation of High-Efficiency Toilets at County Offices	2012
24	Large Turf Landscape Irrigation Audits at County Facilities	2014
25	Replacement of Water Wasting Equipment Related to County Operations	2014
26	Water Boosted System Replacement: Main Jail	2014
27	HVAC Efficiency Modifications: New Administration Building	2014
28	Countywide Streetlight Conversion Project (HPS & MV to LED)	2014
29	Green Building Policy for Leased County Buildings	2014
34	Fleet Replacement 5	2014
35	Solar Power (PV) Option 1	2014

## **6.0 Measure Details**

The following tables provide a complete list of the measures considered in this analysis along with the financial data and results for each. The individual measures are described in the Measure Results section which follows the Measure Results tables.

**Tables Begin on Next Page**

No.	Measure Name	Net Cap Cost	Annual Cost Savings	Annual CO2e Reduction (tons)	Annual Energy Savings (kWh)	Annual Energy Savings (Therms)	Annual Gasoline Savings (gals)	Annual Diesel Savings (gals)	IRR	Net Present Value
1	Water Audits and Implementation of Conservation Measures at County Institutions	\$0	\$570	1	5,050	0	0	0	NA	\$4,600
2	Efficient Toilet-Flushing Systems: Main Jail	\$2,500,000	\$870	2	7,780	0	0	0	-39.5%	(\$2,340,800)
3	Landscape Audit and Installation of River-Friendly Landscaping at County Buildings	\$0	\$1,820	5	16,200	0	0	0	NA	\$14,600
4	Rehabilitate groundwater wells with energy efficient pumps and motors	\$0	\$32,010	80	285,700	0	0	0	NA	\$258,100
5	Use of the Most Efficient Water Production Sources	\$0	\$224,150	559	2,000,000	0	0	0	NA	\$1,806,800
6	Increased Rate of Replacement of SCAS Standard Vehicles with Electric Units	\$1,080	\$2,540	8	0	0	900	0	46.1%	\$19,500
7	Energy-Efficient Taxiway Lighting	\$370,000	\$7,630	19	68,100	0	0	0	-9.0%	(\$286,000)
8	Energy-efficient Lighting at Sacramento International Airport Parking Garage	\$940,000	\$146,300	365	1,305,400	0	0	0	11.4%	\$296,500
9	HVAC System Efficiency Upgrades	\$150,000	\$3,790	9	33,800	0	0	0	-7.2%	(\$110,300)
10	Water Heater Replacement: Main Jail	\$1,000,000	\$13,650	103	0	19,500	0	0	-12.7%	(\$829,200)
11	Energy Efficiency Retrofits: Rio Cosumnes Correctional Center (RCCC)	\$3,500,000	\$86,150	282	650,000	19,000	0	0	-7.4%	(\$2,592,600)
12	Laundry System Efficiency Upgrades: Rio Cosumnes Correctional Center (RCCC)	\$50,000	\$16,660	127	-1,200	24,000	0	0	20.2%	\$87,300
13	Chiller Efficiency Improvement: Juvenile Hall Central Plant	\$72,000	\$22,420	56	200,000	0	0	0	19.4%	\$113,100
14	Improved HVAC Controls: Coroner's Building	\$150,000	\$18,010	70	117,000	7,000	0	0	8.5%	\$4,300
15	Laundry System Efficiency Upgrades: Main Jail	\$50,000	\$18,740	142	-1,400	27,000	0	0	21.6%	\$104,100
16	Efficient Lighting Retrofit: Main Jail	\$580,000	\$30,260	75	270,000	0	0	0	-0.2%	(\$300,800)
17	Utility Power Surge (UPS) Retrofit: County Dept of Technology Building	\$700,000	\$36,990	92	330,000	0	0	0	0.0%	(\$359,300)
18	Chiller Plant Waterside Economizer: County Dept of Technology Building	\$58,000	\$4,480	11	40,000	0	0	0	3.8%	(\$18,300)
19	Chiller Plant Smart Controls: County Dept of Technology Building	\$500,000	\$39,230	98	350,000	0	0	0	4.0%	(\$153,400)

Table 12: Measure Results 1-19

No.	Measure Name	Net Cap Cost	Annual Cost Savings	Annual CO2e Reduction (tons)	Annual Energy Savings (kWh)	Annual Energy Savings (Therms)	Annual Gasoline Savings (gals)	Annual Diesel Savings (gals)	IRR	Net Present Value
20	Chiller Plant Pump Efficiency Upgrade: County Dept of Technology Building	\$40,000	\$11,210	28	100,000	0	0	0	18.1%	\$52,800
21	Energy-Conserving Duct Isolation Dampers: County Dept. of Technology Building	\$36,000	\$5,040	13	45,000	0	0	0	10.2%	\$6,800
22	Turning off Computer Monitors at Night	\$0	\$15,060	38	134,400	0	0	0	NA	\$121,400
23	Installation of High-Efficiency Toilets at County Offices	\$300,000	\$2,830	7	25,300	0	0	0	-15.9%	(\$258,900)
24	Large Turf Landscape Irrigation Audits at County Facilities	\$0	\$1,250	3	11,200	0	0	0	NA	\$10,100
25	Replacement of Water Wasting Equipment Related to County Operations	\$0	\$30	0	220	0	0	0	NA	\$200
26	Water Boosted System Replacement: Main Jail	\$500,000	\$8,290	21	74,000	0	0	0	-11.0%	(\$402,700)
27	HVAC Efficiency Modifications: New Administration Building	\$1,900,000	\$77,050	213	650,000	6,000	0	0	-2.7%	(\$1,163,300)
28	Countywide Streetlight Conversion Project (HPS & MV to LED)	\$6,250,000	\$582,800	1453	5,200,000	0	0	0	0.6%	(\$3,611,300)
29	Green Building Policy for Leased County Buildings	\$20,000	\$184,910	546	1,500,000	24,000	0	0	67.5%	\$1,471,700
30	Fleet Replacement 1	\$1,870,000	\$216,850	674	0	0	76,790	0	8.1%	(\$8,200)
31	Fleet Replacement 2	\$4,834,000	\$337,980	962	0	0	109,270	16,700	2.8%	(\$1,815,500)
32	Fleet Replacement 3	\$7,491,500	\$484,780	1354	0	0	157,620	24,560	2.0%	(\$3,128,000)
33	Fleet Replacement 4	\$8,507,500	\$741,920	2147	0	0	246,880	26,960	5.1%	(\$2,009,400)
34	Fleet Replacement 5	\$8,680,000	\$751,110	2175	0	0	250,130	26,960	5.0%	(\$2,097,300)
35	Solar Power (PV) Option 1	\$10,000	\$760,040	1895	6,781,400	0	0	0	100.7%	\$5,374,600
36	Solar Power (PV) Option 2	\$7,002,840	\$144,770	361	1,291,700	0	0	0	-10.2%	(\$5,550,900)
37	Solar Power (PV) Option 4	\$3,502,840	\$72,380	180	645,800	0	0	0	-10.2%	(\$2,776,800)
38	Solar Power (PV) Option 5	\$702,840	\$14,480	36	129,200	0	0	0	-10.2%	(\$557,500)

Table 13: Measure Results 20-38

## **Measure Results**

The measures included in the analysis are described below. The description of each measure also includes a table listing the results of the measure that include:

- Evaluation score (maximum possible 100) – The score assigned based on an evaluation using ten objective (e.g., financial) and subjective (e.g., community benefit) criteria intended to assess a measure’s effectiveness. This score is intended for advisory purposes in the planning and decision-making process. See Section 3 and Attachment 8.7 for more details.
- Annual GHG emission reductions (metric tons of CO<sub>2</sub>e)
- Implementation date (year) – Each measure in the analysis was assigned an implementation date (calendar year) to enable the calculation of cash flows over the life of the plan and the creation of energy cost trend graphs. For most measures, the implementation date is the actual or projected year of completion. When a future measure’s implementation date was unknown, 2014 was assigned.
- Net capital cost – The capital cost of a project minus incentives and rebates.
- Annual cost savings – The projected cost savings in the first year of operation.
- Financed (Yes/No) – Whether or not the County has secured financing for the measure.
- General Fund cost (Yes/No) – Whether or not the measure will be paid for using money from the County’s General Fund.
- General Fund benefit (Yes/No) – Whether or not the measure cost savings will accrue to the County’s General Fund.
- Simple payback (SPB) (years) – The value determined by dividing the net capital cost by the annual cost savings for an investment. While not effective in determining the value of the investment, it does provide the length of time before the initial investment is repaid.
- Modified internal rate of return (MIRR) (%) - The rate of return that makes the sum of present value of future cash flows and the final market value of a project (or an investment) equal its current market value. Generally speaking, the higher a project's modified internal rate of return, the more desirable it is to undertake the project.
- Net Present Value (NPV) - The current (2011) value of future costs and benefits associated with an investment under consideration.

The measures considered in this analysis are listed in the following pages, with a brief description of each.<sup>31</sup>

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<sup>31</sup> Measure development history, energy unit savings, and cash flow assumptions are available in the Master Project Database Sacramento County, TEAA 2011.

## **1- Water Audits and Implementation of Conservation Measures at County Institutions**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
1	12	1	2012	\$0	\$570	no	yes	yes	0	NA	\$4,600

**Measure Description:** Conduct audits of County institutions (e.g., Corrections) and implement necessary water conservation measures.

## **2- Efficient Toilet-Flushing Systems: Main Jail**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
2	15	2	2014	\$2,500,000	\$870	yes	yes	yes	3,404	-39.5%	(\$2,340,800)

**Measure Description:** Install prison-grade high efficiency toilet flushing systems ("Flushomer") to replace the current inefficient models.

## **3- Landscape Audit and Installation of River-Friendly Landscaping at County Buildings**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
3	12	5	2014	\$0	\$1,820	no	yes	yes	0	NA	\$14,600

**Measure Description:** Conduct landscape audit and install River-Friendly Landscaping in Public Spaces in-lieu of turf. "River-Friendly Landscape" embodies the value of reduced resource use (water, energy and nutrients) and practices the guidelines developed in the local "River Friendly Landscape Program" by the Sacramento Stormwater Quality Partnership.

## **4- Rehabilitate Groundwater Wells with Efficient Pumps and Motors**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
4	31	80	2014	\$0	\$32,010	no	no	no	0	NA	\$258,100

**Measure Description:** Each year Sacramento County Water Agency (SCWA) rehabilitates some of its groundwater wells to restore production levels to near new conditions; new efficient pumps are installed and the motor is replaced or rebuilt for efficiency. Between 2005 and 2010, SCWA rehabilitated over 20 wells, 15 extensively.

**5- Use of the Most Efficient Water Production Sources**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
5	35	559	2014	\$0	\$224,150	no	no	no	0	NA	\$1,806,800

**Measure Description:** Sacramento County Water Agency (SCWA) prioritizes what water production sources to use for water delivery, considering energy-efficiency/cost (as well as the need to not deplete any of the sources). Direct feed wells are the least expensive and energy-intensive form of production (pumping the water once versus 2 or 3 times for treated groundwater or surface water, respectively). This measure entails installation of about 7 direct feed-wells to offset the use of treated groundwater wells during the cooler months.

**6- Increased Rate of Replacement of SCAS Standard Vehicles with Electric Units**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
6	18	8	2014	\$1,080	\$2,540	no	no	no	1	46.1%	\$19,500

**Measure Description:** Increase rate of replacement of SCAS standard vehicles with electric vehicles.

**7- Energy-Efficient Taxiway Lighting**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
7	15	19	2014	\$370,000	\$7,630	no	no	no	58	-9.0%	(\$286,000)

**Measure Description:** Retrofit taxiway lighting with LED technology in phases and during major taxiway renovation/upgrade.

**8- Energy-Efficient Lighting at Sacramento International Airport Parking Garage**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
8	30	365	2014	\$940,000	\$146,300	no	no	no	8	11.4%	\$296,500

**Measure Description:** Replace the high-pressure sodium lights at the parking garage at the Sacramento International Airport with energy efficient lighting.



**9- HVAC System Efficiency Upgrades**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
9	34	9	2014	\$150,000	\$3,790	no	no	no	47	-7.2%	(\$110,300)

**Measure Description:** Replace 10 old and inefficient package AC units with new high efficiency systems at older airport facilities.

**10- Water Heater Replacement: Main Jail**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
10	33	103	2014	\$1,000,000	\$13,650	yes	yes	yes	87	-12.7%	(\$829,200)

**Measure Description:** Replace the current potable water heaters with more energy-efficient models; current heaters are at the end of their serviceable life and are difficult to maintain.

**11- Energy Efficiency Retrofits: Rio Cosumnes Correctional Center (RCCC)**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
11	26	282	2012	\$3,500,000	\$86,150	yes	yes	yes	48	-7.4%	(\$2,592,600)

**Measure Description:** Modernize building systems at the RCCC (built in 1960); install high efficiency lighting technologies and upgrade or replace HVAC systems.

**12- Laundry System Efficiency Upgrades: Rio Cosumnes Correctional Center (RCCC)**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
12	18	127	2014	\$50,000	\$16,660	yes	yes	yes	4	20.2%	\$87,300

**Measure Description:** At the RCCC, change out the conventional laundry methods that rely on hot water and chemicals to a more energy-efficient method that uses ozone (oxygen and electricity) and cold water.

**13- Chiller Efficiency Improvements: Juvenile Hall Central Plant**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
13	29	56	2014	\$72,000	\$22,420	yes	yes	yes	4	19.4%	\$113,100

**Measure Description:** Upgrade chilled water system equipment at Juvenile Hall to operate in variable speed mode in order to reduce energy usage and costs. For every 10% reduction in speed there is a 30% reduction in energy usage.

**14- Improved HVAC Controls: Coroner's Building**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
14	12	70	2014	\$150,000	\$18,010	yes	yes	yes	10	8.5%	\$4,300

**Measure Description:** Upgrade the existing obsolete HVAC control system at the Coroner's Building by providing more stable, reliable and efficient Direct Digital Controls (DDC)

**15- Laundry System Efficiency Upgrades: Main Jail**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
15	18	142	2014	\$50,000	\$18,740	yes	yes	yes	3	21.6%	\$104,100

**Measure Description:** At the Main Jail, change out conventional laundry methods that rely on hot water and chemicals to more energy-efficient ones that use ozone (oxygen and electricity) and cold water.

**16- Efficient Lighting Retrofit: Main Jail**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
16	15	75	2014	\$580,000	\$30,260	yes	yes	yes	23	-0.2%	(\$300,800)

**Measure Description:** Upgrade the lighting in the day rooms of the Main Jail with longer lasting, more energy-efficient lighting.

**17- Utility Power Surge (UPS) Retrofit: County Dept. of Technology Building**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
17	23	92	2014	\$700,000	\$36,990	yes	yes	yes	22	0.0%	(\$359,300)

**Measure Description:** Replace Utility Power Surge (UPS) equipment with a smaller, more energy-efficient model.

**18- Chiller Plant Waterside Economizer: County Dept. of Technology Building**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
18	12	11	2014	\$58,000	\$4,480	yes	yes	yes	15	3.8%	(\$18,300)

**Measure Description:** Add a heat exchanger to the chilled water system to use the cold water from the cooling tower to provide chilled water when the outside air conditions are optimal.

**19- Chiller Plant Smart Controls: County Dept. of Technology Building**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
19	33	98	2014	\$500,000	\$39,230	yes	yes	yes	15	4.0%	(\$153,400)

**Measure Description:** Upgrade the chilled water system controls, including optimized equipment settings, to improve the chiller plant efficiency and save energy.

**20- Chiller Plant Pump Efficiency Upgrade: County Dept. of Technology Building**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
20	12	28	2014	\$40,000	\$11,210	yes	yes	yes	4	18.1%	\$52,800

**Measure Description:** Upgrade chilled water system pumps to operate in variable speed mode in order to reduce energy usage and costs. For every 10% reduction in speed there is a 30% reduction in energy usage.

## **21- Energy-Conserving Duct Isolation Dampers: County Dept. of Technology Building**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
21	12	13	2014	\$36,000	\$5,040	yes	yes	yes	8	10.2%	\$6,800

**Measure Description:** Modify the main HVAC duct dampers to isolate non-occupied floors during nights and weekends, to reduce the amount of air the main air-handling unit delivers (thereby saving energy).

## **22- Turning off Computer Monitors at Night**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
22	26	38	2014	\$0	\$15,060	no	yes	yes	0	NA	\$121,400

**Measure Description:** Implement program to turn off computer monitors at night when not in use.

## **23- Installation of High-Efficiency Toilets at County Offices**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
23	12	7	2012	\$300,000	\$2,830	yes	yes	yes	117	-15.9%	(\$258,900)

**Measure Description:** Replace remaining pre-1992 toilets (3.5-7 gal/flush) in County buildings with high-efficiency toilets (HET; 1.28 gal/flush).

## **24- Large Turf Landscape Irrigation Audits at County Facilities**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
24	12	3	2014	\$0	\$1,250	no	yes	yes	0	NA	\$10,100

**Measure Description:** Conduct water audits to evaluate irrigation practices in large turf landscapes around County facilities and modify irrigation practices and equipment accordingly (timers, sprinkler heads, etc.). Coordinate with appropriate water conservation coordinator with applicable water purveyor. (In Sacramento, turf requires about 57 inches of water/year and typically overwatering on the order of 30%-50% occurs over what is needed.)

**25- Replacement of Water Wasting Equipment Related to County Operations**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
25	12	0	2014	\$0	\$30	no	yes	yes	0	NA	\$200

**Measure Description:** Replace water-wasting equipment with more efficient equipment when grant funds are available from local water purveyors. (For example, replace hoses used to clean surfaces -- such as at the County animal care facility -- with water brooms).

**26- Water Booster System Replacement: Main Jail**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
26	25	21	2014	\$500,000	\$8,290	yes	yes	yes	72	-11.0%	(\$402,700)

**Measure Description:** Replace the current water booster system, which ensures adequate water supply and pressure on all floors of the Main Jail, with an updated, more energy-efficient pump system. The current system is at the end of its serviceable life and difficult to maintain.

**27- HVAC Efficiency Modifications: New Administration Building**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
27	23	213	2014	\$1,900,000	\$77,050	yes	yes	yes	29	-2.7%	(\$1,163,300)

**Measure Description:** Change the HVAC fans for the office areas from constant volume air-flow to variable air-flow to reduce energy usage and costs. For every 10% reduction in speed there is a 30% reduction in energy usage.

**28- Countywide Streetlighting Conversion Project (HPS & MV to LED)**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
28	52	1,453	2014	\$6,250,000	\$582,800	no	no	yes	13	0.6%	(\$3,611,300)

**Measure Description:** This project involves additional conversion of existing high-pressure sodium and mercury-vapor streetlights in residential areas throughout the County to energy-saving LED lighting technology.

**29- Green Building Policy for Leased County Buildings**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
29	31	546	2014	\$20,000	\$184,910	no	yes	yes	0	67.5%	\$1,471,700

**Measure Description:** Adopt policy that establishes criteria for County lease agreements, where the County will only enter into new leases when buildings meet specified energy efficiency or other green building standards.

**30- Fleet Replacement 1**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
30	38	674	2014	\$1,870,000	\$216,850	yes	yes	yes	10	8.1%	(\$8,200)

**Measure Description:** Replace small and mid-size sedans with small and mid-size hybrid sedans, and one large sedan type with mid-size (total of 328 replacements). See Attachment 8.6 for more information.

**31- Fleet Replacement 2**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
31	46	962	2014	\$4,834,000	\$337,980	yes	yes	yes	14	2.8%	(\$1,815,500)

**Measure Description:** Fleet Replacement 1 scenario PLUS: Replace light duty pickups with gasoline hybrid pickups, and replace two types large trucks (F350/450) with CNG trucks (total of 552 replacements). See Attachment 8.6 for more information.

**32- Fleet Replacement 3**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
32	50	1,354	2014	\$7,491,500	\$484,780	yes	yes	yes	18	2.0%	(\$3,128,000)

**Measure Description:** Replace small and mid-size sedans with small and mid-size hybrid sedans, replace large sedans with mid-size, replace light duty pickups with hybrid pickups, and replace large trucks with CNG (total of 839 replacements). See Attachment 8.6 for more information.

**33- Fleet Replacement 4**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
33	50	2,147	2014	\$8,507,500	\$741,920	yes	yes	yes	14	5.1%	(\$2,009,400)

**Measure Description:** Same description as previous scenario, but total of 1,237 replacements. See Attachment 8.6 for more information.

**34- Fleet Replacement 5**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
34	50	2,175	2014	\$8,680,000	\$751,110	yes	yes	yes	14	5.0%	(\$2,097,300)

**Measure Description:** Same description as previous scenario #3, but total of 1,250 replacements. See Attachment 8.6 for more information.

**35- Solar Power (PV) Option 1**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
35	43	1,895	2014	\$10,000	\$760,040	no	yes	yes	57	100.7%	\$5,374,600

**Measure Description:** PV 5.25 MW PPA (no location specified) (Power Purchase Agreement)

**36- Solar Power (PV) Option 2**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
36	36	361	2012	\$7,002,840	\$144,770	yes	yes	yes	54	-10.2%	(\$5,550,900)

**Measure Description:** PV 1MW (no location specified)

**37- Solar Power (PV) Option 4**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
37	30	180	2014	\$3,502,840	\$72,380	yes	yes	yes	57	-10.2%	(\$2,776,800)

**Measure Description:** PV 500kW (no location specified)



**38- Solar Power (PV) Option 5**

No.	Evaluation Score	Annual CO2e Reduction (tons)	Implement Date	Net Cap Cost	Annual Cost Savings	Financed	General Fund Cost	General Fund Benefit	Simple Payback	IRR	Net Present Value
38	18	36	2014	\$702,840	\$14,480	yes	yes	yes	58	-10.2%	(\$557,500)

**Measure Description:** PV 100kW (no location specified)

**39- Completed: Countywide Streetlight Conversion Project (MV to LED)**

**Measure Description:** Convert 1800 existing mercury-vapor streetlights in the unincorporated county to energy-saving LED lighting technology (ARRA funded project).

**40- Completed: Cogeneration Facility for Terminal B-Sacramento International Airport**

**Measure Description:** Purchased and installed a 1 MW cogeneration facility for the new Central Terminal B complex at Sacramento International Airport that will produce electricity for airport operations while also cooling the airport through a waste-heat absorption chiller.

**41- Completed: Energy Efficiency Retrofits: Gibson Ranch Park**

**Measure Description:** Install energy-efficient heating, ventilation, and air conditioning (HVAC) at Gibson Ranch Park.

**42- Completed: Energy Efficiency Upgrades: (J. Harvie Community Center & Caretaker House)**

**Measure Description:** Installed energy-efficiency upgrades.

**43- Completed: Energy Audits and Improvements using Financial Incentive Revolving Fund**

**Measure Description:** Performed energy audits of 35% of square footage of County facilities and implement cost-effective and short-payback energy efficiency improvements to reduce energy use by 5%. To ensure a sustainable funding source capital and staff costs were paid by the financial incentive revolving fund which will be reimbursed by money saved through ongoing energy savings.

**44- Traffic Signal System Upgrade (Energy Efficient LED Lamps)**

**Measure Description:** Between 1997 and 2010, Sacramento County converted its 589 street signals from incandescent light lamps to light emitting diode (LED) technology. LED signals use 10% of the power and last about 5 times longer.

**45- Replacement of CRT Monitors with Energy Efficient Flat Panel Monitors**

**Measure Description:** Since 2005, replaced CRT monitors with flat panel LCD monitors at virtually all County workstations.

**46- Completed: Green building features in new Central Terminal B at Sacramento International Airport**

**Measure Description:** Incorporated energy and water efficiency green building features in construction of the new LEED-certified Central Terminal B, opened in October 2011 at Sacramento International Airport.

**47- Completed: Terminal B Underground Hydrant Fueling - Sacramento International Airport**

**Measure Description:** Constructed a hydrant fueling system at the new Central Terminal B. This will eliminate the need for fuel trucks at Terminal B, enhancing safety and eliminating air pollution, including GHGs.

**48- Completed: Fixed Base Water Meter Reading System (Pilot Study)**

**Measure Description:** SCWA conducted a successful pilot study with establishment of a fixed base water meter reading system for 4000 customer accounts. The computer-based system uses radios saves fuel and labor by eliminating the need for people and vehicles to read meters and also helps identify water leaks. This tool will aid SCWA in meeting the State's mandate for 20% reduction in per capita water use by 2020.

**49- Completed: Routing Efficiencies for Waste Collection Trucks**

**Measure Description:** In 2009, the County Dept. of Waste Management and Recycling (DWMR) adjusted the routes of its collections fleet to reduce the number of direct waste haul trips need to Kiefer Landfill. More trucks now take waste to the intermediary North Area Recovery Station (NARS) where various waste streams are combined into larger trucks for delivery to the landfill, thus resulting in a net decrease in vehicle trip miles.

**50- Completed: Reduce Landside Lighting at Sacramento International Airport**

**Measure Description:** Turned off three of six 1000W lights on 100ft-tall light masts in landside areas of the Sacramento International Airport.

**51- Completed: Reduce Interior Lighting at Terminal A (Sacramento International Airport)**

**Measure Description:** Reduced the interior lighting levels (and associated energy consumption) in Terminal A through use of automatic lighting controls (lighting software) set to run on a modified schedule.

**52- Completed: Energy-Efficiency Retrofit at Airport Terminal A Cooling Towers**

**Measure Description:** SCAS renovated Terminal A Cooling Towers, increasing efficiency and reducing energy consumption.

**53- Completed: Energy-Efficient HVAC Management Systems for TA Central Utilities Plant**

**Measure Description:** Converted central plant to an all-variable speed system and implement Optimum Energy's LOOP control strategy. Utilize HVAC management system to decrease energy use by optimizing plant operations, scheduling equipment (e.g., equipment is turned off during non-occupied hours), utilizing free cooling, etc.

**54- Completed: Energy Efficiency Improvement for Air Handlers at SCAS Facilities**

**Measure Description:** Adjusted economizer operations and programming on existing Direct Digital Control (DDC) constant volume air handlers to fully utilize free cooling.

**55- Completed: Shutting off Airport Escalators After Hours**

**Measure Description:** Seven escalators at the Sacramento International Airport are shut off from midnight to 6 a.m. (saving energy and extending equipment life).

**56- Sheriff Administration Building Cooling Source Replacement**

**Measure Description:** Provide a new source of energy-efficient cooling for the Sheriff Administration building. Its chiller uses an outdated refrigerant which must be replaced or converted when needing major repairs. This facility will be connected to the County Dept. of Technology chillers to supply chilled water for cooling.

**57- Completed: Shutting Off Computer Monitors at Night**

**Measure Description:** Implement policy to shut off computer monitors at night, reducing electricity and extending the life of monitors.

**58- Completed: Improved Landscape Maintenance Efficiencies at SCAS Facilities: Larger Mowers**

**Measure Description:** Utilized large mowers, 72 in. to 11 ft. wide, which cut twice as much grass as a typical mower, to maintain SCAS landscapes. Though the larger mowers consume more fuel, an aggregate savings is realized by using fewer tractors/mowers.

**59- Completed: Improved Landscape Maintenance Efficiencies at SCAS Facilities: Swathers Mowers**

**Measure Description:** Utilize a swather that cuts 22 feet per pass to maintain airport landscapes. The swather is more fuel efficient than tractor/mowers and cuts at twice the speed of a traditional tractor/mower.

**60- Energy Efficient Improvements to Mechanical Systems: Mental Health Treatment Center**

**Measure Description:** Modernized building systems at the Mental Health Treatment Center (built in 1991); provide high efficiency lighting technologies and upgrade or replace HVAC systems. This project is an Energy Services Company (ESCO) process enabled under California Government Code 4217.10.

**61- Completed: Energy-Efficiency Upgrades: John Price District Attorney Building**

**Measure Description:** Installed new HVAC controls (meeting current standard for interfacing with downtown central plant), including converting to a variable air volume (VAV) system. The improvements will increase HVAC efficiency and alleviate heating/cooling problems that now occur.

**62- Completed: County Administration Building Central Plant Improvements**

**Measure Description:** Replaced outdated equipment at the Downtown District heating and cooling plant (700 H Street; circa 1978-2008) with more efficient environmentally-compliant models. Replaced chillers heating boilers, variable speed air handlers, and energy efficient pumping systems. Reused existing infrastructure in the rebuilding of the plant.

**63- Completed: Energy Efficiency Improvements to Lighting and Mechanical Systems: Building Inspection Facility**

**Measure Description:** Upgrade lighting and mechanical system to be energy-efficiency when other improvements (e.g., roofing) are made to the Building Inspection Facility.

**64- Server Virtualization Effort**

**Measure Description:** Completed 421 server virtualizations on a platform of 10 physical servers increasing the energy efficiency of the County's data centers.

**65- Solar Power (Photovoltaic, PV) Option 3**

**Measure Description:** PV 1 MW solar photovoltaic array installed at Vineyard Surface Water Treatment Plant (Power Purchase Agreement).

## **7.0 Summary and Conclusions**

The target GHG emissions reduction of 15% below 2005 levels by 2020 can be achieved by four of the five alternative action plans outlined above. The utility Renewable Portfolio Standard and the California Low Carbon Fuel Standard contribute a significant portion of these emissions reduction. The analysis model underpinning these results will be available for incorporating new information and technologies as they come available, as well as truing the analysis with monitored data. The comprehensive approach to addressing this GHG emission reduction goal allows the county to meet a number of related goals, including improving the long term financial health of the county, reducing the budget vulnerability to future energy cost escalation, addressing the existing maintenance demands and replacement of aging equipment, and providing the public demonstration of commitment and progress in the highly visible challenge of county cost containment and greenhouse gas emissions reduction.

## **8.0 Attachments**

- 8.1 Basis for 2005 GHG Inventory
- 8.2 Energy Consumption Summary 2005 and 2009
- 8.3 General Inputs and Assumptions
- 8.4 Measure Specific Input Values
- 8.5 Vehicle Lists
- 8.6 Vehicle Energy Cost Reduction Strategies
- 8.7 Evaluation Methodology
- 8.8 2005 Baseline Revision Details
- 8.9 Employee Commute Results
- 8.10 Original Project List
- 8.11 Natural Gas Cost Trend from 1989 to 2009 with Projections
- 8.12 Vehicle Fuel Cost Trends

## 8.1 Basis for 2005 GHG Inventory

County of Sacramento Internal Operations 2005 Baseline								
End Use (by Sector)	kWh	Therms	Propane (gals/yr)	LNG (gals/yr)	Gasoline (gals/yr)	E100 (gal/yr)	B100 (gal/yr)	eCO2 (tons)
<b>Buildings and other facilities</b>								
Old Administration Bldg.	1,536,600	0						429.4
Courthouse	0	863						4.6
Branch Center Motor Pool	17,340	9,815						56.8
Parking Garage	1,115,040	1,060						317.2
DHHS Capital Health & Dental	179,403	0						50.1
Health & Human Services-WIC Program-UC	0	91,348						483.3
Mental Health	2,235,360	2						624.6
Adult Court Services	183,680	1,858						61.2
Superior Municipal Court Prob	90,000	240,638						1298.4
Sheriff RCCC Mens	4,879,661	0						1363.5
Mt. Vaca Radio Repeater Station	24,100	189,535						1009.6
B.T. Collins Juvenile Center	3,326,160	0						929.4
Juvenile Court Facility	0	0						0.0
Probation Boys Ranch	1,234,868	0						345.0
Animal Control	258,760	0						72.3
Walnut Grove Facility	57,760	0						16.1
Walnut Grove	272	0						0.1
Carmichael Library	0	0						0.0
Libraries-Galt Library	0	0						0.0
Libraries-Rio Linda Library	0	0						0.0
Vets Meeting Hall	0	15,109						79.9
O.B.#2-John M. Price District	1,294,472	0						361.7
Ancil Hoffman Golf Course Snack/Pro	0	7,669						40.6
ID Lab and Warehouse	318,720	15,187						169.4
Sheriff RCCC Womens	639,840	0						178.8
Branch Center Misc.	0	2,950						15.6
Sheriff Northeast Station House	333,360	0						93.1
Corporate Yard-Administration(BID and Tr.	0	0						0.0
Corporate Yard-Traffic	1,151,680	26,601						462.5
Sheriff South Station House	673,560	70,545						561.5
Corporate Yard-Materials Testing Lab	0	0						0.0
PW Central Warehouse	0	32,724						173.1
Health & Human Services O.B.	1,605,750	0						448.7
DGS	1,473,840	0						411.8
DGS Facilities Management	235,560	0						65.8
Agricultural Commissioner	282,720	21,091						190.6
Water Quality	1,026,240	114,679						893.5
Coroner Crime Lab	2,942,800	117,168						1442.2
Parks - M&O	120,960	0						33.8
Courts/Sheriff Civil/Law Library	2,025,000	0						565.8
Refuse Transfer Station	78,240	20,653						131.1
Refuse Transer Station	1,032,340	0						288.5
New Fleet Facility	0	0						0.0
Effie Yeaw Nature Center	91,680	0						25.6
Donner Sch/Multi-Dis	0	0						0.0
DHA-Information System Division (ISD)	0	0						0.0
Traffic Operations	97,680	62,845						359.8
PrimaryCareCenter	2,516,700	0						703.2
DHHS Primary Care Center	0	0						0.0
VRE Warehouse-report problems in VRE w	0	0						0.0
Warren E Thornton Youth Center	1,319,520	29,952						527.2
Sheriff Administration	2,114,400	5,271						618.7
Sheriff Narcotics & Gangs	555,800	0						155.3
Health & Human Services-Northeast Clinic	0	593						3.1
New Helvetia	41,928	17,666						105.2
DGS Warehouse	0	3,901						20.6
Oak Park Multi-Service Center	216,960	0						60.6
Human Assistance-Galt	0	5,959						31.5
DHA-DHHS	456,480	0						127.5
Dept. Human Assistance Investigations/Fr	0	279,346						1478.0
Central Plant	0	0						0.0
New Admin Center	7,565,000	229,283						3326.9
Main Jail/Lorenzo E. Patino Hall of Justice	7,920,600	0						2213.1
Agricultural Commission/Galt	0	21,623						114.4
Sheriff Work Release/Human As	923,760	1,894						268.1
OCIT Facility	5,767,600	0						1611.6
Lease to City Police	0	0						0.0

County of Sacramento Internal Operations 2005 Baseline									
End Use (by Sector)	kWh	Therms	Propane (gals/yr)	LNG (gals/yr)	Gasoline (gals/yr)	E100 (gal/yr)	B100 (gal/yr)	Diesel (gals/yr)	eCO2 (tons)
Buildings and other facilities									
Greenhouse	0	0							0.0
Health & Human Services-WIC/Sheriff-Suit	0	0							0.0
Health & Human Services-WIC/Sheriff-Suit	0	2,918							15.4
Don Brown Campus	453,040	304							128.2
Sheriff - Carmichael Village	49,684	0							13.9
Health & Human Services-Sienna Vista Apt	0	0							0.0
WIC Grand Ave	260,724	0							72.9
Libraries-Elk Grove Library	0	2,176							11.5
5th St. Warehouse	151,560	161							43.2
East Division Station House	651,327	2,870							197.2
Rossmoor Center	449,440	5,128							152.7
Watt Ave. Employment	271,680	1,158							82.0
Watt Ave. Employment	249,247	0							69.6
Sheriff Crime Unit	0	0							0.0
Health and Human Services-Del Paso Cent	0	0							0.0
DHHS Bowling Green Center	645,120	0							180.3
C Street	0	2,292							12.1
VRE/SSD	1,066,626	6,869							334.4
DHHS Admin Services Center	1,155,360	0							322.8
Sheriff N.W. Division Service Center	0	1,632							8.6
North Central Station House	366,240	10,352							157.1
Granite Park III	1,779,000	0							497.1
Law Library	0	1,721							9.1
DHHS Pharmacy Storage	32,188	1,351							16.1
CPS Warehouse	42,277	52							12.1
North Station Garage	45,897	0							12.8
McCuen Center One (Water Quality/Gener	0	0							0.0
McCuen Center One	0	18							0.1
Public Admin Warehouse	6,082	0							1.7
DA Investigation Support Unit	0	0							0.0
LAFCO	0	0							0.0
Facilities Management Warehouse	714	0							0.2
Sheriff SSD Parking/Towing	0	1,956							10.3
Sheriff SSD Parking/Towing	59,040	0							16.5
La Mancha	31,103	8,820							55.4
Granite Park IV	2,016,600	7,890							605.2
DHA New Services	489,120	0							136.7
DHA St. John's Women's Shelter	0	3,112							16.5
DHA North Bureau	659,680	0							184.3
Water Resources	0	0							0.0
DHHS	172,260	0							48.1
Children's Receiving Home	0	0							0.0
SAFCA - Contractor Suite	0	0							0.0
Sheriff - Van Storage	0	0							0.0
VA Building - ECD	0	0							0.0
ECD	0	0							0.0
Sheriff Sub-Station	0	0							0.0
DHHS - 9750 Business Park Drive	0	0							0.0
Sheriff Suite 124-126	28,262	0							7.9
Granite Regional Park, Bldg A	0	0							0.0
Wilton Community Service Center	0	0							0.0
Probation Department MIS Div.	0	0							0.0
Neighborhood Svcs	0	0							0.0
Walnut Grove Safety Center	0	862							4.6
Florin Rd	2,572	0							0.7
First Five	0	0							0.0
DHA - 2101 Arena Blvd	0	0							0.0
DHA SNR Nutrition	0	0							0.0
Probation Department	0	0							0.0
DOT Watt Ave, Grade Sep. Project	0	799							4.2
Financial Management	103,576	824							33.3
Sr. Nutrition	379,440	332							107.8
DHA Human Resources	103,310	0							28.9
Health Promotion-Education	0	0							0.0
Health Promotion-Education	0	1,361							7.2
Grand Oaks Bureau	245,001	17,686							162.0



County of Sacramento Internal Operations 2005 Baseline									
End Use (by Sector)	kWh	Therms	Propane (gals/yr)	LNG (gals/yr)	Gasoline (gals/yr)	E100 (gal/yr)	B100 (gal/yr)	Diesel (gals/yr)	eCO2 (tons)
Buildings and other facilities									
Susie Gaines-Mitchell Building	1,060,080	1,840							305.9
DHA Admin. Bldg.	166,800	0							46.6
DHA Mental Health Bldg (Bldg A)	104,930	4,711							54.2
DHA, Non-Aid in kind (Bldg. B)	89,465	0							25.0
North County Corporation Yard	2,640	0							0.7
North County Office Building	613,800	0							171.5
North County Garage Building	650,880	0							181.9
North County Warehouse Building	185,040	0							51.7
Sheriff-Work Project	15,283	0							4.3
DHA-Elk Grove	111,651	13,131							100.7
DHA Main	1,408,200	0							393.5
DHA/DHHS	235,263	11,306							125.6
Strategic Planning/DHA/Sheriff	321,943	0							90.0
Superior/Municipal Court-Settlement Conf	315,120	0							88.0
DHHS-CHDP/CPSTraining	21,545	0							6.0
Leased Building 00891	0	0							0.0
Legislative Rep	0	0							0.0
Legislative Rep	0	0							0.0
Leased Building 901	0	3,846							20.3
DHA-R.C. Bureau-Prob	431,200	1,542							128.6
Recorders Office	215,640	0							60.3
Parking Facility	362,880	0							101.4
Adult & Juvenile Field Services	0	0							0.0
Adult & Juvenile Field Services	0	0							0.0
Adult & Juvenile Field Services	0	0							0.0
Micron Corporate Centre	0	0							0.0
Micron Corporate Centre	0	0							0.0
Superior/Muni Crt-Ret Ctr	103,500	0							28.9
Human Assistance-Fair Hearing	0	7,282							38.5
DHHS-DHA-HRA	1,124,400	0							314.2
Sheriff-Training Academy	0	0							0.0
Probation-MIS-Enviro	818,699	0							228.8
DHA-GAIN	390,000	2,172							120.5
DHA-Admin	242,400	2,804							82.6
HR Employment Center	172,320	0							48.1
Erickson Building	0	19,779							104.7
DHA-Bowling Green	609,146	4,140							192.1
Cherry Island Golf Course	0	0							0.0
PWA-CUBS,MIS,HR,GIS,PIO	1,045,651	2,217							303.9
PWA-Waste Mgmt & Recycle	240,560	0							67.2
Sheriff Staff Services Division	0	0							0.0
Sheriff Staff Services Division	0	0							0.0
Leased Building 00968	0	0							0.0
Leased Building 00968	0	0							0.0
Leased Building 00968	0	0							0.0
WIC Program	0	0							0.0
Carol Miller Justice Complex	0	15,582							82.4
Construction Inspection	0	0							0.0
Leased Building 00974	0	0							0.0
Leased Building 00974	0	0							0.0
Leased Building 00976	0	0							0.0
Probation-Admin	1,055,586	0							294.9
Public Works Agency-SRCSD	0	3,182							16.8
Sheriff Training Academy	0	0							0.0
La Sierra Community Center	0	0							0.0
CREDIT U LOT 8TH&G	0	0							0.0
Parking Lot	0	0							0.0
SOUTHERN PACIFIC PARK LOT	3,547	0							1.0
	0	0							0.0
DHA General	154,508	0							43.2
Landscape Maintenance - 102 Electric Acco	0	0							0.0
Misc Transportation - 10 Electric Accounts	3,513,518	0							981.7
Communications - 6 Electric Accounts	695,472	2,690							208.6
ANCIL HOFFMAN REGIONAL PARK	0	0							0.0
Antelope Community Park	0	0							0.0
FOOTHILL COMMUNITY PARK (OLD SPRUC	0	0							0.0
FRUITRIDGE COMMUNITY CENTER	0	0							0.0
TUPELO PARK	0	0							0.0
County Managed Parks - 4 Gas Accounts, 6	2,430,962	0							679.2
SRCSD	0	0							0.0

County of Sacramento Internal Operations 2005 Baseline									
End Use (by Sector)	kWh	Therms	Propane (gals/yr)	LNG (gals/yr)	Gasoline (gals/yr)	E100 (gal/yr)	B100 (gal/yr)	Diesel (gals/yr)	eCO2 (tons)
<b>Buildings and other Facilities</b>									
Storage	0	0							0.0
Infrastructure Finance Section	6,180	0							1.7
Misc. Unassigned Accounts	1,963,294	0							548.6
Online 8/2006	0	0							0.0
Off-line 10/2005	0	0							0.0
Off-line 5/2005	0	0							0.0
Online 2/2009	0	0							0.0
Off-line 6/2007	0	0							0.0
Online 8/2007	0	0							0.0
Online 6/2009	0	0							0.0
Off-line 4/2005	0	0							0.0
Online 9/2009	0	0							0.0
Online 3/2009	0	0							0.0
Online 6/2009	0	0							0.0
This is the new facility name for 00P08	14,418	0							4.0
Waste Management & Recycling - 14 El	1,144,281	1							319.7
<b>Total</b>	<b>93,969,166</b>	<b>1,816,697</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>35868.6</b>
<b>Streetlights</b>									
Street Lights - 17 Electric Accounts	28,668,486								8010.4
Traffic Signals - 607 Electric Accounts	2,871,043								802.2
<b>Total</b>	<b>31,539,529</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8812.6</b>
<b>Water Delivery Facilities</b>									
Water Resources - 118 Electric Account	19,983,904								5583.8
<b>Total</b>	<b>19,983,904</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5583.8</b>
<b>Airport Facilities</b>									
McClellan Airport - General	325,287	1,069							96.5
Sacramento International Airport	44,233,920	192,821							13379.9
Sacramento Executive Airport	1,364,720	18,386							478.6
MHR-Mather General	3,335,756	18,042							1027.5
<b>Total</b>	<b>49,259,683</b>	<b>230,318</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>14982.5</b>
<b>Vehicle Fleet</b>									
Nat Gas Vehicles		334,954							1772.2
Electric									0.0
Propane			25,755						149.1
LNG				844,872					3768.1
Biodiesel									0.0
Gasoline					2,330,578				20462.3
Diesel								1,132,796	11565.8
<b>Total</b>	<b>0</b>	<b>334,954</b>	<b>25,755</b>	<b>844,872</b>	<b>2,330,578</b>	<b>0</b>	<b>0</b>	<b>1,132,796</b>	<b>37717.6</b>
<b>Commute</b>									
Fuel		12,968			3,543,201	3,701	4,583	75,683	31973.8
<b>Total</b>	<b>0</b>	<b>12,968</b>	<b>0</b>	<b>0</b>	<b>3,543,201</b>	<b>3,701</b>	<b>4,583</b>	<b>75,683</b>	<b>31,974</b>
<b>Grand Total</b>	<b>194,752,282</b>	<b>2,394,936</b>	<b>25,755</b>	<b>844,872</b>	<b>5,873,779</b>	<b>3,701</b>	<b>4,583</b>	<b>1,208,479</b>	<b>134939.0</b>

## 8.2 Energy Consumption Summary 2005 and 2009

County Operation and Employee Commute Energy Consumption Data									
Energy Consumption Data Summary 2005	kWh	Therms	Gasoline (gals)	Diesel (gals)	E100 (gal)	B100 (gal)	LNG (gals)	Propane (gals)	GHG Emissions (MTCO2)
Buildings and other facilities	93,969,166	1,816,697	0	0	0	0	0	0	35,869
Streetlights and Traffic Signals	31,539,529	0	0	0	0	0	0	0	8,813
Water delivery facilities	19,983,904	0	0	0	0	0	0	0	5,584
Airport Facilities	49,259,683	230,318	0	0	0	0	0	0	14,983
Vehicle Fleet	0	334,954	2,330,578	1,132,796	0	0	844,872	25,755	37,718
Commute	0	12,968	3,543,201	75,683	3,701	4,583	0	0	31,974
<b>Total</b>	<b>194,752,282</b>	<b>2,394,936</b>	<b>5,873,779</b>	<b>1,208,479</b>	<b>3,701</b>	<b>4,583</b>	<b>844,872</b>	<b>25,755</b>	<b>134,939</b>
Energy Consumption Data Summary 2009	kWh	Therms	Gasoline (gals)	Diesel (gals)	E100 (gal)	B100 (gal)	LNG (gals)	Propane (gals)	GHG Emissions (MTCO2)
Buildings and other facilities	109,456,277	1,654,372	0	0	0	0	0	0	39,337
Streetlights and Traffic Signals	25,493,541	0	0	0	0	0	0	0	7,123
Water delivery facilities	21,508,304	0	0	0	0	0	0	0	6,010
Airport Facilities	39,229,845	199,765	0	0	0	0	0	0	12,018
Vehicle Fleet	0	404,251	1,822,799	665,501	0	0	1,257,435	15,279	30,634
Commute	0	10,867	2,981,578	71,449	3,102	3,840	0	0	26,985
<b>Total</b>	<b>195,687,967</b>	<b>2,269,254</b>	<b>4,804,377</b>	<b>736,950</b>	<b>3,102</b>	<b>3,840</b>	<b>1,257,435</b>	<b>15,279</b>	<b>122,107</b>
<b>Increase in Consumption</b>	<b>935,685</b>	<b>-125,682</b>	<b>-1,069,402</b>	<b>-471,529</b>	<b>-600</b>	<b>-742</b>	<b>412,563</b>	<b>-10,476</b>	<b>-12,832</b>

### 8.3 General Inputs and Assumptions

General Inputs					
Sacramento County Internal Operations		Baseline year:	2005	Results Year	2020
Metric of Analysis	Values Used in Analysis	Year	Power Mix Emissions Coefficient	Gasoline Emissions Coefficient	Diesel Emissions Coefficient
Term of Analysis (yrs)	25	1990	0.616	19.356	22.509
Term of Financing (yrs)	10	1991	0.616	19.356	22.509
Discount Rate (nominal)	6.48%	1992	0.616	19.356	22.509
MIRR Reinvestment Interest Rate (%)	10.00%	1993	0.616	19.356	22.509
kWh Energy Cost Escalation Rate	3.50%	1994	0.616	19.356	22.509
Nat Gas Energy Cost Escalation Rate	2.32%	1995	0.616	19.356	22.509
Vehicle Fuel Cost Inflation Rate	8.00%	1996	0.616	19.356	22.509
Interest Rate	3.95%	1997	0.616	19.356	22.509
Inflation Rate (CPI)	3.48%	1998	0.616	19.356	22.509
Term of MIRR and NPV	10	1999	0.616	19.356	22.509
		2000	0.616	19.356	22.509
		2001	0.616	19.356	22.509
		2002	0.616	19.356	22.509
		2003	0.616	19.356	22.509
		2004	0.616	19.356	22.509
		2005	0.616	19.356	22.509
		2006	0.616	19.356	22.509
		2007	0.616	19.356	22.509
		2008	0.616	19.356	22.509
		2009	0.616	19.356	22.509
		2010	0.616	19.356	22.509
		2011	0.605	19.308	22.453
		2012	0.595	19.260	22.396
		2013	0.584	19.163	22.284
		2014	0.574	19.066	22.171
		2015	0.564	18.872	21.946
		2016	0.555	18.679	21.721
		2017	0.545	18.389	21.384
		2018	0.535	18.098	21.046
		2019	0.526	17.808	20.708
		2020	0.517	17.421	20.258
		Energy Cost Basis			
		Energy Price Base Year	2010	Unit	BTU/unit
		Electricity (\$/kWh)	0.116	kWh	3,413
		Natural Gas (\$/therm)	0.716	Therm	100,000
		Gasoline (\$/gal)	3.050	Gallon	125,000
		Diesel (\$/gal)	3.050	Gallon	138,690
		Biodiesel (\$/gal)	3.355	Gallon	130,000
		\$/Therm CNG Vehicles	0.570	Therm	100,000
		\$/kWh Electric Vehicles	0.116	kWh	3,413
		Ethanol (\$/gal)	3.660	Gallon	84,400
		LNG (\$/gal)	1.270	Gallon	95,475
		Propane (\$/gal)	0.716	Gallon	91,600
Other					
PPA Initial % Increase over Utility kWh	-22.97%				
PPA Energy Cost Escalation Rate	0.00%				
Equivalent Passenger Cars Annual GHG Reduction Percentage	5.48				
Job Creation: Jobs/\$1m	15%				
Conversion to tons (lbs/metric ton)	10.87				
	2204.60				

## **8.4 Measure Specific Input Values**

The inputs used for each measure are provided in the following tables. Most of the measures use the default (general) assumptions listed in Attachment 8.3 above. The values listed below are drawn directly from the measure analysis portions of the analysis and therefore serve as the best source for input verification. Note: there will be variation in the emissions factors for each of the measures. The value provided in these tables is dependent on the year of implementation (due to the Renewables Portfolio Standard). This value changes in each year that the measure is active based on the RPS values provided by the Sacramento Municipal Utility District (SMUD).

**Tables Begin on the Following Page**

Measure Name	Water Audits and Implementation of Conservation Measures at County Institutions	Efficient Toilet-Flushing Systems: Main Jail	Landscape Audit and Installation of River-Friendly Landscaping at County Buildings	Rehabilitate groundwater wells with energy efficient pumps and motors	Use of the Most Efficient Water Production Sources
Measure Number	1	2	3	4	5
Implementation Date	2012	2014	2014	2014	2014
Status	Future	Future	Future	Future	Future
Financed	no	yes	no	no	no
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	10	10	10	10	10
Discount Rate	6.48%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.48%	3.48%	3.48%	3.48%	3.48%
Interest Rate	3.95%	3.95%	3.95%	3.95%	3.95%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	2.32%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$0.700	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.106	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$3.389	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$0.663	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	no
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.086	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.595	0.574	0.574	0.574	0.574
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.595	0.574	0.574	0.574	0.574
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 14: Measure Inputs (1-5)

Measure Name	Increased Rate of Replacement of SCAS Standard Vehicles with Electric Units	Energy-Efficient Taxiway Lighting	Energy-efficient Lighting at Sacramento International Airport Parking Garage	HVAC System Efficiency Upgrades	Water Heater Replacement: Main Jail
Measure Number	6	7	8	9	10
Implementation Date	2014	2014	2014	2014	2014
Status	Future	Future	Future	Future	future
Financed	no	no	no	no	yes
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	10	10	10	10	10
Discount Rate	6.48%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.48%	3.48%	3.48%	3.48%	3.48%
Interest Rate	3.95%	3.95%	3.95%	3.95%	3.95%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	2.32%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$0.700	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.106	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$3.389	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$0.663	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	no
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.086	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.574	0.574	0.574	0.574	0.574
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.574	0.574	0.574	0.574	0.574
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 15: Measure Inputs (6-10)



Measure Name	Energy Efficiency Retrofits: Rio Consumnes Correctional Center (RCCC)	Laundry System Efficiency Upgrades: Rio Consumnes Correctional Center (RCCC)	Chiller Efficiency Improvement: Juvenile Hall Central Plant	Improved HVAC Controls: Coroner's Building	Laundry System Efficiency Upgrades: Main Jail
Measure Number	11	12	13	14	15
Implementation Date	2012	2014	2014	2014	2014
Status	Future	Future	Future	Future	Future
Financed	yes	yes	yes	yes	yes
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	10	10	10	10	10
Discount Rate	6.48%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.48%	3.48%	3.48%	3.48%	3.48%
Interest Rate	3.95%	3.95%	3.95%	3.95%	3.95%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	2.32%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$0.700	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.106	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$3.389	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$0.663	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	no
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.086	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.574	0.574	0.574	0.574	0.574
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.574	0.574	0.574	0.574	0.574
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 16: Measure Inputs (11-15)

Measure Name	Efficient Lighting Retrofit: Main Jail	Utility Power Surge (UPS) Retrofit: County Dept of Technology Building	Chiller Plant Waterside Economizer: County Dept of Technology Building	Chiller Plant Smart Controls: County Dept of Technology Building	Chiller Plant Pump Efficiency Upgrade: County Dept of Technology Building
Measure Number	16	17	18	19	20
Implementation Date	2014	2014	2014	2014	2014
Status	Future	Future	Future	Future	Future
Financed	yes	yes	yes	yes	yes
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	10	10	10	10	10
Discount Rate	6.48%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.48%	3.48%	3.48%	3.48%	3.48%
Interest Rate	3.95%	3.95%	3.95%	3.95%	3.95%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	2.32%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$0.700	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.106	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$3.389	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$0.663	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	no
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.086	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.574	0.574	0.574	0.574	0.574
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.574	0.574	0.574	0.574	0.574
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 17: Measure Inputs (16-20)

Measure Name	Energy-Conserving Duct Isolation Dampers: County Dept. of Technology Building	Turning off Computer Monitors at Night	Installation of High-Efficiency Toilets at County Offices	Large Turf Landscape Irrigation Audits at County Facilities	Replacement of Water Wasting Equipment Related to County Operations
Measure Number	21	22	23	24	25
Implementation Date	2014	2014	2012	2014	2014
Status	Future	Future	Future	Future	Future
Financed	yes	no	yes	no	no
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	10	10	10	10	10
Discount Rate	6.48%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.48%	3.48%	3.48%	3.48%	3.48%
Interest Rate	3.95%	3.95%	3.95%	3.95%	3.95%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	2.32%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$0.700	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.106	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$3.389	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$0.663	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	no
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.086	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.574	0.574	0.595	0.574	0.574
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.574	0.574	0.595	0.574	0.574
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 18: Measure Inputs (21-25)

Measure Name	Water Boosted System Replacement: Main Jail	HVAC Efficiency Modifications: New Administration Building	Countywide Streetlight Conversion Project (HPS & MV to LED)	Green Building Policy for Leased County Buildings	Fleet Replacement 1
Measure Number	26	27	28	29	30
Implementation Date	2014	2014	2014	2014	2014
Status	Future	Future	Future	Future	Future
Financed	yes	yes	no	no	yes
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	10	10	10	10	4
Discount Rate	6.48%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.48%	3.48%	3.48%	3.48%	3.48%
Interest Rate	3.95%	3.95%	3.95%	3.95%	0.00%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	2.32%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$0.700	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.106	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$3.389	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$0.663	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	no
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.086	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.574	0.574	0.574	0.574	0.574
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.574	0.574	0.574	0.574	0.574
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 19: Measure Inputs (26-30)

Measure Name	Fleet Replacement 2	Fleet Replacement 3	Fleet Replacement 4	Fleet Replacement 5	Solar Power (PV) Option 1
Measure Number	31	32	33	34	35
Implementation Date	2014	2014	2014	2014	2014
Status	Future	Future	Future	Future	Future
Financed	yes	yes	yes	yes	no
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	4	4	4	4	10
Discount Rate	6.48%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.48%	3.48%	3.48%	3.48%	3.48%
Interest Rate	0.00%	0.00%	0.00%	0.00%	3.95%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	2.32%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$0.700	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.106	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$3.389	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$0.663	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	yes
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.086	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.574	0.574	0.574	0.574	0.574
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.574	0.574	0.574	0.574	0.574
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 20: Measure Inputs (31-35)

Measure Name	Solar Power (PV) Option 2	Solar Power (PV) Option 4	Solar Power (PV) Option 5	Countywide Streetlight Conversion Project (MV to LED)	Cogeneration Facility for Terminal B- Sacramento International Airport
Measure Number	36	37	38	39	40
Implementation Date	2012	2014	2014	2011	2011
Status	Future	Future	Future	completed	completed
Financed	yes	yes	yes	no	no
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	10	10	10	10	10
Discount Rate	6.48%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.48%	3.48%	3.48%	3.48%	3.48%
Interest Rate	3.95%	3.95%	3.95%	3.95%	3.95%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	2.32%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$0.700	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.106	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$3.389	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$0.663	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	no
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.086	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.595	0.574	0.574	0.605	0.605
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.595	0.574	0.574	0.605	0.605
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 21: Measure Inputs (36-40)

Measure Name	Energy Efficiency Retrofits: Gibson Ranch Park	Energy Efficiency Upgrades: (J. Harvie Community Center & Caretaker House	Energy Audits and Improvements using Financial Incentive Revolving Fund	Traffic Signal System Upgrade (Energy Efficient LED Bulbs)	Replacement of CRT Monitors with Energy Efficient Flat Panel Monitors
Measure Number	41	42	43	44	45
Implementation Date	2011	2011	2011	2010	2010
Status	completed	completed	completed	completed	completed
Financed	no	no	no	no	no
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	10	10	10	10	10
Discount Rate	5.00%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.00%	3.48%	3.48%	3.48%	3.48%
Interest Rate	3.95%	3.95%	3.95%	3.95%	3.95%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	3.50%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.107	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$1.000	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$3.080	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$3.080	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.388	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$4.000	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$1.000	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.107	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	no
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.082	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.605	0.605	0.605	0.616	0.616
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.605	0.605	0.605	0.616	0.616
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 22: Measure Inputs (41-45)



Measure Name	Green building features in new Central Terminal B at Sacramento International Airport	Terminal B Underground Hydrant Fueling - Sacramento International Airport	Fixed Base Water Meter Reading System (Pilot Study)	Routing Efficiencies for Waste Collection Trucks	Reduce Landside Lighting at Sacramento International Airport
Measure Number	46	47	48	49	50
Implementation Date	2011	2011	2010	2010	2010
Status	completed	completed	completed	completed	completed
Financed	no	no	no	no	no
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	10	10	10	10	10
Discount Rate	6.48%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.48%	3.48%	3.48%	3.48%	3.48%
Interest Rate	3.95%	3.95%	3.95%	3.95%	3.95%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	2.32%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$0.700	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.106	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$3.389	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$0.663	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	no
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.086	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.605	0.605	0.616	0.616	0.616
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.605	0.605	0.616	0.616	0.616
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 23: Measure Inputs (46-50)

Measure Name	Reduce Interior Lighting at Terminal A (Sacramento International Airport)	Energy efficiency Retrofit at Airport Terminal A Cooling Towers	Energy efficient HVAC Management Systems for TA Central Utilities Plant	Energy Efficiency Improvement for Air Handlers at SCAS Facilities	Shutting off Airport Escalators after hours
Measure Number	51	52	53	54	55
Implementation Date	2010	2010	2010	2010	2011
Status	completed	completed	completed	completed	completed
Financed	no	no	no	no	no
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	10	10	10	10	10
Discount Rate	6.48%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.48%	3.48%	3.48%	3.48%	3.48%
Interest Rate	3.95%	3.95%	3.95%	3.95%	3.95%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	2.32%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$0.700	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.106	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$3.389	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$0.663	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	no
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.086	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.616	0.616	0.616	0.616	0.605
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.616	0.616	0.616	0.616	0.605
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 24: Measure Inputs (51-55)

Measure Name	Sheriff Administration Building Cooling Source Replacement	Shutting off Computer Monitors at Night	Improved Landscape Maintenance Efficiencies at SCAS Facilities: Larger Mowers	Improved Landscape Maintenance at SCAS Facilities: Swather Mowers	Energy Efficient Improvements to Mechanical Systems: Mental Health Treatment Center
Measure Number	56	57	58	59	60
Implementation Date	2010	2010	2010	2010	2010
Status	completed	completed	completed	completed	completed
Financed	no	no	no	no	no
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	10	10	10	10	10
Discount Rate	6.48%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.48%	3.48%	3.48%	3.48%	3.48%
Interest Rate	3.95%	3.95%	3.95%	3.95%	3.95%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	2.32%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$0.700	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.106	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$3.389	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$0.663	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	no
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.086	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.616	0.616	0.616	0.616	0.616
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.616	0.616	0.616	0.616	0.616
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 25: Measure Inputs (56-60)

Measure Name	Energy Efficient Upgrades: John Price District Attorney Building	County Administration Building Central Plant Improvements	Energy Efficient Improvements to Lighting and Mechanical Systems: Building Inspection Facility	Server Virtualization Effort	Solar Power (Photovoltaic, PV) Option 3
Measure Number	61	62	63	64	65
Implementation Date	2011	2011	2010	2012	2011
Status	completed	completed	completed	completed	completed
Financed	no	no	no	no	no
Term of Analysis (yrs)	25	25	25	25	25
Term of Financing (yrs)	10	10	10	10	10
Discount Rate	6.48%	6.48%	6.48%	6.48%	6.48%
MIRR Reinvestment Interest Rate (%)	10.00%	10.00%	10.00%	10.00%	10.00%
Inflation Rate	3.48%	3.48%	3.48%	3.48%	3.48%
Interest Rate	3.95%	3.95%	3.95%	3.95%	3.95%
Exclude "Completed" \$\$\$ Cost&Benefit	yes	yes	yes	yes	yes
Term of MIRR and NPV	10	10	10	10	10
kWh Energy Cost Escalation Rate	3.50%	3.50%	3.50%	3.50%	3.50%
Nat Gas Energy Cost Escalation Rate	2.32%	2.32%	2.32%	2.32%	2.32%
Vehicle Fuel Cost Escalation Rate	8.00%	8.00%	8.00%	8.00%	8.00%
Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Energy Cost (\$/Therm)	\$0.700	\$0.700	\$0.700	\$0.700	\$0.700
Gasoline Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
Diesel Energy Cost (\$/Gal)	\$2.824	\$2.824	\$2.824	\$2.824	\$2.824
BioDiesel Energy Cost (\$/Gal)	\$3.106	\$3.106	\$3.106	\$3.106	\$3.106
Ethanol Energy Cost (\$/equiv Gal)	\$3.389	\$3.389	\$3.389	\$3.389	\$3.389
CNG Vehicle Energy Cost (\$/Therm)	\$0.663	\$0.663	\$0.663	\$0.663	\$0.663
Electric Vehicle Energy Cost (\$/kWh)	\$0.112	\$0.112	\$0.112	\$0.112	\$0.112
Utilizing PPA Financing (no cap or O&M cost)	no	no	no	no	yes
PPA Initial % Increase over Utility kWh	-22.97%	-22.97%	-22.97%	-22.97%	-22.97%
PPA Initial Cost of Energy	\$0.086	\$0.086	\$0.086	\$0.086	\$0.086
PPA Energy Cost Escalation Rate	0	0	0	0	0
Electricity (#CO2/kWh )	0.605	0.605	0.616	0.595	0.605
Natural Gas (# CO2/Therm)	11.665	11.665	11.665	11.665	11.665
Gasoline (#CO2/gal)	19.356	19.356	19.356	19.356	19.356
Diesel (#CO2/gal)	22.509	22.509	22.509	22.509	22.509
BioDiesel (#CO2/gal)	1.025	1.025	1.025	1.025	1.025
Ethanol (#CO2/gal)	12.232	12.232	12.232	12.232	12.232
CNG (#CO2/therm)	11.665	11.665	11.665	11.665	11.665
Fleet Elect (#CO2/kWh)	0.605	0.605	0.616	0.595	0.605
Propane (#/gal)	12.324	12.324	12.324	12.324	12.324

Table 26: Measure Inputs (61-65)

## 8.5 Vehicle Lists

Sacramento County Fleet List (3225 total units)														
Current Fleet Count			Current Fleet Count			Current Fleet Count			Current Fleet Count			Current Fleet Count		
Model	Count	MPG	Model	Count	MPG	Model	Count	MPG	Model	Count	MPG	Model	Count	MPG
CROWN VIC	437	16.1	EXPLORER	6	17.1	UTILIMASTER	2	9.8	2554 6X4	1	5.6	621B	1	1.0
MALIBU	165	22.8	RAM 1500	5	18.5	CIVIC CNG	2	25.5	8570	1	1.0	MR6885	1	5.6
PRIUS	146	45.8	WFT	5	1.0	1070	2	1.0	FORD	1	18.5	621C	1	1.0
IMPALA	144	21.7	FS181	5	1.0	640	2	1.0	5325	1	1.0	3-HORSE	1	1.0
SILVERADO	135	17.2	330	5	5.6	TD-40T(5+24)	2	1.0	FP60PS168	1	1.0	DCA-125 SSK	1	1.0
DAKOTA	101	18.5	CH600	5	5.6	C2500	2	17.4	RJ350	1	1.0	MT5T	1	1.0
none	91	1.8	CHARGER	5	16.0	D9T	2	1.0	B2500	1	14.5	TC4500	1	5.6
320	76	1.6	FREESTAR	5	19.7	MAGNUM	2	11.9	RT80	1	1.0	MT835B	1	1.0
COLORADO	66	18.5	5000#	5	1.0	ESCAPE HYBRI	2	28.0	FREESTYLE	1	19.7	6E6P	1	1.0
RAM 2500	64	18.1	FL112	5	5.6	450C	2	1.0	545-B	1	1.0	3L40C	1	1.0
FUSION	63	22.1	FL80	5	5.6	ESCORT	2	25.5	B252-3	1	1.0	TILT-DECK	1	1.0
MAXIMA	61	22.7	SAVANNAH	4	12.2	420E	2	1.0	SINGLE AXLE	1	1.0	4 HOSE	1	1.0
RANGER	58	18.5	RAM	4	18.5	FT	2	1.0	B32S-5	1	1.0	TK40RB	1	1.0
CARAVAN	53	19.7	P300	4	1.0	C30	2	7.4	SPECIAL	1	1.0	MX2000	1	1.0
LUMINA	48	22.8	WINDSTAR	4	19.7	D-20T	2	1.0	751	1	1.0	7400	1	5.6
TRAILER	46	1.0	4400	4	5.6	2500	2	18.4	D3G LGP	1	1.0	C7H042	1	1.0
FOCUS	44	25.5	ECONOLINE	4	13.1	D9R	2	1.0	G2	1	1.0	TRA/REM	1	1.0
F250	42	18.4	SIERRA	4	18.5	763	2	1.0	T6A3-F4L	1	1.0	965	1	1.0
CONDOR	39	1.6	45-RTSSF	4	1.0	TIG50	2	1.0	425	1	1.0	7FGU32	1	1.0
EXPEDITION	34	16.8	4400 SBA 4X2	4	5.6	DX 100	2	1.0	TARGET	1	1.0	4640	1	1.0
UPLANDER	34	19.7	C5500	4	6.6	TR 56	2	1.0	G3500	1	12.2	TRL/EASEMENT	1	1.0
TAURUS	33	22.8	CIVIC	4	22.8	SONOMA	2	18.5	TC7H064	1	5.6	973	1	1.0
E350	33	12.2	FOCUS WAGON	4	23.9	DOZER	2	1.0	BB900	1	1.0	TS175B	1	1.0
DIESEL OFFRD	32	1.0	ROLLOFF	4	1.0	CB224D	2	1.0	TITAN	1	9.7	P-300	1	1.0
4700	31	5.5	CAMRY	4	22.8	TUNDRA	2	18.5	257B	1	1.0	TT240	1	1.0
F350	31	8.1	SC8000	4	5.6	SS125DC	2	1.0	7520	1	1.0	P375A	1	1.0
AVEO	30	25.5	MAPHIS	4	1.0	7300	2	5.6	HL-3450	1	1.0	TV 140	1	1.0
S10	27	18.5	255XP	4	1.0	W4500	2	4.1	WOODSMAN	1	1.0	PA12A60BBF6L	1	1.0
R1200RT-P	27	40.0	WA200-6	4	1.0	VC-400	2	1.0	HL760XTD-7	1	1.0	826C	1	1.0
NEON	26	25.4	ODYSSEY	4	19.7	A3RE 3904	2	3.6	TS60	1	1.0	PC3	1	1.0
E250	26	12.2	T440	3	5.6	IT38G	2	1.0	HOWARD	1	1.0	UT610	1	1.0
EXPRESS	23	12.2	ACCORD	3	22.8	836G	2	1.0	UNK	1	1.0	PICKUP	1	1.0
GRAND PRIX	22	22.8	BE2500	3	18.4	WA380-6	2	1.0	HUMM-VEE	1	7.4	UTILITMASTER	1	1.0
F450	21	7.3	LT7501	3	5.6	6X4	2	3.3	EDGE	1	16.8	PM	1	1.0
TAHOE	20	16.8	SP2WP	3	1.0	2 HORSE	2	1.0	2630ES	1	1.0	VACHUNTER	1	1.0
SAFARI	20	19.7	AWD	3	1.0	2574	2	5.6	VANDURA	1	12.2	4821	1	5.6
F150	20	18.5	6320	3	1.0	XL4100	2	1.0	BM A 30C	1	5.6	ENDURO	1	1.0
45A96W	19	1.0	2347	3	1.0	WORKHORSE	2	5.6	W120F	1	5.6	4300SBA 4X2	1	5.6
PRIZM	19	25.5	ATSLT45	3	1.0	TL 234	1	1.0	950	1	1.0	VT500	1	1.0
AVENGER	17	22.8	F150 4X4	3	18.4	277	1	1.0	836H	1	1.0	PTTDM2	1	1.0
UNKNOWN	17	1.3	H60XM	3	1.0	8560	1	1.0	J26X84TR	1	1.0	W14C	1	1.0
CABOVER	14	1.5	MIRAGE	3	1.0	966G	1	1.0	9430T	1	1.0	275	1	1.0
C6500	13	5.6	580	3	1.0	D65EX-15	1	1.0	JOHN DEERE	1	1.0	8012	1	1.0
F250 4X4	13	18.4	MT55	3	9.8	30410	1	1.0	440D	1	1.0	R3-80	1	1.0
ASTRO	12	19.7	D3C	3	1.0	831F2	1	1.0	K2500	1	18.4	872D	1	1.0
FL70	11	5.6	730	3	5.6	60015	1	1.0	446B	1	1.0	CCTV	1	1.0
E150	11	12.2	6330	3	1.0	CHEYENNE	1	1.0	LC068084SR	1	1.5	WD-160	1	1.0
185	10	1.0	WALKING FLOO	3	1.0	F2674	1	5.6	CHEROKEE	1	16.8	CD150	1	1.0
DURANGO	10	16.9	7400SBA	3	4.1	570A	1	1.0	LCT 651	1	1.0	E-ZPOUR	1	1.0
C7500	10	5.8	VIBE	3	23.9	ALERO	1	16.0	RITE	1	1.0	CGP35	1	1.0
TAURUS WAGON	10	23.9	950H	3	1.0	623G	1	1.0	3050TM	1	1.0	CH35	1	1.0
CIVIC HYBRID	9	43.7	C3500	3	14.0	F350 4X4	1	7.4	RJ550	1	1.0	E450	1	9.8
STRATUS	9	22.8	BUILTRITE	3	1.0	TRX300	1	1.0	308D	1	1.0	WX42	1	5.6
B3500	9	12.2	3500	3	7.4	1320-16	1	1.0	RT422	1	1.0	E820	1	1.0
RAM 3500	8	10.4	1500	3	16.4	ESCAPE	1	16.8	311C	1	1.0	110	1	1.0
914G	8	1.0	2574 6X4	3	5.6	1810B	1	1.0	S.M.	1	1.0	EAGLE	1	5.6
RAM BR2500	8	18.4	ST-4825	3	1.0	RAM BE1500	1	18.4	C	1	5.6			
BLUEBIRD	8	5.3	4060MMH	3	1.0	F550 4X4	1	5.6	601	1	1.0			
SUBURBAN	7	17.0	T350 LIFT	3	1.0	5900	1	1.0	M-9D	1	5.6			
TRAILBLAZER	7	16.8	BB385	3	2.6	F650	1	5.6	570 MXT	1	1.0			
4900	7	5.6	T8500	3	5.6	CONVEYOR	1	1.0	C1070	1	1.0			
4300 SBA 4X2	7	4.3	4200	3	7.4	F750	1	5.6	CORSICA	1	25.5			
7400 SBA 6X4	6	5.6	TR 40LP	3	1.0	D25S-3	1	1.0	320DL	1	1.0			
CAVALIER	6	25.5	BUS	3	5.9	F7B42	1	5.6	SLT8-30324E	1	1.0			
INTREPID	6	21.1	600	3	4.1	TA35	1	5.6	3246ES	1	1.0			
MTT-10	6	1.0	RAM B3500	3	12.2	F800	1	5.6	CV818T	1	1.0			
RAM VAN	6	12.2	250	3	1.0	335	1	5.6	325-D	1	1.0			
BR2500	6	18.4	RAM BR1500	3	18.5	350	1	1.0	5GH9-010	1	1.0			
BR1500	6	18.5	MUSTANG	3	22.8	740C	1	1.0	MELTER	1	1.0			
C4500	6	7.1	TRI-PLANE	2	1.0	AUTRON	1	1.0	6 HOSE	1	1.0			
1652	6	6.9	G25E-3	2	1.0	WORKSTAR	1	5.6	MG747	1	1.0			
4300 SBA	6	4.1	300C	2	22.8	2510 ATV	1	1.0	SURPLUS	1	1.0			
C8500	6	5.6	LESABRE	2	16.0	UTS230	1	1.0	37GSST	1	1.0			
ATALT45	6	1.0	CH75	2	1.0	254XP	1	1.0	6 X 4	1	5.6			
F550	6	6.6	LNG TRUCK	2	1.5	W156Y	1	1.0	MPG	1	5.6			

## 8.6 Vehicle Energy Cost Reduction Strategies

**Scenario 1:** Vehicle replacement methodology:

- Only vehicles older than model year 2005
- No vehicles from Sheriff Department

Vehicle Replacement Scenario 1 (328 units affected)					
Count	Current	Replacement	Fuel	Miles per Gallon	Incremental Cost
26	Neon	Hybrid Compact Rpc Neon	Gasoline	50.00	\$10,000
114	MALIBU	Hybrid Compact Rpc Malibu & Impala	Gasoline	50.00	\$6,000
77	IMPALA	Hybrid Compact Rpc Malibu & Impala	Gasoline	50.00	\$6,000
0	Fusion	Hybrid Mid Sedan Rpc Taurus & Fusion	Gasoline	39.00	\$6,000
0	Maxima	Hybrid Mid Sedan Rpc Maxima & Lumina	Gasoline	39.00	\$4,000
47	Lumina	Hybrid Mid Sedan Rpc Maxima & Lumina	Gasoline	39.00	\$4,000
9	Focus	Hybrid Mid Sedan Rpc Focus	Gasoline	39.00	\$10,000
31	Taurus	Hybrid Mid Sedan Rpc Taurus & Fusion	Gasoline	39.00	\$6,000
24	CROWN VIC	Midsized Sedan Impala Rplc Crn Vic	Gasoline	19.00	\$0

**Scenario 2:** Vehicle replacement methodology and county staff notes:

- Only vehicles older than model year 2005
- Includes CNG trucks
- No vehicles from Sheriff Department
- Hybrid Pickup incremental cost based on 3/4 ton 2011

Vehicle Replacement Scenario 2 (552 units affected)					
Count	Current	Replacement	Fuel	Miles per Gallon	Incremental Cost
26	Neon	Hybrid Compact Rpc Neon	Gasoline	50.00	\$10,000
114	MALIBU	Hybrid Compact Rpc Malibu & Impala	Gasoline	50.00	\$6,000
77	IMPALA	Hybrid Compact Rpc Malibu & Impala	Gasoline	50.00	\$6,000
0	Fusion	Hybrid Mid Sedan Rpc Taurus & Fusion	Gasoline	39.00	\$6,000
0	Maxima	Hybrid Mid Sedan Rpc Maxima & Lumina	Gasoline	39.00	\$4,000
47	Lumina	Hybrid Mid Sedan Rpc Maxima & Lumina	Gasoline	39.00	\$4,000
9	Focus	Hybrid Mid Sedan Rpc Focus	Gasoline	39.00	\$10,000
31	Taurus	Hybrid Mid Sedan Rpc Taurus & Fusion	Gasoline	39.00	\$6,000
24	CROWN VIC	Midsized Sedan Impala Rplc Crn Vic	Gasoline	19.00	\$0
37	SILVERADO	Hybrid Pickup Rplc Silverado, Dakota, Colorado	Gasoline	21.00	\$13,500
85	DAKOTA	Hybrid Pickup Rplc Silverado, Dakota, Colorado	Gasoline	21.00	\$13,500
0	Colorado	Hybrid Pickup Rplc Silverado, Dakota, Colorado	Gasoline	21.00	\$13,500
35	Ram 2500	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
19	Ranger	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
8	F250	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
25	S10	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
7	F350	Large Truck CNG (F350)	CNG	5.84	\$9,500
8	F450	Large Truck CNG (F450)	CNG	5.27	\$9,500



**Scenario 3:** Vehicle replacement methodology and county staff notes:

- Only vehicles older than model year 2008
- Includes CNG trucks
- No vehicles from Sheriff Department
- Hybrid Pickup incremental cost based on 3/4 ton 2011

Vehicle Replacement Scenario 3 (839 units affected)					
Count	Current	Replacement	Fuel	Miles per Gallon	Incremental Cost
26	Neon	Hybrid Compact Rpc Neon	Gasoline	50.00	\$10,000
114	MALIBU	Hybrid Compact Rpc Malibu & Impala	Gasoline	50.00	\$6,000
86	IMPALA	Hybrid Compact Rpc Malibu & Impala	Gasoline	50.00	\$6,000
17	Fusion	Hybrid Mid Sedan Rpc Taurus & Fusion	Gasoline	39.00	\$6,000
20	Maxima	Hybrid Mid Sedan Rpc Maxima & Lumina	Gasoline	39.00	\$4,000
47	Lumina	Hybrid Mid Sedan Rpc Maxima & Lumina	Gasoline	39.00	\$4,000
44	Focus	Hybrid Mid Sedan Rpc Focus	Gasoline	39.00	\$10,000
31	Taurus	Hybrid Mid Sedan Rpc Taurus & Fusion	Gasoline	39.00	\$6,000
73	CROWN VIC	Midsized Sedan Impala Rplc Crn Vic	Gasoline	19.00	\$0
102	SILVERADO	Hybrid Pickup Rplc Silverado, Dakota, Colorado	Gasoline	21.00	\$13,500
99	DAKOTA	Hybrid Pickup Rplc Silverado, Dakota, Colorado	Gasoline	21.00	\$13,500
17	Colorado	Hybrid Pickup Rplc Silverado, Dakota, Colorado	Gasoline	21.00	\$13,500
50	Ram 2500	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
42	Ranger	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
18	F250	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
26	S10	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
13	F350	Large Truck CNG (F350)	CNG	5.84	\$9,500
14	F450	Large Truck CNG (F450)	CNG	5.27	\$9,500

**Scenario 4:** Vehicle replacement methodology and county staff notes:

- Only vehicles older than model year 2008
- Includes CNG trucks
- Includes vehicles from Sheriff Department
- Hybrid Pickup incremental cost based on 3/4 ton 2011

<b>Vehicle Replacement Scenario 4 (1,237 units affected)</b>					
Count	Current	Replacement	Fuel	Miles per Gallon	Incremental Cost
26	Neon	Hybrid Compact Rpc Neon	Gasoline	50.00	\$10,000
115	MALIBU	Hybrid Compact Rpc Malibu & Impala	Gasoline	50.00	\$6,000
115	IMPALA	Hybrid Compact Rpc Malibu & Impala	Gasoline	50.00	\$6,000
37	Fusion	Hybrid Mid Sedan Rpc Taurus & Fusion	Gasoline	39.00	\$6,000
61	Maxima	Hybrid Mid Sedan Rpc Maxima & Lumina	Gasoline	39.00	\$4,000
48	Lumina	Hybrid Mid Sedan Rpc Maxima & Lumina	Gasoline	39.00	\$4,000
44	Focus	Hybrid Mid Sedan Rpc Focus	Gasoline	39.00	\$10,000
33	Taurus	Hybrid Mid Sedan Rpc Taurus & Fusion	Gasoline	39.00	\$6,000
337	CROWN VIC	Midsized Sedan Impala Rplc Crm Vic	Gasoline	19.00	\$0
114	SILVERADO	Hybrid Pickup Rplc Silverado, Dakota, Colorado	Gasoline	21.00	\$13,500
101	DAKOTA	Hybrid Pickup Rplc Silverado, Dakota, Colorado	Gasoline	21.00	\$13,500
17	Colorado	Hybrid Pickup Rplc Silverado, Dakota, Colorado	Gasoline	21.00	\$13,500
62	Ram 2500	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
51	Ranger	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
21	F250	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
27	S10	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
14	F350	Large Truck CNG (F350)	CNG	5.84	\$9,500
14	F450	Large Truck CNG (F450)	CNG	5.27	\$9,500

**Scenario 5:** Vehicle replacement methodology and county staff notes:

- Only vehicles older than model year 2008
- Includes CNG trucks
- Includes vehicles from Sheriff Department
- Hybrid Pickup incremental cost based on 3/4 ton 2011

Vehicle Replacement Scenario 5 (1,250 units affected)					
Count	Current	Replacement	Fuel	Miles per Gallon	Incremental Cost
26	Neon	Hybrid Compact Rpc Neon	Gasoline	50.00	\$10,000
115	MALIBU	Hybrid Compact Rpc Malibu & Impala	Gasoline	50.00	\$6,000
115	IMPALA	Hybrid Compact Rpc Malibu & Impala	Gasoline	50.00	\$6,000
37	Fusion	Hybrid Mid Sedan Rpc Taurus & Fusion	Gasoline	39.00	\$6,000
61	Maxima	Hybrid Mid Sedan Rpc Maxima & Lumina	Gasoline	39.00	\$4,000
48	Lumina	Hybrid Mid Sedan Rpc Maxima & Lumina	Gasoline	39.00	\$4,000
44	Focus	Hybrid Mid Sedan Rpc Focus	Gasoline	39.00	\$10,000
33	Taurus	Hybrid Mid Sedan Rpc Taurus & Fusion	Gasoline	39.00	\$6,000
337	CROWN VIC	Midsize Sedan Impala Rplc Cn Vic	Gasoline	19.00	\$0
114	SILVERADO	Hybrid Pickup Rplc Silverado, Dakota, Colorado	Gasoline	21.00	\$13,500
101	DAKOTA	Hybrid Pickup Rplc Silverado, Dakota, Colorado	Gasoline	21.00	\$13,500
17	Colorado	Hybrid Pickup Rplc Silverado, Dakota, Colorado	Gasoline	21.00	\$13,500
62	Ram 2500	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
51	Ranger	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
21	F250	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
27	S10	Hybrid Pickup Rplc Ram 2500, Ranger, F250, S10	Gasoline	21.00	\$13,500
14	F350	Large Truck CNG (F350)	CNG	5.84	\$9,500
14	F450	Large Truck CNG (F450)	CNG	5.27	\$9,500
4	DURANGO	Small SUV Hybrid Rplc Durango	Gasoline	32.00	\$10,500
9	TAHOE	Large SUV Hybrid Rplc Tahoe	Gasoline	21.00	\$14,500

## 8.7 Evaluation Methodology and Results

The GHG Emission Reduction Action Plans involve more than CO<sub>2</sub>e reduction and cash flow. There are critical concerns that should be factored into the decision making process. These may include the financial metrics to evaluate the worthiness of the investment; the annual energy cost savings realized by implementing the measures; the degree to which the measure resolves existing problems, such as old, high maintenance air conditioning units; the visibility of the measures to the public. Photovoltaic systems are a demonstration of actions taken by the jurisdiction. Other key considerations include the employee impacts of new equipment or procedures, which may alleviate problems experienced by staff; and the impact on the variability of future energy costs and the associated budgetary vulnerability.

The decision to include a measure in the County's Internal Operations Climate Action Plan was based on a comprehensive appraisal of that measure and its impact on the overall cost/benefits of the Action Plan. Each measure was evaluated and scored for the ten metrics listed below. The evaluation methodology, including weights that were assigned to each of the metrics, is described in Attachment 8.7. While the scoring may be imprecise in some situations (subjective criteria), avoiding this step may effectively assign a value of zero to many criteria important to the jurisdiction.<sup>32</sup> It is equally important to note that the scoring of the measures is advisory only and not binding on the ultimate selection of measures for implementation. A relatively low score does not preclude a measure, nor should a high score guarantee inclusion of the measure in the Action Plan.

### Measure Scoring

Each measure is scored by the following evaluation criteria (method of assigning scores discussed in next section):

- 1) Annual Cost Savings: The measures are scored by the magnitude of the annual cost savings in the first year of operation, independent of other considerations. The scoring is quantitative.
- 2) Investment Value: The measures are scored by the Net Present Value (NPV) which is calculated for each measure, based on the investment and the current value of the energy savings over the first 10 years. The scoring is quantitative.
- 3) GHG Reduction: Each measure is scored on its impact on the reduction of GHG emissions (MTCO<sub>2</sub>e) as compared to the other measures under consideration. The scoring is quantitative.
- 4) Job Creation: The investment in energy projects is estimated to create 10.87 jobs per \$1,000,000 of capital cost. The number of jobs created for each measure is scored relative to the median number of jobs created by each of the other measures. This number is based on the value required in the EECBG project application process (2009). The scoring is quantitative.
- 5) Resolution of Maintenance Problems: This metric evaluates how the measure solves existing problems, such as a failing air conditioning system. The replacement of old mechanical units will save maintenance staff time and associated costs. This measure is subjectively evaluated as "yes", "no", "no determination".

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<sup>32</sup> Alternatively, the subjective metrics can be excluded in the analysis by weighting these "0" (weighting methodology described in Attachment 8.7).

- 6) **Energy Cost Stabilization:** Energy cost variability is a concern for all jurisdictions. The price volatility of natural gas and the spike in cost for electricity in 2000-2001 give reason to address this vulnerability. This metric evaluates the impact by measure on long term energy cost volatility. This metric is simplified for comparison by converting all fuel types to their MMBTU<sup>33</sup> equivalence. The MMBTU saved by each measure is compared to the median reduction for all measures to determine its evaluation score. The scoring is quantitative.
- 7) **Implementation Feasibility:** The ability or likelihood of project implementation is evaluated to credit those projects (and associated action plans) that have a clear path to realizing tangible results. This is a subjective determination with the following evaluation options:
  - Problematic: Numerous Barriers
  - Challenging: Some Barriers
  - No Determination
  - Likely if Prioritized: Few Significant Barriers
  - Very Likely: No Barriers
- 8) **Employee Co-benefits:** The additional burden or inconvenience imposed on jurisdiction staff is a consideration for any measure under consideration. This metric evaluates this impact. A photovoltaic system has no impact. A measure expanding staff flexibility would be scored positively. This measure is subjectively evaluated as “yes”, “no”, “no determination”.
- 9) **Community Co-benefits:** The additional benefits to the community are a consideration as well. The improvement of public facilities, lighting or HVAC for example, would result in a favorable score. This measure is subjectively evaluated as “yes”, “no”, “no determination”.
- 10) **Visibility in the Community:** Some measures provide an additional benefit by demonstrating to the general public the actions of the jurisdiction to reduce energy costs. Measures such as Photovoltaic systems are scored high for this criterion. This measure is subjectively evaluated as “yes”, “no”, “no determination”.

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<sup>33</sup> MMBTU = thousand thousand British Thermal Units = 1 million BTUs

### **Scoring Methodologies**

Approach: Include both Objective and Subjective criteria.

- The scoring for all measures is from 0 (min) to 5 (max).
- Benefit accrual only. No negative scores.
- The score for the objective measures (0-5) is based on the median of the measure values being evaluated (cost savings, GHG reduction...).
- The criteria are geometrically scaled to incorporate the broad range of measure values.

#### Objective Criteria:

1. Annual Cost Savings
2. Net Present Value
3. Greenhouse Gas Reduction (MTCO<sub>2</sub>e)
4. Energy Cost Volatility (based on MMBTU saved)
5. Energy Cost

#### Objective Criteria Scoring: 0 to 5 scale:

- Equal to or less than 0 = 0
- 0 to Median Value<sup>34</sup> = 1
- Median Value to 5x Median Value = 2
- 5x Median to 10x Median Value = 3
- 10x Median to 100x Median Value = 4
- Greater than 100x Median Value = 5

#### Subjective Criteria:

1. Resolution of Existing Maintenance Problems -
2. Employee Co-benefits -
3. Community Co-benefits -
4. Community Visibility -
5. Implementation Feasibility -

#### Subjective Scoring Choices

Yes=5, No=0, No Determination =0

Yes=5, No=0, No Determination =0

Yes=5, No=0, No Determination =0

Yes=5, No=0, No Determination =0

Problematic: Numerous Barriers = 0

Challenging: Some Barriers = 0

No Determination = 0

Likely if Prioritized: Few Significant Barriers = 1

Very Likely: No Barriers = 3

Prioritized: No Barriers, Funding Identified = 5

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<sup>34</sup> The median is the middle score with half larger and half smaller.

The various criteria under consideration may not be equal in importance. The evaluation methodology includes the weighting of the various evaluation metrics to emphasize some and de-emphasize others. Table 27 below provides several weighting strategies that may be applied to the measures. For example, “Financial Outcome Favored” evaluation weighting scenario assigns the maximum value of 5 to the Cost Savings and Investment Value metrics while providing a neutral value of 1 for the other metrics. Under this scenario, all criteria are included in the measure scoring, but the results will heavily favor the measures and plans that maximize positive economic outcomes.

Evaluation Criteria and Scoring	Evaluation Criteria Weighting Values									
	Annual Cost Savings	Investment Value (NPV)	GHG Reduction	Job Creation	Resolution of Existing Maintenance Problems	Energy Cost Stabilization	Implementation Feasibility	Employee Co-Benefits	Community Co-Benefits	Community Visibility
Criteria Weighting	5	1	5	5	4	3	3	2	2	1

Table 27: Evaluation Criteria Relative Weighting Strategies

The following tables provide the evaluation scoring strategy for each of the ten metrics.

Cost Savings			Investment Value (NPV)			GHG Reduction			Job Creation		
Criteria Weighting	5		1			5			5		
function	criteria	value	function	criteria	value	function	criteria	value	function	criteria	value
less than	0	0	both less than	0	0	less than	0	0	less than	0	0
Less than	0	0	NPV<	0	0	Less than	0	0	Less than	0	0
Less than	\$20,576	1	NPV<	\$95,315	1	Less than	81	1	Less than	7	1
Less than	\$102,881	2	NPV<	\$476,573	2	Less than	404	2	Less than	35	2
Less than	\$205,761	3	NPV<	\$953,146	3	Less than	807	3	Less than	70	3
Less than	\$2,057,611	4	NPV<	\$9,531,464	4	Less than	8074	4	Less than	696	4
Greater than	\$2,057,611	5	NPV>	\$9,531,464	5	Greater than	8074	5	Greater than	696	5



Resolution of Existing Maintenance Problems			Energy Cost Stabilization			Implementation Feasibility			Employee Co-Benefits			Community Co-Benefits			Community Visibility		
Criteria Weighting	4		3			3			2			2			1		
function	criteria	value	function	criteria	value	function	criteria	value	function	criteria	value	function	criteria	value	function	criteria	value
Yes	Resolves Maintenance Problems	5	less than	0	0	Problematic	Problematic Barriers	0	Yes	Employee Co-Benefits	5	Yes	Community Co-Benefits	5	Yes	Community Visibility	5
No	Resolves Maintenance Problems	0	Less than	0	0	Unlikely	Challenging Barriers	0	No	Employee Co-Benefits	0	No	Community Co-Benefits	0	No	Community Visibility	0
ND	No Determination	0	Less than	1048	1	ND	No Determination	0	ND	No Determination	0	ND	No Determination	0	ND	No Determination	0
			Less than	5242	2	Likely	Likely: Few Significant Barriers	1									
			Less than	10484	3	Very likely	Very Likely: No Barriers, Funding not identified	3									
			Less than	104836	4	Prioritized	Prioritized: No Barriers, Funding Identified	5									
			Greater than	104836	5												

Evaluation Score	Measure Name	No.	Annual CO2e Reduction (tons)	Net Cap Cost	Annual Cost Savings	Simple Payback	IRR	Net Present Value
52	Countywide Streetlight Conversion Project (HPS & MV to LED)	28	1,453	\$6,250,000	\$0	13	NA	\$3,353,200
50	Fleet Replacement 3	32	1,354	\$7,491,500	\$484,800	18	0.3%	(\$4,440,400)
50	Fleet Replacement 4	33	2,147	\$8,507,500	\$741,900	14	3.3%	(\$3,499,800)
50	Fleet Replacement 5	34	2,175	\$8,680,000	\$751,100	14	3.2%	(\$3,618,000)
46	Fleet Replacement 2	31	962	\$4,834,000	\$338,000	14	2.8%	(\$1,815,400)
43	Solar Power (PV) Option 1	35	1,895	\$36,752,843	\$760,000	57	85.6%	\$2,099,000
38	Fleet Replacement 1	30	674	\$1,870,000	\$216,900	10	6.3%	(\$335,800)
36	Solar Power (PV) Option 2	36	361	\$7,002,843	\$144,800	54	-7.7%	(\$6,225,500)
35	Use of the Most Efficient Water Production Sources	5	559	\$0	\$224,200	0	NA	\$0
34	HVAC System Efficiency Upgrades	9	9	\$150,000	\$3,800	47	NA	\$0
33	Water Heater Replacement: Main Jail	10	103	\$1,000,000	\$13,600	87	-14.2%	(\$1,004,300)
33	Chiller Plant Smart Controls: County Dept of Technology Building	19	98	\$500,000	\$39,200	15	2.2%	(\$241,000)
31	Rehabilitate groundwater wells with energy efficient pumps and motors	4	80	\$0	\$32,000	0	NA	\$0
31	Green Building Policy for Leased County Buildings	29	546	\$20,000	\$184,900	0	64.7%	\$1,468,200
30	Energy-efficient Lighting at Sacramento International Airport Parking Garage	8	365	\$940,000	\$146,300	8	NA	\$0
30	Solar Power (PV) Option 4	37	180	\$3,502,843	\$72,400	57	-13.0%	(\$3,681,200)
29	Chiller Efficiency Improvement: Juvenile Hall Central Plant	13	56	\$72,000	\$22,400	4	17.3%	\$100,500
26	Energy Efficiency Retrofits: Rio Consumnes Correctional Center (RCCC)	11	282	\$3,500,000	\$86,100	48	-9.0%	(\$3,205,800)
26	Turning off Computer Monitors at Night (Municipal Services Agency)	22	38	\$0	\$15,100	0	NA	\$121,400
25	Water Boosted System Replacement: Main Jail	26	21	\$500,000	\$8,300	72	-12.5%	(\$490,300)
23	Utility Power Surge (UPS) Retrofit: County Dept of Technology Building	17	92	\$700,000	\$37,000	22	-1.7%	(\$481,900)
23	HVAC Efficiency Modifications: New Administration Building	27	213	\$1,900,000	\$77,000	29	-4.3%	(\$1,496,200)
18	Increased Rate of Replacement of SCAS Standard Vehicles with Electric Ones	6	8	\$1,080	\$2,500	1	NA	\$0
18	Laundry System Efficiency Upgrades: Rio Cosumnes Correctional Center (RCCC)	12	127	\$50,000	\$16,700	4	18.1%	\$78,600
18	Laundry System Efficiency Upgrades: Main Jail	15	142	\$50,000	\$18,700	3	19.5%	\$95,300

Table 28: Measures Ranked by Evaluation Score (top 25 measures)

Evaluation Score	Measure Name	No.	Annual CO2e Reduction (tons)	Net Cap Cost	Annual Cost Savings	Simple Payback	IRR	Net Present Value
18	Solar Power (PV) Option 5	38	36	\$702,843	\$14,500	58	-13.1%	(\$738,800)
15	Efficient Toilet-Flushing Systems: Main Jail	2	2	\$2,500,000	\$900	3,404	-40.5%	(\$2,778,800)
15	Energy-Efficient Taxiway Lighting	7	19	\$370,000	\$7,600	58	NA	\$0
15	Efficient Lighting Retrofit: Main Jail	16	75	\$580,000	\$30,300	23	-1.9%	(\$402,400)
12	Water Audits and Implementation of Conservation Measures at County Institutions	1	1	\$0	\$600	0	NA	\$4,600
12	Landscape Audit and Installation of River-Friendly Landscaping at County Buildings	3	5	\$0	\$1,800	0	NA	\$14,600
12	Chiller Plant Pump Efficiency Upgrade: County Dept of Technology Building	20	28	\$40,000	\$11,200	4	16.1%	\$45,800
12	Energy-Conserving Duct Isolation Dampers: County Dept. of Technology Building	21	13	\$36,000	\$5,000	8	8.3%	\$500
12	Large Turf Landscape Irrigation Audits at County Facilities	24	3	\$0	\$1,300	0	NA	\$10,100
12	Replacement of Water Wasting Equipment Related to County Operations	25	0	\$0	\$0	0	NA	\$200
12	Improved HVAC Controls: Coroner's Building	14	70	\$150,000	\$18,000	10	6.7%	(\$22,000)
12	Chiller Plant Waterside Economizer: County Dept of Technology Building	18	11	\$58,000	\$4,500	15	2.1%	(\$28,500)
12	Installation of High-Efficiency Toilets at County Offices	23	7	\$300,000	\$2,800	117	-16.7%	(\$289,400)

Table 29: Measures Ranked by Evaluation Score (bottom 13 measures)

### Summary

This evaluation process is intended to provide an overview of the effectiveness of each measure. While it should encourage a more comprehensive review of the cost/benefits of each strategy, these quantitative results are in part based on subjective judgments and are advisory only. They should be only one consideration in the selection of the most appropriate measures for the jurisdiction.

## 8.8 2005 Baseline Revision Details

### Overview of 2005 Baseline Changes

- 1) The LGOP inventory guidelines (including emissions factors) were used to create the 2005 baseline.
- 2) Electricity and gas use has been updated by staff.
- 3) Vehicle Fleet fuel use has been updated by staff (including Airport Fleet).
- 4) An Employee Commute Survey has been completed.
- 5) Waste sector tons reflect the existing waste numbers in the IFC Memo (Revised Inventory Results and BAU Forecast Memo\_2010\_11\_19) .

2005 Baseline used in Analysis (TEAA)		
Sector	CO2e (metric tons)	Percent
Buildings	35,870	26.6%
Vehicle Fleet	37,720	28.0%
Employee Commute	31,970	23.7%
Streetlights and Traffic Signals	8,810	6.5%
Waste		0.0%
Kiefer Landfill Waste-in-Place		0.0%
Elk Grove Landfill Waste-in-Place		0.0%
Sacramento International Airport	14,980	11.1%
Water Delivery	5,580	4.1%
Total	134,930	100.0%

2005 Original Baseline		
Sector	CO2e (metric tons)	Percent
Buildings	55,981	32.8%
Vehicle Fleet	25,138	14.7%
Employee Commute	0	0.0%
Streetlights and Traffic Signals	888	0.5%
Waste	0	0.0%
Kiefer Landfill Waste-in-Place	49,841	29.2%
Elk Grove Landfill Waste-in-Place	1,511	0.9%
Sacramento International Airport	37,459	21.9%
Total	170,818	100%

## 8.9 Employee Commute Results

Sacramento County Commute Survey Results October 18, 2010									
Note: Results based on survey of county employees conducted in the fall of 2010 by County staff									
Overall Results		Results Tabulation (respondent total)	Total Miles per year	Annual Gasoline (gals)	Annual Diesel (gals)	Annual E20 (gals)	Annual B20 (gals)	Annual B100 (gals)	Annual NG (gal equiv)
Estimated Employees	12,007	SOV (Single Occupant Vehicle)	16,707,656	707,728	15,174	3,859	2,497	456	0
Total valid responses (sample)	3140	Commute	1,555,824	26,675	366	0	0	0	0
Total miles (all respondents)	20,476,080	Rail or Bus	686,242	0	245	0	0	0	2,704
		Motorcycle	207,151	4,548	0	0	0	0	0
Single Occupancy Vehicle (SOV)		Bicycle or Walking	133,027	0	0	0	0	0	0
Total miles SOV	16,707,656	Totals	19,289,901	738,951	15,784	3,859	2,497	456	2,704
Ave mpg SOV	24.36	Total per Employee	6,143.28	235.33	5.03	1.23	0.80	0.15	0.86
Total gallons	685,907	Total 2009 (All Employees)	73,762,368	2,825,665	60,356	14,758	9,549	1,745	10,341
Carpool Results		Rail or Bus		Rail or Bus		Motorcycle			
Carpool Total Miles per year	1,555,824	Rail or Bus Total Miles per year	686,242	Rail or Bus Total Miles per year		686,242	Motorcycle Total Miles per year		207,151
Carpool MPG	25.22	Total Gals per year	3,483	Total Gals per year		3,483	Motorcycle Gasoline (gals)		4,548
Carpool Count (people in carpool)	2.24	Rail or Bus Diesel (gals)	245	Rail or Bus Diesel (gals)		245			
Total Gasoline Gals per year	26,675	Rail Bus NG (gal equiv)	2,704	Rail Bus NG (gal equiv)		2,704			

## 8.10 Original Project List (includes duplicate and ineligible project)

Original Project Name
1 Countywide Streetlight Conversion Project (MV to LED)
2 Energy Efficiency Retrofits: Gibson Ranch Park
3 Energy Efficiency Upgrades (J. Harvey Community Center and Caretaker House)
4 Energy Audits and Improvements using Financial Incentive Revolving Fund
5 Energy Efficiency Retrofit: Rio Cosumnes Correctional Center (RCCC)
6 Sacramento Regional Energy Alliance
7 Green Building Task Force/ Ordinance
8 Cogeneration Facility for New Airport Terminal B
9 Climate Action Plan, Phase II
10 911 Communications Center Relocation
11 East McClellan Overlay Project
12 Hazel Avenue Phase 1 - U.S. 50 to Curragh Downs Drive
13 North Kiefer Boulevard - Closure at Kiefer Boulevard
14 ADA Transition Plan Implementation - Various Locations
15 AC Overlay Various Locations
16 Countywide Streetlight Conversion Project (HPS & MV to LED)
17 American River Bike Trail Green Transportation Rehabilitation Project
18 Gibson Ranch Rehab Project
19 Jean Harvie Community Center Renovations and Improvement
20 Herald Park Infrastructure Improvements
21 Florin School and Park public parking lot
22 Drainage/Flood Control Rehabilitation Projects(various)
23 Kinross Rd/Root Ave SD Improvement
24 Central Trunk Sewer Rehabilitation Project
25 Green building features in new Central Terminal B at Sacramento International Airport
26 CSA T-Main & Florin Interceptor
27 McClellan RDA- Rehabilitation Infrastructure Projects
28 Auburn/Garfield
29 McClellan RDA
30 McClellan RDA
31 Morrison Creek Flood Detention/Stormwater Quality/Groundwater Recharge Project
32 Rancho Cordova Library
33 Rio Cosumnes Correctional Center energy efficiency upgrades
34 District-Wide Cleanout Install Project
35 Main Sewer Line Connection - Sacramento International Airport
36 Meter Retrofit
37 Mather RDA
38 Mutual Housing at the Highlands- Sustainable Housing
39 Solar Powered Wastewater Treatment Plant Pond Aerators
40 Main Jail energy efficiency upgrades
41 Jean Harvie Caretaker Home Improvements
42 Runway 22L Runway Visual Range (RVR) Equipment Replacement - Mather Airport
43 Anatolia WTP Phase 2 / Excelsior Well 4& 5
44 Varena Apartments
45 Housing Authority Activities
46 Retro-commission top energy users
47 Perimeter Security Fence, Phase 2 - Sacramento International Airport
48 Poppy Ridge WTP Phase 2
49 Greystone Apartments
50 Septic System Conversions - Wenatchee Ct

Original Project Name
51 Equip Maritime Well
52 Summerset Apartments
53 Big Horn On-Site Well Equipping and Blend Line
54 VOA Living Center
55 Septage Road Improvements
56 Sheldon/Hwy 99 Flow Control Station
57 Reclaimed Water Piping Replacement
58 Kammerer/Promenade Flow Control Station
59 Moyno Pump Replacement
60 Mather Housing Filter Upgrades
61 Lakeside WTP Arsenic Upgrades
62 Sheldon/East Stockton Wholesale Metering Station
63 Security Upgrades
64 Airport Infrastructure Improvements, Phase 2 - Sacramento International Airport
65 Dwight Road WTP Arsenic Filter
66 Freedom Park Drive and North Watt Avenue Complete Green Streets Project
67 Watt Avenue @ US 50 Interchange - La Riviera Drive to Kiefer Boulevard
68 McClellan RDA
69 Landfill gas system and flare improvements
70 Bradshaw Road & Gerber Road Intersection Improvement Project
71 Countywide Sidewalk Continuity Project Phase IIIA
72 Elverta Road: Watt Avenue to Dutch Haven Boulevard
73 Forcum Avenue and Bell Avenue Roadway Improvements
74 Intersection Improvements Disabled Access - Phase IV
75 Marconi Avenue Improvements - Fair Oaks Boulevard to Walnut Avenue
76 Traffic Signal System Upgrade (energy efficient controllers)
77 Arden Arcade Signal Upgrade
78 Interstate 5 at Metro Air Parkway Interchange
79 Arden Way Improvement
80 El Camino Ave Pedestrian and Bike Improvements
81 Dry Creek Parkway Trail Green- Transportation Project
82 Drainage/Flood Control Pump Rehabilitation Projects (various)
83 Auburn Boulevard Streetscape
84 Natural Gas Vehicle Fueling Station
85 Taxiway "W" Completion - Sacramento International Airport
86 SIMS Road Rehabilitation
87 Dissolved Air Flotation Thickener Rehabilitation
88 Bufferlands Facility Replacement
89 Rehabilitate Airport Access Road, Taxiways and Aprons, Security Fencing and Lighting
90 Runway 16R-34L Parallel Taxiway - Sacramento International Airport
91 Franklin NP Tank and Booster Station
92 SCADA Upgrade
93 Aircraft Hangars - Sacramento Executive Airport
94 Generator Auto Switch Retrofit
95 Runway 4L-22R Extension - Mather Airport
96 Electrical Panel Upgrades
97 Firehouse & Las Cruces Roofs
98 Florin Road Sewer Interceptor Project
99 Pedestrian Master Plan Implementation - Various Locations
100 McClellan RDA

Original Project Name
101 Orangevale Library
102 Rio Linda - Elverta Library
103 Old Florin Town Streetscape
104 Stockton RDA
105 Cathodic Protection System Repairs
106 Franklin RDA- Infrastructure Projects
107 Septic System Conversions - Bannister Road
108 Terminal B Underground Hydrant Fueling - Sacramento International Airport
109 Septic System Conversions - Santa Junita (Beacon Ave)
110 Secondary Sedimentation Tank Repair
111 Terminal B Apron - Sacramento International Airport
112 AirCargo Access Road Construction - Mather Airport
113 Runway 4R-22L Centerline Touchdown Zone Lights - Mather Airport
114 Deer Creek Hills Preserve – North Pond Interpretive Trail
115 Sacramento Northern Bike Trail
116 Mather RDA
117 Wilton Community Park
118 McFarland Ranch Barn Projects
119 Airport Infrastructure Improvements, Phase 1 - Sacramento International Airport
120 Landside Infrastructure Rehabilitation Program - Mather Airport
121 Primary Odor Reduction Tower Repair
122 Elevator Rehabilitation
123 Federal Aviation Administration Airport Traffic Control Tower - Sacramento International Airport
124 Service Saddle Replacement
125 Waterman Road Realignment
126 Phase II Expansion Recycled Water Project
127 Runway 2-20 Safety Area Compliance and Security Fencing - Sacramento Executive Airport
128 SCAS Continuity of Operations Infrastructure Program - Mather Airport
129 Alder Creek Corridor
130 McFarland Ranch Day Camp
131 Clifton's Drain
132 Regional Dog Park
133 American River School House Renovation & outdoor seating area
134 Rossmoor Bar Arboretum
135 Deer Creek Trail @ Slough House
136 Golf Courses Project
137 Septic System Conversions - Southbreeze
138 Septic System Conversions- Santa Juanita (South)
139 Septic System Conversions- Cherry/Granita area
140 Elder Creek and Gerber Creek flood control downstream reaches
141 Septic System Conversions- Van Dyce Ct area
142 Walnut Grove System Improvements
143 Biogas Enhancement Project
144 Upper Dry Creek Relief Interceptor Project
145 Mather Housing Tank Site Improvements
146 Mather Main Base Tank Site Improvements
147 South Sacramento County Agriculture & Habitat Lands Recycled Water Project - Ph
148 Hood System Improvements
149 Installation of high-efficiency toilets at County offices
150 Water Audits and Implementation of Conservation Measures at County Institutions

Original Project Name
151 Large Turf Landscape Irrigation Audits at County Facilities
152 Landscape Audit and Installation of River-Friendly Landscaping at County Buildings
153 Replacement of water wasting equipment related to County operations
154 Energy Efficiency of Water Supply System (G)
155 Develop Water Use Efficiency Policy for County Facilities and Operations (G)
156 Study Feasibility of Sub-metering for County-owned Facilities (G)
157 Conduct Energy and Water Efficiency Audits of Water and Drainage Infrastructure (G)
158 Audit the Water Efficiency of SCWA and DWR Operations (G)
159 Audit the Water Efficiency of all County Field Operations (G)
160 Develop an Energy Policy for Water and Drainage Infrastructure (G)
161 Hagginbottom Pump Station Generator (CIP Project #7)
162 Willhaggin Drive Storm Drainage Pump Station (D43) Trash Rake, Discharge Lines and
163 Rehabilitate groundwater wells with efficient pumps and motors
164 Use of the Most Efficient Water Production Sources
165 Supervisor and Data Acquisition (SCADA) Upgrade/Replacement
166 Fixed Base Water Meter Reading System (Pilot Study)
167 Fixed Base Meter Reading System (B)
168 Lockwood vs. Kiefer
169 Routing Efficiencies for Waste Collection Trucks
170 SCAS-Mandate use of Boarding Bridge Power and Air
171 Increased Rate of Replacement of SCAS Standard Vehicles with Electric Ones
172 SCAS- 3 MW Solar Power Plant (on-site)
173 SCAS- Purchase Renewable energy through SMUD Greenergy Program (min.of 5%)
174 Energy-Efficient Taxiway lighting
175 Energy-efficient Lighting at Sacramento International Airport Parking Garage
176 HVAC System Efficiency Upgrades
177 SCAS- Set Waste Reduction Goals (Eliminate Styrofoam Cups etc.)
178 SCAS- Turf (grass) to Hardscape Transition
179 SCAS- Employee Parking Lot Increased Motorcycle Parking
180 SCAS- Implement SFO's "Sustainable 16"
181 Shuttle Bus Replacement (CIP Project #17)
182 Terminal A Cooling Tower Rehabilitation (CIP Project #22)
183 Terminal Modernization Programs-Ancillary Facilities (CIP Project #26)
184 Terminal Modernization Programs-Early Projects (CIP Project #27)
185 Terminal Modernization Programs-Special Systems (CIP Project #28)
186 Terminal Modernization Programs-Terminal Facilities Airside (CIP Project #29)
187 Terminal Modernization Programs-Terminal Facilities Landside (CIP Project #30)
188 Water Tank Facilities Enhancement (CIP Project #31)
189 SCAS Jet Fuel Farm (G)
190 Aircraft Preconditioned Air and Electric Power (G)
191 Reduce Landside Lighting at Sacramento International Airport
192 Reduce Interior Lighting at Terminal A (Sacramento International Airport)
193 Energy-efficiency Retrofit at Airport
194 Peak Demand Load Reduction
195 Energy-efficient HVAC Management Systems for TA Central Utilities Plant
196 Energy Efficiency Improvement for Air Handlers at SCAS Facilities
197 Variable Volume Air Handlers
198 Shutting off Airport Escalators after hours
199 Energy-saving Temperature Setting in SCAS Computer Room
200 Changed Default on Airport-Wide Printers to Double-Sided

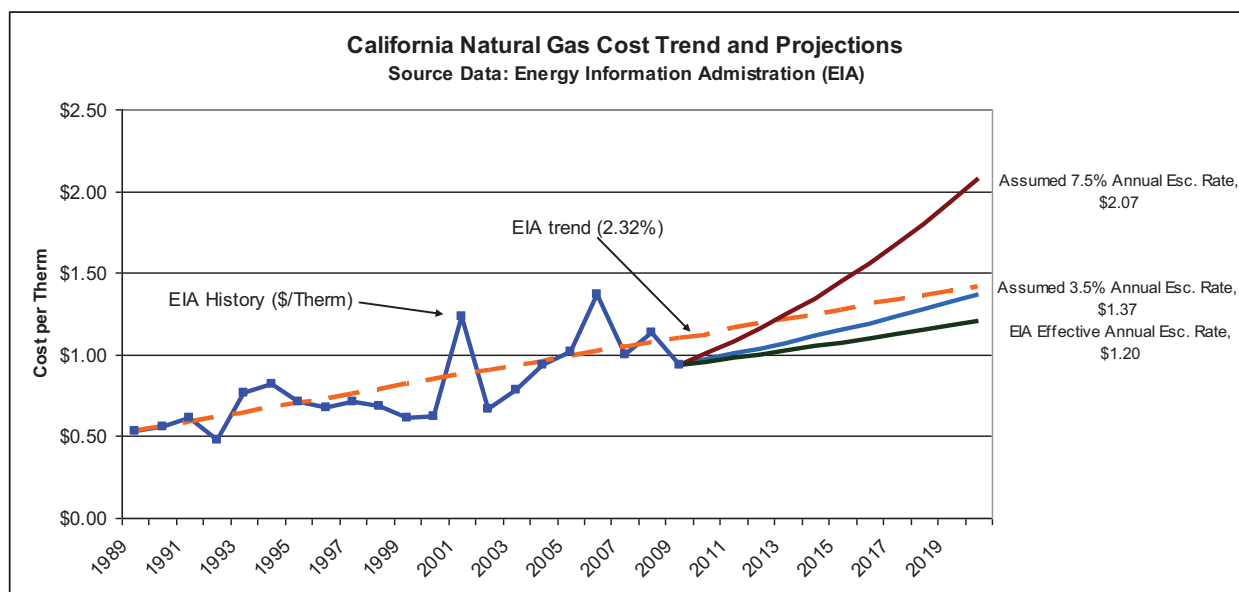


Original Project Name
201 Shutting Off Computer Monitors at Night
202 Participate in SMUD's Voluntary Curtailment Program (Load Shaving)
203 Waste Diversion and Recycling Goals/Strategies (Regulatory) -Review source documents
204 Alternative Fuel Stations (G) (CAP)
205 Improved landscape maintenance efficiencies at SCAS facilities: larger mowers
206 Improved landscape maintenance efficiencies at SCAS facilities: Swather mowers
207 Recycling Program-asphalt, wood, aluminum, etc.
208 Removal of Hazardous Waste
209 Taxiway Edge Lights Replaced with Flush Mount
210 Added LED lights to Taxiway E
211 Recycle Grass Clipping Back onto Lawn
212 Incorporated Artificial Plants in various areas
213 Additional Recycle Compactor added
214 Live-fire training use of propane versus hydrocarbon fuels
215 County Light-Duty Fleet Conversion Program (G)
216 County Employee Carpool Incentives (G)
217 Alternative Fuel Vehicles for County Heavy-Duty Fleet (G)
218 County Employee Transportation Program (G)
219 Bike Lockers and Other Secure Bike Storage (G)
220 Flexible Employee Work Schedules (G)
221 Provide Training for Employees to Reduce Emissions (G)
222 Develop County Employee Carpool-at-Work Incentives (G)
223 Expand Fleet Conversion Program (G)
224 Increase Designated Parking for Alternative Fuel Vehicles in County Parking Lots (G)
225 Improve County Employee Transportation Program (G)
226 Develop Employee Shuttle System (G)
227 Provide Additional Bike Lockers and Other Secure Bike Storage in County Buildings
228 Utilize GPS to minimize travel distances on County-owned vehicles (G)
229 County Energy Program Manager (G)
230 County Building Energy Efficiency Upgrades (G)
231 LEED Certification for New County Buildings (G)
232 Implement Interim Green Building Standards for New County-Owned Buildings (G)
233 Adopt Green Building Policy for New County-Owned Buildings (G)
234 Green Building Policy for Leased County Buildings
235 Conduct Green Building Audits for County-Owned Buildings (G)
236 Implement County Building Green Building Upgrades (G)
237 Study the Water Use Efficiency of County Facilities (G)
238 Conduct Energy and Water Efficiency Audits for Buildings (G)
239 Recycling Programs at County-Owned Facilities (G)
240 Fleet Services -New Liquefied Compressed Natural Gas (LCNG) Station (CIP Project #10)
241 John Price District Attorney Building -Cooling Tower Replacement (CIP Project #10)
242 Energy-efficiency upgrades: John Price District Attorney Building
243 Main Jail-Evaluate Walk-in Refrigeration Systems for Replacement (CIP Project #17)
244 Water Booster System Replacement: Main Jail
245 Water Heater Replacement: Main Jail
246 New Administration Building Central Plant Improvements
247 RCCC-Upgrade Lighting (CIP Project #49)
248 RCCC-Replace Chiller at 448-Bed Facility(CIP Project #48)
249 Energy Efficiency Retrofits: Rio Cosumnes Correctional Center (RCCC)
250 Voter Registration and Elections-Replace HVAC in Server Room (CIP Project #51)

Original Project Name
251 Energy Efficiency Improvements to Lighting and Mechanical Systems: Building Inspection
252 Mental Health Annex-Replace Roof (CIP Project #32)
253 Energy Efficiency Improvements to Mechanical Systems: Mental Health Treatment Center
254 Sheriff Administration Building-Modernize HVAC System in Server and Radio Room(CIP Project #32)
255 Sheriff Administration Building Cooling Source Replacement
256 Sheriff Administration Building -Replace Heating Sources(CIP Project #56)
257 Retrocommissioning of Top 10 Energy Using Buildings
258 Old Admin-Wireless HVAC Controls
259 Old Admin-Wireless Lighting Controls
260 Parking Garage-High Efficiency Lighting
261 Parking Garage-Exhaust Controls
262 Laundry System Efficiency Upgrades: Rio Cosumnes Correctional Center (RCCC)
263 Chiller Efficiency Improvements: Juvenile Hall Central Plant
264 Juvenile Hall-Kitchen Exhaust Fan controls
265 John Price District Attorney Building-Wireless Lighting Controls
266 John Price District Attorney Building-Convert HVAC CV to VAV
267 John Price District Attorney Building Parking Lot-High Efficiency Lighting
268 Branch Center-High Efficiency Lighting in West Parking Lots
269 Old WQ-Wireless HVAC Controls
270 Old WQ-Wireless Lighting Controls
271 Improved HVAC Controls: Coroner's Building
272 Coroner's-Replace Refrigeration Chiller
273 Coroner's-Optimize Exhaust Hood Controls
274 Sheriff Administration Building-Wireless Lighting Controls
275 Sheriff Administration Building-Wireless HVAC Controls
276 New Administration Building -Wireless Lighting Controls
277 New Administration Building -Wireless HVAC Controls
278 HVAC Efficiency Modifications: New Administration Building
279 New Administration Building-Replace Electric WH
280 New Administration Building-High Efficiency Parking Lot Lighting
281 Laundry System Efficiency Upgrades: Main Jail
282 Efficient Lighting Retrofit: Main Jail
283 Main Jail-Kitchen Exhaust Fan Controls
284 Main Jail-Optimize Heat Recovery Systems
285 OCIT Building-Wireless HVAC Data Center Controls
286 OCIT Building- Data Center Lighting Controls
287 Utility Power Surge (UPS) Retrofit: County Dept of Technology Building
288 OCIT Building- Modify Data Center Cooling
289 Chiller Plant Waterside Economizer: County Dept of Technology Building
290 Chiller Plant Smart Controls: County Dept of Technology Building
291 Chiller Plant Pump Efficiency Upgrade: County Dept of Technology Building
292 Energy-Conserving Duct Isolation Dampers: County Dept of Technology Building
293 Employee Garage-High Efficiency Lighting
294 Jury Lot-High Efficiency Lighting
295 LED Street Light Conversion (1,800 MV to LED)
296 Expand Use of Teleconferencing and Other Virtual Meeting Tools (G)
297 County Green Information Technology (IT) Program (G)
298 Develop and Adopt a County Green IT Policy For Establishing Energy Efficiency Standards
299 Enhancing County Green Information Technology (IT) Program (G)
300 County Employee Carpool Incentives (G)

Original Project Name
301 County Employee Transportation Program (G)
302 Flexible Employee Work Schedules (G)
303 Provide Training for Employees to Reduce Emissions (G)
304 Conduct Employee Commute Survey (G)
305 Improve County Employee Transportation Program (G)
306 Develop Employee Shuttle System (G)
307 Employee Green Building Training and Certifications (G)
308 Develop and Adopt County Renewable Energy Policy (G,C)
309 Traffic Signal System Upgrade (energy efficient LED bulbs)
310 Energy Efficient Streetlights (G) -(Induction)
311 Enhance Tree Planting and Maintenance in County Rights-of-Way (G)
312 Increase Landscaping of County Rights-of-Way (G)
313 ARRA-Streetlighting Conversion Project (CIP Project #5)
314 ARRA-Traffic Signal Upgrades (CIP Project #6)
315 Garfield Avenue and Cypress Traffic Signal Project
316 Alternative Fuel Waste Collection Fleet (G)
317 Fleet Routing To Reduce Vehicle Miles Traveled (G)
318 Landfill Gas-to-Energy Plant at Kiefer Landfill (G, C)
319 Collections -Automated Refuse Collection Truck, 30 Cubic Yards (3) (CIP Project #1)
320 Collections -Automated Refuse Collection Truck, 35 Cubic Yards (2) (CIP Project #2)
321 Collections - GPS Equipment Project (CIP Project #3)
322 Collections -Rear Loading Collection Trucks, (3) (CIP Project #4)
323 Equipment Replacements (CIP Project #5)
324 Kiefer Landfill -Dozer (CIP Project #6)
325 Kiefer Landfill -Gas and Leachate Management Systems Improvements (CIP Project #7)
326 Kiefer Landfill -Gas Monitoring Probes (CIP Project #9)
327 Kiefer Landfill -Gas Remediation (CIP Project #10)
328 Kiefer Landfill -Horizontal Grinder (CIP Project #11)
329 Kiefer Landfill -Landfill Gas Beneficial Use Project (CIP Project #12)
330 Kiefer Landfill- Loader, Wheeled with Claw (CIP Project #13)
331 Kiefer Landfill -Rest Stop Area (CIP Project #18)
332 Kiefer Landfill -Truck, Articulating Haul (CIP Project #19)
333 Kiefer Landfill -Truck, Water, All-Wheel Drive (CIP Project #20)
334 Kiefer Landfill -Water Supply Project (CIP Project #21)
335 North Area Recovery Station - Compactor, Wheeled (CIP Project #22)
336 North Area Recovery Station -Master Plan and Expansion (CIP Project #23)
337 North Area Recovery Station -Truck, Tractor (2) (CIP Project #23)
338 North Area Recovery Station -Truck, Water, 2,500-Gallon
339 Computer Server Virtualization Effort
340 Turning off Computer Monitors at Night (Municipal Services Agency)
341 Replacement of CRT Monitors with Energy-efficient Flat Panel Computer Monitors
342 Duplex Printing
343 Efficient Toilet-flushing Systems: Main Jail
344 Terminal B: Trucking in Hydrant Fueling - Sacramento International Airport
345 Dept of Technology Virtual Server Consolidation (A)
346 Dept of Technology Virtual Server Consolidation (B)

## 8.11 Natural Gas Cost Trend from 1989 to 2009 with Projections



California Price of Natural Gas Sold to Commercial Consumers (Dollars per Thousand Cubic Feet)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1989	5.28	5.25	5.27	5.16	4.28	4.07	4.63	4.57	4.39	4.35	5.13	5.49
1990	5.56	5.64	5.64	5.29	4.54	4.37	4.40	4.64	4.37	5.03	5.05	5.58
1991	6.08	6.29	6.29	5.60	4.71	5.17	4.88	5.42	4.21	4.09	6.31	5.92
1992	4.80	8.65	5.94	5.93	3.77	3.91	4.39	4.40	4.20	4.53	5.45	5.73
1993	7.66	6.00	6.84	6.08	5.79	6.44	5.12	6.58	5.75	4.92	5.03	5.69
1994	8.16	8.70	8.27	8.28	5.85	7.77	5.42	7.45	7.19	5.68	6.02	6.83
1995	7.11	6.74	6.41	5.98	5.56	5.98	5.68	6.20	6.00	6.04	4.67	7.01
1996	6.74	6.19	6.60	5.99	5.55	5.42	5.50	5.25	5.46	5.68	5.49	6.36
1997	7.12	6.92	6.65	6.04	5.28	6.26	5.85	4.95	5.83	6.64	7.03	6.98
1998	6.80	6.86	7.18	6.76	5.77	6.01	5.59	5.98	5.93	5.73	6.08	6.38
1999	6.15	6.64	5.46	5.88	5.53	5.74	6.00	6.42	6.30	6.69	6.74	6.76
2000	6.20	6.73	6.68	6.29	7.04	6.69	7.57	7.29	7.96	8.52	8.76	10.41
2001	12.35	14.26	14.20	11.58	10.78	9.65	7.32	6.69	5.56	4.67	5.18	5.35
2002	6.61	5.91	5.57	6.14	5.70	5.42	5.50	5.35	5.46	5.84	7.02	7.44
2003	7.85	7.99	8.88	8.88	7.57	7.99	7.85	7.87	8.05	7.53	7.96	8.79
2004	9.37	8.88	8.21	7.29	7.84	8.28	8.25	8.24	7.90	8.08	9.64	9.96
2005	10.18	9.83	9.52	9.31	9.42	9.00	9.48	9.51	10.86	13.10	14.36	13.45
2006	13.69	12.33	11.12	9.81	10.02	9.04	8.94	9.16	9.42	8.14	9.61	10.48
2007	9.99	10.57	10.47	10.22	10.21	10.84	10.84	9.69	9.17	9.55	10.16	10.27
2008	11.37	11.26	11.53	12.67	13.42	13.98	15.83	13.30	11.29	10.54	8.84	9.13
2009	9.36	8.20										

Source: U.S. Energy Information Administration (<http://tonto.eia.doe.gov/dnav/ng/hist/n3020ca3m.htm>)

## 8.12 Vehicle Fuel Cost Trends

### **Petrofuel Price Trends and Future**

Jim Housman, PE (retired)

11/19/07

There are a number of factors that contribute to the cost of gasoline at the pump. According to the U.S. Energy Information Agency (EIA) the price of gasoline can be broken down as follows:

Crude Oil:	64%
Refining (including additives)	13%
Distribution and Marketing	9%
Taxes:	14%

It should be clear from the attached graph that the major factor driving gasoline prices is the price of crude oil. There have been two distinct issues driving the price of crude in the past five years, geo-political issues and geological issues.

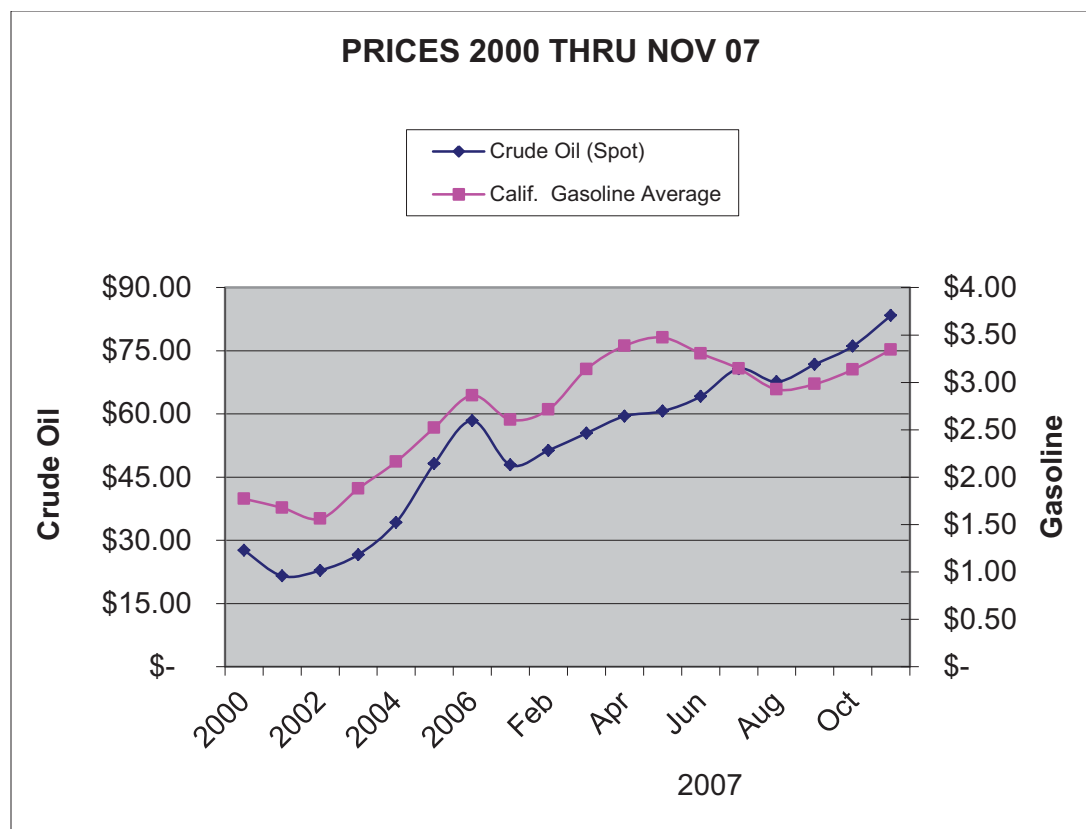
The geo-political issues driving oil prices are primarily the declining value of the dollar, the rapid growth in demand, primarily in Asia, and the economic uncertainty caused by military conflict. An additional geo-political factor is the shift in oil resources from the control (primarily) of privately owned multinational oil companies to being owned and managed by national oil companies. The motivation of shareholder owned companies is largely short term profits, driving the producers to produce the maximum amount of oil in the shortest time. National oil companies, while depending on oil revenue for investment capital, may be motivated to invest a significant portion of their income in non-oil related programs decreasing their ability to increase production as existing oil fields decline. Oil can also be used as a diplomatic tool, punishing enemies and rewarding friends. Short term decisions made by national oil companies for political reasons may have long term economic effects on oil using societies.

Geologically the oil industry is shifting from an environment where a relatively small number of oil fields are each producing very large quantities of oil to one where a very large number of oil fields are each producing a relatively small amount of oil. For example twenty years ago there were 15 oil fields in the world producing over one million barrels per day. Today there are only four, and at least one of those fields (Cantarell in Mexico) is in significant decline. Two thirds of the fields in the oil producing nations in the world are in decline. Not a single field discovered in the past ten years is capable of producing a million barrels per day. (reference 4)

In 1987, after the oil industry recovered from the turmoil caused by the Iran revolution, the price of gasoline in the United States averaged under 70 cents per gallon. In that same year the spot price of crude oil (the price quoted in the news) was about \$13.40. In November of 2007 those prices were \$3.40 for gasoline in California and \$83.03 for crude oil.

In planning for future energy costs we can extrapolate these numbers to estimate gasoline cost in 2008 and future years.

In the simplest terms the cost of gasoline has grown, on average, at about 8% a year over the past twenty years. However if we look at just the past five years, from 2002 to 2007, the price of gasoline has escalated more like 17% each year. In 2012 the difference between those growth rates will be the difference between gasoline at \$5.00 per gallon or \$7.45 per gallon. Given the political and geological issues faced by the oil industry it would be prudent to assume that oil prices will continue their upward momentum.



Sources:

1. <http://publications.uu.se/abstract.xsql?dbid=7625>
2. [http://tonto.eia.doe.gov/dnav/pet/pet\\_pri\\_wco\\_k\\_w.htm](http://tonto.eia.doe.gov/dnav/pet/pet_pri_wco_k_w.htm)
3. [http://tonto.eia.doe.gov/dnav/pet/pet\\_pri\\_gnd\\_a\\_epm0\\_pte\\_cpgal\\_w.htm](http://tonto.eia.doe.gov/dnav/pet/pet_pri_gnd_a_epm0_pte_cpgal_w.htm)
4. <http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp>
5. <http://www.simmonsco-intl.com/files/giantoilfields.pdf>

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## APPENDIX B

### Summary Sheets for Measures Included in the Analysis



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**Measure No. 1****Water Audits and Implementation of Conservation Measures at County Institutions****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Conduct audits of County institutions and implement necessary water conservation measures.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
12	1	\$0	\$570	5,054	NA	NA	\$4,600

**Implementation**




			Financing								
Responsible County Department	Status*	Assumed Implementation Date	General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services and/or Water Resources	Future	2012	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Water Resources staff provided the following sample water savings calculation to demonstrate potential water savings of changing out 2,000 toilets at one County facility: 2,000 people x 3 flushes each @ savings of 2 gallons per flush = 12,000 gallons saved per day. The benefits of these savings are shown above under "analysis results".
- NOTE:** Multiple water audits and associated actions can be conducted across the County, resulting in benefits that are potentially orders of magnitude higher than those shown above under "analysis results".
- Average energy the SCWA used to produce and distribute one gallon of water in 2009 = .00162 kwh. Therefore 1 gallon of water saved = .00162 kwh saved. (11/9/2010 Keith Hall email).
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Reduction in water use (and associated reduction in energy use) results in lower utility bills and cost savings to the County and ratepayers/taxpayers.
	Reduces Energy Use	Conservation of water results in a reduction of energy needed to treat and deliver the water.
	Conserves Water	The primary intent of the measure is to conserve water.

**Measure No. 2****Efficient Toilet-Flushing Systems: Main Jail****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	n	n	n	y

**Description**

Install prison-grade high efficiency toilet flushing systems (“flushometer”) to replace the current aging and inefficient models.

**Analysis Results**

Evaluation Score	Annual CO2 reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
15	2	\$2,500,000	\$870	7,776	3,404	-39.5	(\$2,340,800)

**Implementation**




Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and water/energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Prison-grade toilets are far more expensive than conventional toilets, making this investment appear (from an energy, water and emissions reductions point of view) to not be cost-effective. However, the aging and inefficient models currently in the jail will eventually need to be replaced, and prison-grade toilets are a necessity regardless of their cost-effectiveness from an energy/water savings perspective.
- Assume water savings of 4.8 million gallons per year.
- Average energy the SCWA used to produce and distribute one gallon of water in 2009 = .00162 kwh (1 gal water saved = .00162 kwh) (11/9/2010 Keith Hall email).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	High efficiency toilets reduce water use which reduces the amount of energy needed to treat and deliver the water, lowers utility bills and saves the County money.
	Reduces Energy Use	High efficiency toilets reduce water use which reduces the amount of energy needed to treat and deliver the water.
	Conserves Water	High efficiency toilets conserve water.

**Measure No. 3****Landscape Audit and Installation of River-Friendly Landscaping at County Buildings****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Conduct landscape audit and install River-Friendly Landscaping in Public Spaces in-lieu of turf. River-Friendly Landscape embodies the value of reduced resource use (water, energy and nutrients) and practices the guidelines developed in the local "River Friendly Landscape Program" by the Sacramento Stormwater Quality Partnership.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
12	5	\$0	\$1,820	16,200	NA	NA	\$14,600

**Implementation**



Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Water Resources/ General Services	Future	2014	yes								







\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- In Sacramento, turf requires about 57 inches of water/year and typically overwatering on the order of 30%-50% occurs over what is needed.
- For this measure, assume 50-100% water savings where RFL replaces conventional landscaping. This measure assumes that **one acre** of conventional landscape would be converted, with a savings of between 7-15 million gallons per year. Analysis assumes average savings of 10M gal/year.
- **NOTE:** This analysis only reflects converting one acre to RFL. Multiple conversions can be conducted across the County, resulting in benefits that are potentially orders of magnitude higher than those shown above under "analysis results".
- Average energy the SCWA used to produce and distribute one gallon of water in 2009 = .00162 kwh (1 gal water saved = .00162 kwh) (11/9/2010 Keith Hall email).
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	River Friendly Landscaping conserves water and reduces green waste hauled to the landfill, both of which save money. The measure may create or help keep jobs.
	Reduces Energy Use	Conservation of water results in a reduction of energy needed to treat and deliver the water.

	Conserves Water	River Friendly Landscaping conserves water.
	Improves Water Quality	River Friendly Landscaping uses less water and produces less site runoff. The practices also use little or no pesticides and herbicides, so any runoff is cleaner.
	Improves Air Quality	River Friendly Landscaping can reduce or eliminate the need for gas-powered mowers and results in less green waste hauled to the landfill (less vehicle trips).
	Protects Public Health/Safety	Chemical-free landscaping is safer for humans and pets.
	Protects Habitat/Open Space/Ag & Range	Reducing runoff flows and ensuring cleaner flows will help protect habitat in the downstream ecosystem.
	Reduces Waste to Landfill	River Friendly Landscaping encourages grasscycling and reuse of green waste materials on-site as compost to reduce green waste hauled to the landfill.

**Measure No. 4****Rehabilitate Groundwater Wells with Efficient Pumps and Motors****Water Delivery Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Each year Sacramento County Water Agency (SCWA) rehabilitates some of its groundwater wells to restore production levels to near new conditions; new efficient pumps are installed and the motor is replaced or rebuilt for efficiency. Between 2005 and 2010, SCWA rehabilitated over 20 wells (15 extensively).

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
31	80	\$0	\$32,015	285,651	NA	NA	\$258,100

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
SCWA	Future	2014		yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- For the work conducted since 2005, the electrical efficiency improved an average of 11.3% for these wells which translate to about 62,869 KWH annually additive to previous years' efficiency increases since 2005, providing a total annual savings for 2010 of 285,651 KWH. Over time the efficiency of a well will erode; however, as more wells are rehabilitated each year the electricity usage reduction will be sustained from year to year. If the wells maintain efficiency for 10-years before beginning to decline, the average annual savings could be in excess of 600,000 KWH.
- Average energy the SCWA used to produce and distribute one gallon of water in 2009 = .00162 kwh (1 gal water saved = .00162 kwh) (11/9/2010 Keith Hall email).
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Energy efficient pumps and motors reduce energy use and utility bills and save SCWA and its water customers' money.
	Reduces Energy Use	Energy efficient pumps and motors reduce energy use.

**Measure No. 5****Use of the Most Efficient Water Production Sources****Water Delivery Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Sacramento County Water Agency (SCWA) prioritizes what water production sources to use for water delivery, considering energy-efficiency/cost (as well as the need to not deplete any of the sources). Direct feed wells are the least expensive and energy-intensive form of production (pumping the water once versus 2 or 3 times for treated groundwater or surface water, respectively). This measure entails installation of about 7 direct feed-wells to offset the use of treated groundwater wells during the cooler months.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
35	559	\$0	\$224,200	2,000,000	NA	NA	\$1,806,800

**Implementation**

			Financing								
Responsible County Department	Status*	Assumed Implementation Date	General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
SCWA	Future	2014		yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

These direct-feed wells can offset the use of wells needing treatment during the cooler months, reducing energy consumption by about 2,000,000 kWh annually.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Direct feed wells cost less to operate and use less energy, saving SCWA and its customers money.
	Reduces Energy Use	Direct feed wells use less energy.
	Conserves Water	Less pumping and transport of the water means less water lost in the system.



**Measure No. 6****Increased Rate of Replacement of SCAS Standard Vehicles with Electric Ones****Vehicle Fleet**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Increase rate of replacement of Sacramento County Airport System (SCAS) standard small utility vehicles with electric ones.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Gasoline Savings (gal)	Simple Payback (years)	Internal Rate of Return	Net Present Value
18	8	\$1,080	\$2,540	900	1	46.1%	\$19,500

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Future	2014		yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Assumes 3 vehicles/year.
- Assumes incremental value of 2% premium for electric vehicles over standard (gas) vehicles (approximately \$200 per vehicle).
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Reduction in gasoline use results in cost savings to the County and taxpayers.
	Improves Air Quality	Use of electric vehicles instead of fossil fuel-powered vehicles results in less emissions and air pollution.

**Measure No. 7****Energy Efficient Taxiway Lighting****Airport Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Retrofit taxiway lighting with light emitting diode (LED) technology in phases and during major taxiway renovation/upgrade.

**Analysis Results**

Evaluation Score	Annual CO2 reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
15	19	\$370,000	\$7,630	68,100	58	-9.0%	(\$286,000)

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Future	2014		yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data above provided by Greg Rowe, SCAS (11/18/2010 email).
- Also see Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Energy efficient LED technology reduces energy use and saves the County and taxpayers money.
	Reduces Energy Use	LED technology uses less energy than conventional lighting.

**Measure No. 8****Energy Efficient Lighting at Sacramento International Airport Parking Garage****Buildings and Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Replace the high-pressure sodium lights at the parking garage at the Sacramento International Airport with energy efficient lighting.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
30	365	\$940,000	\$146,300	1,305,400	8	11.4%	\$296,500

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports/ General Svcs	Future	2014		yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Savings are based on replacing existing HPS lighting with bi-level induction lighting.
- Cost and energy savings data provided by Greg Rowe, SCAS (11/18/2010 email).
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Use of energy efficient lighting reduces energy use, lowers utility bills and saves money.
	Reduces Energy Use	Use of energy efficient lighting reduces energy use.



## Measure No. 9

### HVAC System Efficiency Upgrades at Airports

#### Buildings and Other Facilities

Action Plan				
A	B	C	D	E
n	y	y	y	y

### Description

Replace 10 old and inefficient package AC units with new high efficiency systems at older airport facilities.

### Analysis Results

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
34	9	\$150,000	\$3,790	33,800	47	-7.2%	(\$110,300)

### Implementation

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports/ General Svcs	Future	2014		yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

### Assumptions

- Replace 10 package AC units throughout SCAS facilities. Annual energy savings based on federal energy management program.
- Cost and energy savings data provided by Greg Rowe, SCAS (11/18/2010 email).
- Also see assumptions provided in Appendix A, Attachment 8.4.

### Co-Benefits

	Provides Economic Benefits/ Creates Jobs	Use of energy-efficient equipment reduces energy use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Use of energy-efficient equipment reduces energy use.

**Measure No. 10****Water Heater Replacement: Main Jail****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Replace the current potable water heaters with more energy-efficient models; current heaters are at the end of their serviceable life and are difficult to maintain.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (therms)	Simple Payback (years)	Internal Rate of Return	Net Present Value
33	103	\$1,000,000	\$13,650	19,500	87	-12.7%	(\$829,200)

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data sourced from County's Capital Improvement Plan (CIP) and Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Use of energy-efficient water heaters will reduce energy use, lower utility bills and save the County money.
	Reduces Energy Use	Use of energy-efficient water heaters will reduce energy use.

**Measure No. 11****Energy Efficiency Retrofits: Rio Cosumnes Correctional Center****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Modernize building systems at the RCCC (built in 1960). Install high efficiency lighting technologies and upgrade/replace HVAC systems.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings	Simple Payback (years)	Internal Rate of Return	Net Present Value
26	282	\$3,500,000	\$86,150	650,000 kWh & 19,000 therms	48	-7.4%	(\$2,592,600)

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2012	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data sourced from County's Capital Improvement Plan (CIP) and Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Installation of modern lighting and heating and cooling equipment reduces electricity and natural gas use, lowers utility bills and saves the County money.
	Reduces Energy Use	Use of modern energy-efficient lighting, heating and cooling equipment reduces energy use.

**Measure No. 12**
**Laundry System Efficiency Upgrades: Rio Cosumnes Correctional Center**  
**Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

At the RCCC, change out the conventional laundry methods that rely on hot water and chemicals to a more energy-efficient method that uses ozone (oxygen and electricity) and cold water.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
18	127	\$50,000	\$16,660	-1,200 kwh & 24,000 therms	4	20.2%	\$87,300

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	The new equipment results in a slightly higher electricity use but significantly lower natural gas use, which lowers the gas utility bill and saves the County money.
	Reduces Energy Use	New energy-efficient equipment uses less energy overall.
	Conserves Water	The new system uses less water.
	Improves Air Quality	Potential air quality benefit by using less chemicals.



**Measure No. 13****Chiller Efficiency Improvements: Juvenile Hall Central Plant****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Upgrade chilled water system equipment at Juvenile Hall to operate in variable speed mode in order to reduce energy usage and costs. For every 10% reduction in speed there is a 30% reduction in energy usage.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Total Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
29	56	\$72,000	\$22,400	200,000	4	19.4%	\$113,100

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Variable speed motors: Assume that for every 10% reduction in speed there is a 30% reduction in energy usage.
- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	New equipment reduces energy use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	New equipment reduces energy use.
	Conserves Water	New equipment may use less water.

**Measure No. 14****Improved HVAC Controls: Coroner's Building****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Upgrade the existing obsolete HVAC control system at the Coroner's Building by providing more stable, reliable and efficient Direct Digital Controls (DDC).

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings	Simple Payback (years)	Internal Rate of Return	Net Present Value
12	70	\$150,000	\$18,010	117,000 kWh & 7,000 therms	10	8.5%	\$4,300

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Direct digital control (DDC) is the automated control of an HVAC system by a computer. DDC allows customization for the intended use, including time schedules, setpoints, controllers, logic, timers, trend logs, and alarms.
- Data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Installation of modern heating and cooling equipment reduces electricity and natural gas use, lowers utility bills and saves the County money.
	Reduces Energy Use	Installation of modern heating and cooling equipment reduces electricity and natural gas use.

**Measure No. 15****Laundry System Efficiency Upgrades: Main Jail****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

At the Main Jail, change out conventional laundry methods that rely on hot water and chemicals to more energy-efficient ones that use ozone (oxygen and electricity) and cold water.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings	Simple Payback (years)	Internal Rate of Return	Net Present Value
18	142	\$50,000	\$18,740	-1,400 kWh & 27,000 therms	3	21.6%	\$104,100

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	The new equipment results in a slightly higher electricity use but significantly lower natural gas use, which lowers the gas utility bill and saves the County money.
	Reduces Energy Use	New energy-efficient equipment uses less energy overall.
	Conserves Water	The new system uses less water.
	Improves Air Quality	Potential air quality benefit by using less chemicals.



## Measure No. 16

## Efficient Lighting Retrofit: Mail Jail

## Buildings and Other Facilities

Action Plan				
A	B	C	D	E
n	y	y	y	y

## Description

Upgrade the lighting in the day rooms of the Main Jail with longer lasting, more energy-efficient lighting.

## Analysis Results

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Total Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
15	75	\$580,000	\$30,260	270,000	23	-0.2%	(\$300,800)

## Implementation

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

## Assumptions

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

## Co-Benefits

	Provides Economic Benefits/ Creates Jobs	Energy efficient lighting reduces electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Energy efficient lighting reduces energy use.

**Measure No. 17**
**Utility Power Surge (UPS) Retrofit: Dept. of Technology Building**  
**Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Replace Utility Power Surge (UPS) equipment with a smaller, more energy-efficient model.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Total Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
23	92	\$700,000	\$36,990	330,000	22	0.0%	(\$153,400)

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Use of energy efficient equipment reduces electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Use of energy efficient equipment reduces energy use.

**Measure No. 18**
**Chiller Plant Waterside Economizer: Dept. of Technology Building**  
**Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Add a heat exchanger to the chilled water system to use the cold water from the cooling tower to provide chilled water when the outside air conditions are optimal.

**Analysis Results**

Evaluation Score	Annual CO2 reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
12	11	\$58,000	\$4,480	40,000	15	3.8%	(\$18,300)

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	The new system reduces electricity use for chilling water, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Use of heat exchanger equipment reduces energy use.

**Measure No. 19****Chiller Plant Smart Controls: Dept. of Technology Building****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Upgrade the chilled water system controls, including optimized equipment settings, to improve the chiller plant efficiency and save energy.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
33	98	\$500,000	\$39,230	350,000	15	4.0%	(\$153,400)

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Upgraded equipment and operational improvements reduce energy use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Upgraded energy-efficient equipment and operational improvements reduce energy use.



**Measure No. 20**
**Chiller Plant Pump Efficiency Upgrade: Dept. of Technology Building**  
**Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Upgrade chilled water system pumps to operate in variable speed mode in order to reduce energy usage and costs. For every 10% reduction in speed there is a 30% reduction in energy usage.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
12	28	\$40,000	\$11,210	100,000	4	18.1%	\$52,800

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Variable speed mode: Assume that for every 10% reduction in speed there is a 30% reduction in energy usage.
- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Upgraded pumps reduce energy use, lower utility bills and save the County and taxpayers money.
	Reduces Energy Use	Upgraded energy-efficient pumps reduce energy use.

**Measure No. 21**
**Energy Conserving Duct Isolation Dampers: Dept. of Technology Building**  
**Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Modify the main HVAC duct dampers to isolate non-occupied floors during nights and weekends, to reduce the amount of air the main air-handling unit delivers (thereby saving energy).

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
12	13	\$36,000	\$5,040	45,000	8	10.2%	\$6,800

**Implementation**



Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Operational modifications to the HVAC system reduce electricity use, lower utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Operational modifications to the HVAC system reduce energy use.



## Measure No. 22

## Turning off Computer Monitors at Night

## Buildings and Other Facilities

Action Plan				
A	B	C	D	E
n	y	y	y	y

## Description

Implement program to turn off computer monitors at night when not in use.

## Analysis Results

Evaluation Score	Annual CO2 reduction (tons)	Total Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
26	38	\$0	\$15,060	134,389	NA	NA	\$121,400

## Implementation

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Municipal Services Agency	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

## Assumptions

- Assume each monitor consumes 80 watts and there are 450 monitors.
- Assume they all run 24 hours/day - roughly 1000kw/day. Assume 9 hour work day and computers shut off for remaining hours each day.
- **NOTE:** Only assumes 450 monitors, although many more are in operation. Savings will increase as more monitors are shut off per this policy.
- Also see assumptions described in Appendix A, Attachment 8.4.

## Co-Benefits

	Provides Economic Benefits/ Creates Jobs	Operational modifications reduce electricity use, lower utility bills and save the County and taxpayers money.
	Reduces Energy Use	Operational modifications reduce energy use.

**Measure No. 23****Installation of High Efficiency Toilets at County Offices****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	n	n	n	y

**Description**

Replace remaining pre-1992 toilets (3.5-7 gal/flush) in County buildings with high-efficiency toilets (HET; 1.28 gal/flush).

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
12	7	\$300,000	\$2,832	25,272	117	-15.9%	(\$258,900)

**Implementation**




Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2012	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Assumes 2,000 toilets.
- Assumes 12,000 employees @ 2.5 flushes/person/day and savings of 2 gal/flush = 60,000 gal saved per day.
- Average energy the SCWA used to produce and distribute one gallon of water in 2009 = .00162 kwh (1 gal water saved = .00162 kwh) (11/9/2010 Keith Hall email).
- Cost assumptions: Assumes 2,000 toilets; \$200/unit minus average rebate of \$50 plus \$100 for installation.
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	High efficiency toilets conserve water, which reduces the energy needed to treat and deliver the water, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	High efficiency toilets reduce water use and associated energy use.
	Conserves Water	High efficiency toilets conserve water (about 2-5 gal/flush, depending on type of toilet replaced).

**Measure No. 24****Large Turf Landscape Irrigation Audits at County Facilities****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	n	y	y	y

**Description**

Conduct water audits to evaluate irrigation practices in large turf landscapes around County facilities and modify irrigation practices and equipment accordingly (timers, sprinkler heads, etc). Coordinate with appropriate water conservation coordinator with applicable water purveyor.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
12	3	\$0	\$1,250	11,200	NA	NA	\$10,100

**Implementation**




			Financing								
Responsible County Department	Status*	Assumed Implementation Date	General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Water Resources – Water Supply	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- In Sacramento, turf requires about 57 inches of water applied per year. Typically overwatering on the order of 30%-50% occurs over what is needed. Irrigation practices can be altered to better conserve water. Water Conservation Coordinators can assist in coordinating a free (in many cases) irrigation system evaluation and develop a customized monthly irrigation schedule.
- For this measure, assume 15 acres of turf and 30% overwatering = 6.9M gal water saved per year.
- Average energy the SCWA used to produce and distribute one gallon of water in 2009 = .00162 kwh (1 gal water saved = .00162 kwh) (11/9/2010 Keith Hall email).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Reduced water use results in less energy needed to treat and deliver the water, lowering both water and electricity bills and saving the County and ratepayers money.
	Reduces Energy Use	Reduced water use results in reduced energy use.
	Conserves Water	New irrigation practices conserve water.



## Measure No. 25

# Replacement of Water-Wasting Equipment Related to County Operations

## Buildings and Other Facilities

Action Plan				
A	B	C	D	E
n	n	n	y	y

### Description

Replace water-wasting equipment with more efficient equipment when grant funds are available from local water purveyors. For example, replace hoses used to clean surfaces – such as at the Animal Care Facility – with water brooms.

### Analysis Results

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
12	0	\$0	\$25	224	NA	NA	\$200

### Implementation

			Financing								
Responsible County Department	Status*	Assumed Implementation Date	General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services/ Water Resources	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

### Assumptions

- Many Sacramento Area Water agencies that participate in the Regional Water Authority (RWA) will offer water conserving equipment starting in 2010 such as water brooms to CII (Commercial, Industrial or Institutional) users as part of a grant. Facilities that clean pavement with hoses, such as animal care, might benefit from such devices.
- Estimated Water Savings Calculation:
  - Replace hose nozzles with water broom, use 48 gallons rather than 528 gallons
  - ¾" hose used 60 minutes a day at 40 psi uses 528 gallons.
  - Running hose vs. water broom (8 gpm) - depends on number of hoses.
- Also see assumptions described in Appendix A, Attachment 8.4.

### Co-Benefits

	Provides Economic Benefits/ Creates Jobs	Use of new equipment reduces water use which reduces need for energy to treat and deliver the water, lowers water and electricity bills and saves the County money.
	Reduces Energy Use	Use of new equipment reduces energy use.
	Conserves Water	Use of new equipment conserves water.

**Measure No. 26****Water Booster System Replacement: Main Jail****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	n	n	y	y

**Description**

Replace the current water booster system, which ensures adequate water supply and pressure on all floors of the Main Jail, with an updated, more energy-efficient pump system. The current system is at the end of its serviceable life and difficult to maintain.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
25	21	\$500,000	\$8,290	74,000	72	-11.0%	(\$402,700)

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data sourced from County's Capital Improvement Plan (CIP) and Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Replacement of the old water booster equipment with more energy-efficient equipment reduces energy use, lowers utility and maintenance costs and saves money
	Reduces Energy Use	The new equipment reduces energy use.

**Measure No. 27****HVAC Energy Modifications: County Administration Building****Buildings and other facilities**

Action Plan				
A	B	C	D	E
n	n	n	n	y

**Description**

Change the HVAC fans for the office areas from constant volume air-flow to variable air-flow to reduce energy usage and costs. For every 10% reduction in speed there is a 30% reduction in energy usage.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings	Simple Payback (years)	Internal Rate of Return	Net Present Value
23	213	\$1,900,000	\$77,050	650,000 kWh & 6,000 therms	29	-2.7%	(1,163,300)

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Variable speed motors: Assume that for every 10% reduction in speed there is a 30% reduction in energy usage.
- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Equipment modifications reduce electricity and natural gas use, lower utility bills and save the County and taxpayers money.
	Reduces Energy Use	Equipment modifications reduce energy use.





## Measure No. 28

## Countywide Streetlight Conversion Project (HPS &amp; MV to LED)

## Streetlights and Traffic Signals

Action Plan				
A	B	C	D	E
n	y	y	y	y

## Description

This project involves additional conversion of existing high-pressure sodium (HPS) and mercury-vapor (MV) streetlights in residential areas throughout the County to energy-saving light-emitting diode (LED) technology.

## Analysis Results

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
52	1453	\$6,250,000	\$582,802	5,200,000	13	0.6%	(\$3,611,300)

## Implementation

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
SACDOT	Future	2014					yes				

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

## Assumptions

- Assumes replacement of approximately half of the County's 22,374 high-pressure sodium (HPS) and mercury-vapor (MV) streetlights to LED. HPS lights consume between 50-400 watts each, while MV consume between 100-400 watts each. Equivalent LED's consume less than half the wattage of HPS and MV streetlights.

## Co-Benefits

	Provides Economic Benefits/ Creates Jobs	LED technology uses less electricity than conventional lights, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	LED technology reduces energy use.
	Protects Public Health/Safety	More energy efficient lighting decreases need for cycling/darkening activities which could impact public safety.

**Measure No. 29****Green Building Policy for Leased County Buildings****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	y	y	y	y

**Description**

Adopt a "Leased Green Building" policy that establishes criteria for County lease agreements, where the County will only enter into new leases when buildings meet specified energy efficiency or other green building standards.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
31	546	\$20,000	\$184,910	1,500,000 kwh & 24,000 therms	0	67.5%	\$1,471,700

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Assumes \$20,000 implementation cost to create the policy and get it included in the new lease agreements.
- Assumes new leases would reduce the total energy consumption for leased spaces by 5% from current levels. Initially, some renewed leases could be 20% more efficient while existing leases would remain the same, with an end (average) result of a 5% total energy consumption reduction by 2020.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Energy efficient buildings reduce energy use, lower utility bills and save the County and taxpayers money.
	Reduces Energy Use	Green building features such as energy and water efficient equipment and operations reduce energy use.
	Conserves Water	Water efficient equipment and operations conserve water.



## Measure No. 30

### Fleet Replacement 1

#### Vehicle Fleet

Action Plan				
A	B	C	D	E
n	y	n	n	n

### Description

Replace small and mid-size sedans with small and mid-size hybrid sedans, and one large sedan type with mid-size (total of 328 replacements).

### Analysis Results

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Fuel (gas) Savings (gal)	Simple Payback (years)	Internal Rate of Return	Net Present Value
38	674	\$1,870,000	\$216,850	76,787	10	8.1%	(\$8,200)

### Implementation

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services/Fleets	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

### Assumptions

See Appendix A, Attachment 8.6.

### Co-Benefits

	Provides Economic Benefits/ Creates Jobs	Operation of hybrid vehicles results in lower fuel bills and saves the County and taxpayers money in operational costs.
	Reduces Energy Use	Operation of hybrid vehicles results in less fossil fuel energy use.
	Improves Air Quality	Operation of hybrid vehicles results in less emissions/air pollution.



## Measure No. 31

### Fleet Replacement 2

#### Vehicle Fleet

Action Plan				
A	B	C	D	E
n	n	y	n	n

#### Description

Fleet Replacement 1 scenario Plus:

Replace light duty pickups with gasoline hybrid pickups, and replace two types of large trucks (F350/450) with CNG trucks (total of 552 replacements).

#### Analysis Results

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Total Capital Cost	Annual Cost Savings	Annual Fuel Savings (gal)	Simple Payback (years)	Internal Rate of Return	Net Present Value
46	962	\$4,834,000	\$337,980	109,300 (gas) 16,700 (diesel)	14	2.8%	(\$1,815,400)

#### Implementation

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services/Fleets	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

#### Assumptions

See Appendix A, Attachment 8.6.

#### Co-Benefits

	Provides Economic Benefits/ Creates Jobs	Operation of hybrid and alternative fuel-powered vehicles results in lower fuel bills and saves the County and taxpayers money in operational costs.
	Reduces Energy Use	Operation of hybrid and alternative fuel-powered vehicles results in less fossil fuel energy use.
	Improves Air Quality	Operation of hybrid vehicles results in less emissions/air pollution.



## Measure No. 32

### Fleet Replacement 3

#### Vehicle Fleet

Action Plan				
A	B	C	D	E
n	n	n	y	n

#### Description

Replace small and mid-size sedans with small and mid-size hybrid sedans, replace large sedans with mid-size, replace light duty pickups with hybrid pickups, and replace large trucks with CNG (total of 839 replacements)

#### Analysis Results

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Fuel Savings (gal)	Simple Payback (years)	Internal Rate of Return	Net Present Value
50	1354	\$7,491,500	\$484,780	157,600 (gas) 24,600 (diesel)	18	2.0%	(\$3,128,000)

#### Implementation

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services/Fleets	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

#### Assumptions

See Appendix A, Attachment 8.6.

#### Co-Benefits

	Provides Economic Benefits/ Creates Jobs	Operation of hybrid and alternative fuel-powered vehicles results in lower fuel bills and saves the County and taxpayers money in operational costs.
	Reduces Energy Use	Operation of hybrid and alternative fuel-powered vehicles results in less fossil fuel energy use.
	Improves Air Quality	Operation of hybrid vehicles results in less emissions/air pollution.



## Measure No. 33

### Fleet Replacement 4

#### Vehicle Fleet

Action Plan				
A	B	C	D	E
n	n	n	n	n

#### Description

Replace small and mid-size sedans with small and mid-size hybrid sedans, replace large sedans with mid-size, replace light duty pickups with hybrid pickups, and replace large trucks with CNG (total of 1,237 replacements).

#### Analysis Results

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Fuel Savings (gal)	Simple Payback (years)	Internal Rate of Return	Net Present Value
50	2147	\$8,507,500	\$741,920	246,900 (gas) 27,000 (diesel)	14	5.1%	(\$2,009,400)

#### Implementation

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services/Fleets	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

#### Assumptions

See Appendix A, Attachment 8.6. Note: This fleet replacement strategy was included in the list of 69 measures analyzed for this plan but was not selected for any of the 5 alternative plans discussed in Chapter 3; Fleet Replacement Scenario 5 was selected instead due to better savings and GHG reductions.

#### Co-Benefits

	Provides Economic Benefits/ Creates Jobs	Operation of hybrid and alternative fuel-powered vehicles results in lower fuel bills and saves the County and taxpayers money in operational costs.
	Reduces Energy Use	Operation of hybrid and alternative fuel-powered vehicles results in less fossil fuel energy use.
	Improves Air Quality	Operation of hybrid vehicles results in less emissions/air pollution.



## Measure No. 34

### Fleet Replacement 5

#### Vehicle Fleet

Action Plan				
A	B	C	D	E
n	n	n	n	y

#### Description

Replace small and mid-size sedans with small and mid-size hybrid sedans, replace large sedans with mid-size, replace light duty pickups with hybrid pickups, and replace large trucks with CNG (total of 1,250 replacements)

#### Analysis Results

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Fuel Savings (gal)	Simple Payback (years)	Internal Rate of Return	Net Present Value
50	2175	\$8,680,000	\$751,110	250,100 (gas) 27,000 (diesel)	14	5.0%	(\$2,097,300)

#### Implementation

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

#### Assumptions

See Appendix A, Attachment 8.6.

#### Co-Benefits

	Provides Economic Benefits/ Creates Jobs	Operation of hybrid and alternative fuel-powered vehicles results in lower fuel bills and saves the County and taxpayers money in operational costs.
	Reduces Energy Use	Operation of hybrid and alternative fuel-powered vehicles results in less fossil fuel energy use.
	Improves Air Quality	Operation of hybrid vehicles results in less emissions/air pollution.



## Measure No. 35

## Solar Power (Photovoltaic PV) Option 1 – 5.25 MW

## Buildings and Other Facilities

Action Plan				
A	B	C	D	E
n	y	y	y	y

## Description

PV 5.25MW (no location specified) (Power Purchase Agreement)

## Analysis Results

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
43	1895	\$10,000	\$760,037	6,781,363	57	100.7%	\$5,374,600

## Implementation

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Undefined	Future	2014							yes		

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

## Assumptions

- Assumes cost of \$10,000 to seek and retain a qualified vendor/builder for a Power Purchase Agreement.
- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

## Co-Benefits

	Provides Economic Benefits/ Creates Jobs	Use of solar power reduces conventional electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Use of solar power reduces fossil fuel energy use and provides a more reliable energy source.





## Measure No. 36

## Solar Power (Photovoltaic, PV) Option 2 - 1MW

## Buildings and Other Facilities

Action Plan				
A	B	C	D	E
n	n	n	n	n

## Description

PV 1MW (no location specified)

## Analysis Results

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
36	361	\$7,002.083	\$144,700	1,291,700	54	-10.2%	(\$5,550,900)

## Implementation

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Undefined	Future	2012	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

## Assumptions

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.
- Note: Five power options were analyzed to demonstrate the relative costs and benefits of different size solar PV systems (ranging from 100kW to 3MW). Although four of the five options (including this one) are not included in any of the alternative plans, the County is interested in implementing such projects in the future when found to be cost-effective. This analysis is intended to be used as a starting point for determining feasibility of a future solar project.

## Co-Benefits

	Provides Economic Benefits/ Creates Jobs	Use of solar power reduces conventional electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Use of solar power reduces fossil fuel energy use and provides a more reliable energy source.

**Measure No. 37****Solar Power (Photovoltaic, PV) Option 4 - 500kW****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	n	n	n	n

**Description**

PV 500kW (no location specified)

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
30	180	\$3,502,843	\$72,380	645,800	57	-10.2%	(\$2,776,800)

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.
- Note: Five power options were analyzed to demonstrate the relative costs and benefits of different size solar PV systems (ranging from 100kW to 3MW). Although four of the five options (including this one) are not included in any of the alternative plans, the County is interested in implementing such projects in the future when found to be cost-effective. This analysis is intended to be used as a starting point for determining feasibility of a future solar project.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Use of solar power reduces conventional electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Use of solar power reduces fossil fuel energy use and provides a more reliable energy source.

**Measure No. 38****Solar Power (Photovoltaic, PV) Option 5 – 100kW****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
n	n	n	n	n

**Description**

PV 100kW (no location specified)

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
18	36	\$702,843	\$14,480	129,200	58	-10.2%	(\$557,500)

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Future	2014	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.
- Note: Five power options were analyzed to demonstrate the relative costs and benefits of different size solar PV systems (ranging from 100kW to 3MW). Although four of the five options (including this one) are not included in any of the alternative plans, the County is interested in implementing such projects in the future when found to be cost-effective. This analysis is intended to be used as a starting point for determining feasibility of a future solar project.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Use of solar power reduces conventional electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Use of solar power reduces fossil fuel energy use and provides a more reliable energy source.

**Measure No. 39****Countywide Streetlight Conversion Project (MV to LED)****Streetlights and Traffic Signals**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Converted 1800 existing mercury-vapor streetlights in the unincorporated county to energy-saving LED lighting technology.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	281.7	\$837,000	\$112,974	1,008,000	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
SACDOT	Completed	2011									

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Replaced 1800 existing mercury-vapor streetlights (175 watts each; \$54.76 in electricity cost each per year) with LED lighting technology (65 watts each; \$18.97 in electricity cost each per year)
- Assumed labor per unit - \$125
- Assumed fixture cost per unit - \$340

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	LED technology uses less electricity than conventional lights, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	LED technology reduces energy use.
	Protects Public Health/Safety	More energy efficient lighting decreases need for cycling/darkening activities which could impact public safety

**Measure No. 40****Cogeneration Facility for Terminal B – Sacramento International Airport****Airport Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Purchased and installed a 1 MW cogeneration facility for the new Central Terminal B complex at Sacramento International Airport.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	214.6	\$961,000	\$568,527	7,190,208 (kwh) & -339,160 (therms)	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Completed	2011									

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- American Reinvestment and Recovery Act (ARRA) funded project
- Project included the design, purchase and installation of a 1 (one) Megawatt generator to complete a Cogeneration power system to serve the new \$1.1 billion central terminal complex at Sacramento International Airport. The Cogeneration Facility utilizes a single engine, 1 (one) Megawatt, Lean Burn Low NO<sub>x</sub> Natural Gas-fired reciprocating engine cogeneration plant with hot water heat recovery. This allows for local generation of a significant portion of the required base electrical load, eliminating the line loss and other inefficiencies associated with transmitting this power from a remote site. As a by-product of electricity production, the waste heat from the generator is utilized to provide both heating and cooling via a heat exchanger and an absorption chiller. This heat would ordinarily be dissipated into the atmosphere and be wasted. The system is "base loaded", which means it is sized so that when running at its most efficient rate, all of the electrical energy and heat energy is fully utilized by the building. The local, dedicated production of power also allows the deletion of one diesel backup generator, further reducing the potential production of GHG and NO<sub>x</sub> emissions.
- Also see assumptions described in Appendix A, Attachment 8.4

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Use of cogeneration (on-site generation of electricity by burning of methane [natural gas by-product]) reduces the need for external electrical power and saves money.
	Reduces Energy Use	Operation of the cogeneration plant reduces the amount of external energy use required to power the terminal.

**Measure No. 41****Energy Efficiency Retrofits: Gibson Ranch Park****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Installed energy-efficient heating, ventilation, and air conditioning (HVAC) at Gibson Ranch Park.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	4.8	\$489,436	\$1,905	17,000	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Completed	2011			yes						

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- American Reinvestment and Recovery Act (ARRA) funded project
- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Energy efficient equipment reduces electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Energy efficient equipment reduces energy use.

**Measure No. 42****Energy Efficiency Upgrades: Jean Harvie Community Center & Caretaker House****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Installed energy-efficiency upgrades (including energy efficient roof/insulation, electrical system and appliances) when renovating the Jean Harvie Community Center and Caretaker House.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	3.4	\$97,887	\$1,345	12,000	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

			Financing								
Responsible County Department	Status*	Assumed Implementation Date	General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Completed	2011				yes					

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- American Reinvestment and Recovery Act (ARRA) funded project
- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Energy efficient equipment reduces electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Energy efficient equipment reduces energy use.

**Measure No. 43****Energy Audits and Improvements Using Financial Incentive Revolving Fund****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Performed energy audits of 35% of square footage of County facilities and implemented cost-effective and short-payback energy efficient improvements to reduce energy use by 5%. To ensure a sustainable funding source, capital and staff costs were paid by the financial incentive revolving fund, which will be reimbursed by money saved through ongoing energy savings.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	586.8	\$806,740	\$235,362	2,100,000	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

			Financing								
Responsible County Department	Status*	Implementation Date	General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Completed	2011				yes					

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- American Reinvestment and Recovery Act (ARRA) funded project
- The costs and benefits for this measure assume that energy audits are performed for 35% of square footage of County facilities and energy efficient improvements are implemented to reduce energy use by 5%. Data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Energy efficient equipment reduces electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Energy efficient equipment reduces energy use.



**Measure No. 44****Traffic Signal System Upgrade (Energy Efficient LED Bulbs)****Streetlights and Traffic Signals**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Converted all 589 traffic signals in the County from incandescent light bulbs to LED.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	1942.2	\$2,555,000	\$779,042	6,950,932	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
SACDOT	Completed	2010	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Sacramento County began the conversion of street signals from incandescent light bulbs to light emitting diode (LED) technology in 1997. As of 2010, all of the 589 traffic signals maintained by the County have been upgraded to LEDs. LEDs are more energy-efficient, consuming approximately 10% of the electrical power required to light an incandescent traffic signal. They also have a longer life expectancy – about five times longer than incandescents.
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	LED technology uses less electricity than conventional lights, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	LED technology reduces energy use.

**Measure No. 45****Replacement of CRT Monitors with Energy Efficient Flat Panel Monitors****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Since 2005, replaced CRT monitors with flat panel LCD monitors at virtually all County workstations.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	2	NA	\$808	7,208	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis. Net capital cost was not

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Technology	Completed	2010	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Assume 1340 units were converted to CRT. NOTE: This only reflects data available for the Municipal Services Agency – the actual number of countywide conversions is far higher (potentially 10-fold).
- Assume that each CRT consumes 73 watts in active mode and LCD consumes 41 watts (LBNL 2007).
- Cost assumptions: CRT=\$149, LCD= \$299 (Energy Star Calculator).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Use of more energy efficient computer equipment reduces electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Use of more energy efficient computer equipment reduces energy use.

**Measure No. 46****Green Building Features in Terminal B – Sacramento International Airport****Airport Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Incorporated energy and water efficiency green building features in construction of Central Terminal B (certified LEED Silver) which opened in October 2011 at Sacramento International Airport.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	-570.3	\$1.072 B	-\$228,744	1,048,299	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Completed	2011		Yes			yes	yes			

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Data provided by airports for net capital cost and new terminal energy consumption.
- The data reflects the net increase in energy use (i.e., difference between energy consumed by old terminal facility and new Terminal B). Although the new complex is certified LEED Silver and will be far more energy efficient than the terminal it replaced (circa 1967), those energy savings are offset by the fact that the new complex is 750,000 sf compared to the old terminal of 250,000 sf.
- Assume baseline (non-LEED) Terminal B would consume 3,089,249 kwh/year. Terminal B as constructed is anticipated to consume only 2,040,950 kwh/year due to its green building features and energy efficiency/renewable energy measures. The net result is an energy savings of 1,048,299 kwh/year.
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits (as compared to old terminal or conventional construction)**

	Provides Economic Benefits/ Creates Jobs	Energy and water efficient lighting and equipment reduces electricity use, lowers utility bills and saves money related to long-term operation.
	Reduces Energy Use	Energy efficient equipment reduces energy use for long-term operation.
	Conserves Water	Water efficient equipment (e.g., toilets, faucets) conserves water.

**Measure No. 47****Terminal B Underground Hydrant Fueling – Sacramento International Airport****Airport Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Constructed a hydrant fueling system at the new Central Terminal B. This eliminates the need for fuel trucks at Terminal B, enhancing safety and eliminating air pollution, including GHGs.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Fuel (diesel) Savings (gal)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	0	\$14,000,000	0	NA	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

			Financing								
Responsible County Department	Status*	Implementation Date	General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Completed	2011		Yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Constructed a new hydrant fueling system for the new Central Terminal B. This improvement will eliminate the need for fuel trucks at Terminal B enhancing both safety at the airport and eliminating air pollution created by the trucks. The analysis assumes that this is a new service associated with the new Terminal B. This measure shows no energy or CO<sub>2</sub> savings as it is a new (additional) service implemented after the 2005 emissions baseline was created. Therefore, the benefit of this measure is that it prevented additional emissions from being added to the County's inventory; without this project, significant new emissions would have to be calculated and added to the inventory (from additional fuel consumption and associated emissions resulting from the fuel being conveyed via trucks.)
- The Airport has constructed the portion which terminates at taxiway W. The airline consortium is responsible for financing the completion of the project. Full implementation of this project is unknown at this time.
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Elimination of truck trips lowers diesel fuel costs, saving money.
	Improves Water Quality	Elimination of fuel truck trips through the airport reduces risk of spills which could impair runoff water quality.
	Improves Air Quality	Reduced vehicle miles by fuel trucks reduces air pollution.
	Protects Public Health/Safety	Elimination of fuel truck trips through the airport reduces risk of spills and other hazards.

**Measure No. 48****Fixed Base Water Meter Reading System (Pilot Study)****Water Delivery Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

SCWA conducted a successful pilot study with establishment of a fixed base water meter reading system for 4000 customer accounts. The computer-based system uses radios and saves fuel and labor by eliminating the need for people and vehicles to read meters. The measure also helps identify water leaks. This tool will aid SCWA in meeting the State's mandate for 20% reduction in per capita water use by 2020.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Fuel Savings (gal)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	0.1	\$0	\$34	12	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**




Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
SCWA	Completed	2010		yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- There is not enough data at this time to calculate water savings using the FBMRS in addition to the savings from water meters, but there is enough to calculate potential annual gas savings. SCWA has about 49,200 accounts. Of the total accounts, 4,000 have the FBMRS and information is captured without the use of people or vehicles. If these meters were read, it is estimated to use 12 gallons of gas per year (assuming scooters 40 mpg). If expanded to current account levels this could save as much as 150 gallons of gas annually.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Reduction in fuel costs.
	Reduces Energy Use	Reduced use of fossil fuel energy related to vehicle trips.
	Conserves Water	The measure helps identify water leaks which can be remedied to save water.

**Measure No. 49****Routing Efficiencies for Waste Collection Trucks****Vehicle Fleet**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

In 2009, DWMR adjusted the routes of its collections fleet to reduce the number of direct waste haul trips needed to Kiefer Landfill. More trucks now take waste to the intermediary North Area Recovery Station (NARS) where various waste streams are combined into larger trucks for delivery to the landfill, thus resulting in a net decrease in vehicle trip miles.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Fuel Savings (gal)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	209.6	\$0	\$58,608	65,000 (LNG)	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Waste Management and Recycling	Completed	2010		yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Reduction in collection truck routes: Re-routing reduced collection truck routes from the residential curbside collection of municipal solid waste (MSW), greenwaste, and comingled recyclables leading to reduced vehicle trip miles incurred by the collection fleet.
- Reduction in travel distance: DWMR redirected more than 10 routes from the county service area to NARS instead of Kiefer Landfill, resulting in 1000 fewer miles per week in collection vehicle trip miles. Since NARS is a transfer station, the MSW re-routed to NARS eventually needs to be sent to the landfill for disposal. While re-routing increased the trip miles from the NARS to Kiefer Landfill, the transfer trucks used for these trips haul 20 tons of MSW per load compared to collection trucks that typically only haul 6 tons of MSW per load. As a result, there is a substantial overall reduction in vehicle trip miles.

Vehicle	Capacity (ton)	Fuel	Trips (based on annual miles reduced)	Miles per Trip reduced	MPG	Net annual miles reduced	Annual Gallons LNG Saved	Annual Gallons Diesel Saved	Cost (\$/gal LNG)	Cost (\$/gal Diesel)
Refuse	6	LNG	1000	52	0.8	52000	65000	0	\$1.27	
Transfer	20	Diesel	300	-52	5	-15600	0	-3120		\$3.05

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Reduced vehicle trip miles reduces fuel use which results in cost savings to the County and taxpayers
	Improves Air Quality	Reduced vehicle trip miles reduces emissions and air pollution.

**Measure No. 50****Reduce Landside Lighting at Sacramento International Airport****Streetlights and Traffic Signals**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Turned off three of six 1000W lights on 100ft-tall light masts in landside areas of the Sacramento International Airport.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kWh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	391.2	\$0	\$156,908	1,400,000	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Completed	2010		Yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Turn off three of six 1000W lights on 100ft-tall light masts in landside areas of the Sacramento International Airport.
- Cost and energy savings data provided by Greg Rowe, SCAS 11/18/2010.
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Operational changes to reduce lighting lowers electricity use/utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Operational changes to lighting reduces energy use.



**Measure No. 51****Reduce Interior Lighting at Terminal A – Sacramento International Airport****Airport Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Reduce the interior lighting levels (and associated energy consumption) in Terminal A through use of automatic lighting controls (lighting software) set to run on a modified schedule.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kWh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	124.2	\$0	\$49,812	444,444	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

			Financing								
Responsible County Department	Status*	Implementation Date	General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Completed	2010		Yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Estimated costs and benefits for this measure are based on reducing the interior lighting levels (and associated energy consumption) in Terminal A through use of automatic lighting controls (lighting software) set to run on a modified schedule
- Cost and energy savings data provided by Greg Rowe, SCAS 11/18/2010.
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Operational changes to reduce lighting lowers electricity use/utility bills and saves money.
	Reduces Energy Use	Operational changes to lighting reduces energy use.



**Measure No. 52****Energy Efficient Retrofit at Airport Terminal A Cooling Towers****Airport Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

SCAS renovated Terminal A Cooling Towers, increasing efficiency and reducing energy consumption.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kWh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	70.6	\$0	\$28,324	252,720	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Completed	2010		Yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Rehabilitation resulted in a 10% increased efficiency, resulting in annual energy savings of 252,720 kWh.
- Cost and energy savings data provided by Greg Rowe, SCAS 11/18/2010.
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Renovations to equipment reduces electricity use, lowers utility bills and saves money.
	Reduces Energy Use	More energy-efficient equipment results in reduced energy use.

**Measure No. 53****Energy Efficient HVAC Management System for Terminal A Central Utilities Plant****Airport Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Converted central plant to an all-variable speed system and utilized HVAC management system to decrease energy use by optimizing plant operations, scheduling equipment (e.g., equipment is turned off during non-occupied hours), utilizing free cooling, etc.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kWh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	263.8	\$269,520	\$105,821	944,175	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

			Financing								
Responsible County Department	Status*	Assumed Implementation Date	General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Completed	2010		Yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Air conditioner equipment power is described in terms of "tons of refrigeration". A ton of refrigeration is approximately equal to the cooling power of one short ton (2000 pounds) of ice melting in a 24-hour period. The value is defined as 12,000 BTU per hour, or 3517 watts. Residential central air systems are usually from 1 to 5 tons (3 to 20 kilowatts [kW]) in capacity.
- The estimated costs and benefits for this measure are based on a 1000-ton system.
- Cost and energy savings data provided by Greg Rowe, SCAS 11/18/2010.
- Also see assumptions provided in Appendix A, Attachment 8.4.

Plant Design (tons)	Est. Annual Load (ton-hrs)	Energy Usage Savings (kWh/yr)	Demand Savings (kW)	Water Usage Savings (gal/yr)	Energy Costs Savings (\$/yr)	Est. Imp. Cost (\$)	Est. Incentive (\$)	Final cost after incentive (\$)	GHG Reduction (lbs/yr)	IRR (%)	Simple Payback (yrs)
1,000	2,307,902	944,175	53.9	166,169	\$77,029	\$319,520	\$50,000	\$269,520	980,997	29%	3.5

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Equipment and operational modifications result in less energy use, lower utility bills and cost savings.
	Reduces Energy Use	Equipment and operational modifications result in less energy use.

**Measure No. 54****Energy Efficiency Improvements for Air Handlers at SCAS Facilities****Airport Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Adjusted economizer operations and programming on existing Direct Digital Control (DDC) constant volume air handlers to fully utilize free cooling.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kWh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	33.2	\$0	\$13,325	118,888	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Completed	2010		Yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Direct digital control (DDC) is the automated control of an HVAC system by a computer. DDC allows customization for the intended use, including time schedules, setpoints, controllers, logic, timers, trend logs, and alarms.
- Constant volume DDC air handlers run at one speed only and is either on or off, as opposed to a variable air volume air handler which speeds up and slows down, which in turn increases or decreases the air volume.
- The energy savings are based on using free outside air (OSA) cooling from 70 to 73 deg.
- Cost and energy savings data provided by Greg Rowe, SCAS 11/18/2010.
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Equipment and operational modifications result in less energy use, lower utility bills and cost savings.
	Reduces Energy Use	Equipment and operational modifications result in less energy use.

**Measure No. 55****Shutting Off Airport Escalators After Hours****Airport facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Seven escalators at the Sacramento International Airport are shut off from midnight to 6 a.m. This saves energy and extends life of the equipment.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kWh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	6.1	\$0	\$2,454	21,900	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Completed	2011		Yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Based on operation of escalators 18 hrs/day instead of 24 hrs/day.
- Cost and energy savings data provided by Greg Rowe, SCAS 11/18/2010.
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Operational modifications result in less energy use, lower utility bills and cost savings.
	Reduces Energy Use	Operational modifications result in less energy use.

**Measure No. 56****Sheriff Administration Building Cooling Source Replacement****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Provided a new source of energy-efficient cooling for the Sheriff Administration building. Its chiller used an outdated refrigerant which had to be replaced or converted when needing major repairs. This facility was connected to the County Dept. of Technology chillers to supply chilled water for cooling.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	195.6	NA	\$78,454	700,000	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis. Net Capital Cost data was not available for this analysis.

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Completed	2010	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Energy efficient equipment reduces electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Energy efficient equipment reduces energy use.

**Measure No. 57****Shutting Off Computer Monitors at Night****Airport facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Implemented policy to shut off computer monitors at night, reducing electricity and extending the life of monitors.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kWh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	37.6	\$0	\$15,062	134,389	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Completed	2010		Yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Assume each monitor consumes 80 watts and there are 550 monitors (11/15/2010 James Lane email).
- Assume they all run 24 hours/day - roughly 1000kw/day. Assume 9 hour work day and computers shut off for remaining hours each day.
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Operational modifications result in less energy use, lower utility bills and cost savings.
	Reduces Energy Use	Operational modifications result in less energy use.

**Measure No. 58****Improved Landscape Maintenance Efficiencies at SCAS Facilities: Larger Mowers****Vehicle Fleet**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Utilize larger mowers (72 inch to 11 ft), which cut twice as much grass as previous conventional mowers. Though the larger mowers consume more fuel, an aggregate savings is realized by using fewer tractors/mowers.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Fuel Savings (gal)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	13.3	\$75,000	\$3,671	1,300 (Diesel)	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**



Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Completed	2010		Yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- 3 mowers times cost difference of \$25,000 each (cost of 11' mower minus cost of 72" that was already going to be purchased).
- Cost and energy savings data provided by Greg Rowe, SCAS 11/18/2010.
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Lower fuel costs and reduced labor saves the County and taxpayers money.
	Improves Air Quality	Reduction in mower use reduces emissions and air pollution.

**Measure No. 59**

## Improved Landscape Maintenance Efficiencies at SCAS Facilities: Swather Mowers

**Vehicle Fleet**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Utilize a swather that cuts 22 feet per pass to maintain airport landscapes. The swather is more fuel efficient than tractor/mowers and cuts at twice the speed of a traditional tractor/mower.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Fuel Savings (gal)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	15.2	\$91,000	\$4,194	1,485 (Diesel)	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**



Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Airports	Completed	2010		Yes							

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Assume 1,700 acres times 0.874 gallons of diesel fuel saved per acre.
- Cost and energy savings data provided by Greg Rowe, SCAS 11/18/2010.
- Also see assumptions provided in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Lower fuel costs and reduced labor saves the County and taxpayers money.
	Improves Air Quality	Reduction in mower use reduces emissions and air pollution.



**Measure No. 60**

## Energy Efficient Improvements to Mechanical Systems: Mental Health Treatment Center

### Buildings and Other Facilities

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Modernized building systems at the Mental Health Treatment Center (built in 1991); provided high efficiency lighting technologies and more efficient HVAC systems. This project is an Energy Services Company (ESCO) process enabled under California Government Code 4217.10.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	525.9	NA	\$165,711	1,280,000 kwh & 31,800 therms	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis. Net Capital Cost was not available for this analysis.

**Implementation**



Responsible County Department	Status*	Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Completed	2010									

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Energy efficient equipment reduces electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Energy efficient equipment reduces energy use.

**Measure No. 61**
**Energy Efficient Upgrades: John Price District Attorney Building**  
**Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Installed new HVAC controls (meeting current standard for interfacing with downtown central plant), including converting to a variable air volume (VAV) system. The improvements increased HVAC efficiency and alleviated heating/cooling problems.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	76.2	\$450,000	\$28,859	250,000 kwh & 1200 therms	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Completed	2011	no								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Energy efficient equipment reduces electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Energy efficient equipment reduces energy use.

**Measure No. 62****County Administration Building Central Plant Improvements****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Replaced outdated equipment at the Downtown District heating and cooling plant (700 H Street; circa 1978-2008) with more efficient environmentally-compliant models. Replaced chillers, heating boilers, variable speed air handlers, and energy efficient pumping systems. Reused existing infrastructure in the rebuilding of the plant.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	1024.9	\$3,500,000	\$368,433	3,100,000 kwh & 30,000 therms	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Completed	2011									

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- The older equipment was beyond its reliable serviceable life and in need of replacement. The chillers used an obsolete refrigerant no longer available and the cooling capacity no longer met the existing demand of the facilities the plant serves. One heating boiler was replaced in 2008, the remaining two boilers were limited in operations because of current Sacramento Metropolitan Air Quality Management District emission standards. Chiller replacement with environmentally compliant refrigerants, heating boilers that meet today's emission standards, variable speed air handlers, and energy efficient pumping systems reduce the operating costs now and into the future. The reduction in project costs is largely due to the cost saving of rebuilding the existing central plant and reusing existing infrastructure.
- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Energy efficient equipment reduces electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Energy efficient equipment reduces energy use.

**Measure No. 63**

# Energy Efficient Improvements to Lighting and Mechanical Systems: Building Inspection Facility

## Buildings and Other Facilities

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

Upgraded lighting and mechanical system to be energy-efficient when other improvements (e.g., roofing) were made to the Building Inspection Facility.

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	108.5	NA	\$33,128	250,000 kwh & 7,300 therms	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis. Net Capital Cost was not available for this analysis.

**Implementation**

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Completed	2010	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Dan Mendonsa, DGS (May 2011).
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Energy efficient lighting and equipment reduces electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Energy efficient lighting and equipment reduces energy use.



## Measure No. 64

### Server Virtualization Effort

#### Buildings and Other Facilities

Action Plan				
A	B	C	D	E
y	y	y	y	y

### Description

Virtualized 421 servers onto a platform of 10 physical servers.

### Analysis Results

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	251.6	NA	\$100,931	900,552	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis. Net capital cost data was not available for this measure.

### Implementation

Responsible County Department	Status*	Assumed Implementation Date	Financing								
			General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
Technology	Completed	2012	yes								

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

### Assumptions

- Assume average energy consumption of 200 kwh/server per month including datacenter savings.
- Cost and energy savings information provided by Brenda Bongiorno, DTEch 9/29/2010.
- Also see assumptions described in Appendix A, Attachment 8.4.

### Co-Benefits

	Provides Economic Benefits/ Creates Jobs	Use of virtual servers is more energy efficient, reduces energy use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Use of virtual servers reduces energy use as compared to physical servers.

**Measure No. 65****Solar Power (Photovoltaic, PV) Option 3****Buildings and Other Facilities**

Action Plan				
A	B	C	D	E
y	y	y	y	y

**Description**

PV 1MW (located at Vineyard Surface Water Treatment Plant) (Power Purchase Agreement)

**Analysis Results**

Evaluation Score	Annual CO <sub>2</sub> reduction (tons)	Net Capital Cost	Annual Cost Savings	Annual Energy Savings (kwh)	Simple Payback (years)	Internal Rate of Return	Net Present Value
NA	360.9	\$10,708	\$144,769	1,291,688	NA	NA	NA

NA: Since this measure has been completed or is funded and in the process of being completed, some financial metrics were not included in the Consultant's cost-benefit analysis.

**Implementation**

			Financing								
Responsible County Department	Status*	Implementation Date	General Fund	Enterprise Fund	2009 Federal Stimulus	2010 Energy Eff. Grant (EECBG)	Other Grant	Utility Rebate	Power Purchase Agreement	Revolving Energy Fund (REF)	To Be Determined
General Services	Completed	2011	yes						yes		

\* Assumed status for purposes of analysis. "Completed" with a future implementation date indicates funding is secured.

**Assumptions**

- Cost and energy savings data provided by Mike Crooks, Water Resources.
- Also see assumptions described in Appendix A, Attachment 8.4.

**Co-Benefits**

	Provides Economic Benefits/ Creates Jobs	Use of solar power reduces conventional electricity use, lowers utility bills and saves the County and taxpayers money.
	Reduces Energy Use	Use of solar power reduces fossil fuel energy use and provides a more reliable energy source.

## APPENDIX C

### Results of Sacramento County Employee Commute Survey, Fall 2010

Sacramento County Commuter Survey Results	18-Oct-10
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Overall Results	
Estimated Employees	11,000
Total valid responses (sample)	3140
Total miles (all respondents)	20,476,080

Single Occupancy Vehicle (SOV)	
Total miles SOV	16,707,656
Ave mpg SOV	24.36
Total gallons	685,907

Carpool Results	
Carpool Total Miles per year	1,555,824
Carpool MPG	25.22
Carpool Count (people in carpool)	2.24
Total Gasoline Gals per year	26,675



Rail or Bus	
Rail or Bus Total Miles per year	686,242
Total Gals per year	3,483
Rail or Bus Diesel (gals)	245
Rail Bus NG (gal equiv)	2,704

Motorcycle	
Motorcycle Total Miles per year	207,151
Motorcycle Gasoline (gals)	4,548






















Results Tabulation	Total Miles per year	Annual Gasoline (gals)	Annual Diesel (gals)	Annual E20 (gals)	Annual B20 (gals)	Annual B100 (gals)	Annual NG (gal equiv)
SOV	16,707,656	707,728	15,174	3,859	2,497	456	0
Commute	1,555,824	26,675	366	0	0	0	0
Rail or Bus	686,242	0	245	0	0	0	2,704
Motorcycle	207,151	4,548	0	0	0	0	0
Bicycle or Walking	133,027	0	0	0	0	0	0
Totals	19,289,901	738,951	15,784	3,859	2,497	456	2,704
Total per Employee	6,143	235	5	1	1	0	1
Total 2009	67,576,085	2,588,683	55,294	13,520	8,748	1,598	9,474



Sacramento County Employee Commute Survey

1. How many days per week on average did you travel to work?		
	Response Percent	Response Count
5 days 	63.0%	2,067
4.5 days - 9 days in two weeks 	26.2%	860
4 days 	7.8%	257
3 days 	1.3%	44
2.5 days - 5 days in two weeks 	0.6%	20
2 days 	0.6%	21
1 day 	0.4%	14
answered question		3,283
skipped question		22

**2. How many weeks did you work last year? For example, choosing 52 means you worked every week. Please subtract vacation and sick time, leave, time you worked at home, and any other time during the year that you didn't travel to work for the County.**

		Response Percent	Response Count
52		13.2%	428
51		5.2%	170
<b>50</b>		<b>24.5%</b>	<b>793</b>
49		17.7%	574
48		17.6%	569
47		5.6%	182
46		3.7%	121
45		3.5%	112
44		1.0%	31
43		0.7%	23
42		1.1%	36
41		0.2%	6
40		2.0%	64
39		0.2%	6
38		0.5%	17
37		0.2%	5
36		0.5%	15
35		0.2%	6
34		0.2%	7
33		0.1%	3
32		0.3%	9
31		0.0%	0

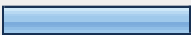
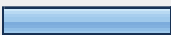





30	█	0.3%	9
29	█	0.1%	3
28	█	0.1%	3
27	█	0.0%	1
26	█	0.2%	7
25	█	0.1%	2
24	█	0.2%	6
23	█	0.0%	1
22	█	0.0%	1
21		0.0%	0
20	█	0.1%	2
19	█	0.0%	1
18	█	0.1%	2
17	█	0.0%	1
16	█	0.1%	2
15	█	0.1%	2
14	█	0.0%	1
13		0.0%	0
12	█	0.1%	2
11	█	0.0%	1
10	█	0.0%	1
9		0.0%	0
8		0.0%	0
7	█	0.0%	1
6		0.0%	0
5	█	0.0%	1
4		0.0%	0
3	█	0.0%	1

2	0.0%	1
1	0.0%	0
0	0.3%	10
<b>answered question</b>		<b>3,239</b>
<b>skipped question</b>		<b>66</b>



















**3. Please estimate the percent of travel to and from work last year by the following modes. Hint: Your numbers below should add up to 100%. If you get to work by driving alone in your car, then put 100 in the first box and go to the next question. If you carpool half of the time and walk the other half, put 50 in each box next to those choices.**
























	Response Average	Response Total	Response Count
<b>Drive alone</b>	<b>88.07</b>	<b>263,338</b>	2,990
Carpool	33.32	21,259	638
Amtrak, Light Rail or bus	40.85	21,935	537
Motorcycle/Other fossil fuel	11.66	3,626	311
Bicycle/Walk/Other non-fossil fuel	16.22	6,342	391
<b>answered question</b>		<b>3,165</b>	
<b>skipped question</b>		<b>140</b>	

#### 4. Where do you work?

		Response Percent	Response Count
Bradshaw Complex (including surrounding area and Mather)		27.9%	879
Downtown Sacramento (anywhere in the downtown area)		25.1%	792
Kiefer Landfill		0.4%	14
Sac International Airport		3.7%	117
Other North Area (north of Highway 50, including McClellan, Watt Avenue, etc.)		13.1%	414
Other South Area (south of Highway 50, including Florin Road, Power Inn Road, etc.)		26.8%	846
South County (south of Elk Grove, including Galt, RCCC, etc.)		2.9%	91
<b>answered question</b>			<b>3,153</b>
<b>skipped question</b>			<b>152</b>

## 5. What County Department do you work for?

	Response Percent	Response Count
Agricultural Commission & Weights and Measures 	0.2%	7
Airports 	2.6%	80
Animal Care and Regulation 	0.2%	5
Assessor 	2.2%	69
Board of Supervisors 	0.5%	17
Budget and Debt Management	0.0%	0
Chief Operations Office 	0.0%	1
Child Support Services 	4.6%	143
Clerk of the Board of Supervisors	0.0%	0
Communications and Information Technology 	2.7%	85
Compliance - HIPAA	0.0%	0
Conflict Criminal Defenders 	0.2%	5
Cooperative Extension	0.0%	0
Coroner 	0.3%	10
County Clerk/Recorder 	1.2%	36
County Counsel 	0.9%	29
County Executive Office 	0.5%	16
Countywide Services Agency 	0.6%	18
District Attorney 	0.0%	1
Economic Development/Intergovernmental Affairs 	0.4%	13
Elections 	0.1%	3
Engineering 	2.3%	73















Environmental Management		2.1%	65
Environmental Review & Assessment		0.4%	14
Finance		2.3%	71
General Services		2.8%	87
<b>Health and Human Services</b>		<b>21.2%</b>	<b>659</b>
Human Assistance (Welfare)		20.9%	651
Inspector General		0.1%	3
Internal Services Agency		0.2%	6
Labor Relations		0.1%	3
Legislative Advocate		0.0%	0
Municipal Services Agency		7.9%	247
Neighborhood Services		0.2%	6
Personnel Services Department		4.0%	125
Planning and Community Development		0.4%	12
Probation		5.0%	157
Public Defender		0.8%	26
Public Information Office		0.0%	0
Regional Parks		0.6%	19
Retirement		0.8%	25
Revenue Recovery		0.9%	28
Sheriff		0.6%	18
Transportation		2.9%	89
Voter Registration and Elections		0.7%	21
Waste Management and Recycling		1.4%	43
Water Resources		4.1%	129
<b>answered question</b>			<b>3,115</b>
<b>skipped question</b>			<b>190</b>

6. How many miles do you commute per day? In other words what is the total number of miles you travel to and from work each day? Hint: if you drive 5 miles to work and 5 miles home, you should enter 10 total miles below.




	Response Average	Response Total	Response Count
Total miles commuted per day by car	29.73	86,701	2,916
	answered question		2,916
	skipped question		389






**7. What kind of vehicle do you drive to work in? Please choose from the following vehicle types. If you're not sure what type your vehicle is, please visit here for examples: <http://www.epa.gov/fueleconomy/class-high.htm>**

	Response Percent	Response Count
Two Seater 	1.2%	35
Mini Compact Car 	0.9%	27
Sub Compact Car 	2.5%	72
Compact Car 	22.0%	634
<b>Midsized Car</b> 	<b>26.6%</b>	<b>766</b>
Large Car 	4.7%	136
Small Station Wagon 	1.6%	47
Midsized Station Wagon 	1.2%	36
Sport Utility Vehicle 	21.0%	605
Minivan 	4.0%	116
Small Pickup Truck 	5.5%	158
Standard Pickup Truck 	7.9%	229
Van (Cargo) 	0.0%	1
Van (Passenger) 	0.7%	19
<b>answered question</b>		<b>2,881</b>
<b>skipped question</b>		<b>424</b>

## 8. What is the brand, make and model year of the vehicle you drive to work in?

		Response Percent	Response Count
Brand (e.g. Ford, Chevrolet, etc.)		99.8%	2,860
Make (e.g. Taurus, Malibu, etc.)		97.6%	2,798
Model Year (e.g. 2005)		98.6%	2,826
<b>answered question</b>			<b>2,867</b>
<b>skipped question</b>			<b>438</b>

## 9. Is your vehicle two-wheel drive (2WD) or four wheel/all wheel drive (4WD/AWD)? Is it a hybrid? (Please check all that apply)

		Response Percent	Response Count
Two-wheel drive		73.5%	2,078
Four-wheel/all wheel drive		25.9%	733
Hybrid (gas/electric or other)		2.5%	71
<b>answered question</b>			<b>2,826</b>
<b>skipped question</b>			<b>479</b>

## 10. What kind of fuel does your vehicle use? (Please check the one that applies)

	Response Percent	Response Count
Gasoline (this applies to regular and hybrid electric vehicles)	97.2%	2,817
Diesel	1.5%	44
Ethanol Blend (E20 or lower)	0.7%	19
Biodiesel Blend (B20 or lower)	0.3%	8
Biodiesel (100%)	0.1%	3
Other non-fossil	0.2%	6
<i>answered question</i>		2,897
<i>skipped question</i>		408

## 11. If you checked gasoline, diesel, biodiesel, or a blend, about how many miles per gallon (mpg) does your vehicle get? If you aren't sure, you can check here: <https://www.fueleconomy.gov/mpg/MPG.do?action=addGuestVehicle>

	Response Average	Response Total	Response Count
Average miles per gallon (mpg)	23.89	66,461	2,782
<i>answered question</i>			2,782
<i>skipped question</i>			523















## 12. How many people on average are in your carpool vehicle?

	Response Average	Response Total	Response Count
Total people in your carpool	1.56	906	579
<i>answered question</i>			579
<i>skipped question</i>			2,726




**13. How many miles do you commute via carpool per day? In other words, what is the total number of miles you travel to and from work each day? Hint: if you carpool 5 miles to work and 5 miles home, you should enter 10 total miles below.**

	Response Average	Response Total	Response Count
Total miles per day commuting by carpool	23.93	13,423	561
	answered question		561
	skipped question		2,744




**14. What kind of vehicle do you carpool to work in? Please choose from the following vehicle types. If you're not sure what type the vehicle is, please visit here for examples: <http://www.epa.gov/fueleconomy/class-high.htm>**

	Response Percent	Response Count
Two Seater 	1.5%	6
Mini Compact Car 	1.7%	7
Sub Compact Car 	3.0%	12
Compact Car 	21.2%	86
<b>Midsize Car</b> 	<b>31.4%</b>	<b>127</b>
Large Car 	4.4%	18
Small Station Wagon 	1.2%	5
Midsize Station Wagon 	1.0%	4
Sport Utility Vehicle 	19.5%	79
Minivan 	5.7%	23
Small Pickup Truck 	3.2%	13
Standard Pickup Truck 	3.7%	15
Van (Cargo) 	0.2%	1
Van (Passenger) 	2.2%	9
<b>answered question</b>		<b>405</b>
<b>skipped question</b>		<b>2,900</b>





### 15. What is the brand, make and model year of the vehicle you carpool to work in?

		Response Percent	Response Count
Brand (e.g. Ford, Chevrolet, etc.)		99.8%	399
Make (e.g. Taurus, Malibu, etc.)		96.5%	386
Model Year (e.g. 2005)		97.8%	391
<b>answered question</b>			<b>400</b>
<b>skipped question</b>			<b>2,905</b>

### 16. Is your vehicle two-wheel drive (2WD) or four wheel/all wheel drive (4WD/AWD)? Is it a hybrid? (Please check all that apply)

		Response Percent	Response Count
Two-wheel drive		73.8%	296
Four-wheel/all wheel drive		25.7%	103
Hybrid (gas/electric or other)		3.5%	14
<b>answered question</b>			<b>401</b>
<b>skipped question</b>			<b>2,904</b>





**17. What kind of fuel does your carpool vehicle use? (Please check the one that applies)**

	Response Percent	Response Count
Gasoline (this applies to regular and hybrid electric vehicles) 	96.9%	402
Diesel 	2.2%	9
Ethanol Blend (E20 or lower) 	0.7%	3
Biodiesel Blend (B20 or lower)	0.0%	0
Biodiesel (100%)	0.0%	0
Other non-fossil 	0.2%	1
<b>answered question</b>		<b>415</b>
<b>skipped question</b>		<b>2,890</b>

**18. If you checked gasoline, diesel, biodiesel, or a blend, about how many miles per gallon (mpg) does your carpool vehicle get? If you aren't sure, you can check here: <https://www.fueleconomy.gov/mpg/MPG.do?action=addGuestVehicle>**

	Response Average	Response Total	Response Count
Average miles per gallon (mpg)	24.88	9,753	392
<b>answered question</b>			<b>392</b>
<b>skipped question</b>			<b>2,913</b>

## 19. Do you take Amtrak, Light Rail or a Bus?

	Response Percent	Response Count
Amtrak 	3.4%	11
Light Rail 	36.7%	117
<b>Bus</b> 	<b>40.8%</b>	<b>130</b>
Combination (e.g. Bus and Light Rail) 	19.1%	61
<i>answered question</i>		<b>319</b>
<i>skipped question</i>		<b>2,986</b>

## 20. What is the average number of passengers on the train or bus you ride? (Your best estimate is OK)




	Response Average	Response Total	Response Count
<b>Total average passengers</b>	<b>91.98</b>	<b>29,249</b>	318
<i>answered question</i>			<b>318</b>
<i>skipped question</i>			<b>2,987</b>

## 21. How many miles do you commute via train or bus per day? In other words, what is the total number of miles you travel to and from work each day? Hint: if you take the train or bus 5 miles to work and 5 miles home, you should enter 10 total miles below.

	Response Average	Response Total	Response Count
<b>Total miles per day by bus</b>	<b>24.48</b>	<b>8,031</b>	328
<i>answered question</i>			<b>328</b>
<i>skipped question</i>			<b>2,977</b>



**22. If you take a bus, what type of fuel does the bus you take use? (Please check one) If you only take Amtrak or Light Rail, please skip this question.**

	Response Percent	Response Count
Natural Gas 	41.0%	84
Diesel 	7.3%	15
Don't know 	51.7%	106
Other (please specify)		8
<b>answered question</b>		<b>205</b>
<b>skipped question</b>		<b>3,100</b>

**23. How many miles do you commute via motorcycle or another type of fossil fuel vehicle (other than an automobile) per day? In other words, what is the total number of miles you travel to and from work each day? Hint: if you drive 5 miles to work and 5 miles home, you should enter 10 total miles below.**

	Response Average	Response Total	Response Count
Total miles per day by motorcycle or other	22.86	3,018	132
<b>answered question</b>			<b>132</b>
<b>skipped question</b>			<b>3,173</b>

**24. How many miles per gallon (mpg) does your motorcycle or vehicle get?**

	Response Average	Response Total	Response Count
Average miles per gallon (mpg)	39.09	4,691	120
<b>answered question</b>			<b>120</b>
<b>skipped question</b>			<b>3,185</b>

## 25. How many people ride the motorcycle when you commute?

	Response Average	Response Total	Response Count
Average number of riders	0.83	97	117
	<i>answered question</i>		117
	<i>skipped question</i>		3,188

## 26. How many miles do you commute per day? In other words, what is the total number of miles you travel to and from work each day? Hint: if you bicycle 5 miles to work and 5 miles home, you should enter 10 total miles below.

	Response Average	Response Total	Response Count
Total miles per day by walking/bicycle/other	15.61	4,215	270
	<i>answered question</i>		270
	<i>skipped question</i>		3,035