SACRAMENTO COUNTY

DRAFT

Climate Action Plan

Phase 1
May 2009

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Executive Summary

Introduction

Sacramento County faces a myriad of challenges, including those posed by population growth, escalating demands on finite resources, and the impacts of a changing climate. The County is committed to improving the livability and quality of life for all its community members for now and in the future. Addressing a changing climate is not only required by California law, it is essential to ensuring a sustainable future and dovetails with the County's ongoing efforts toward sustainability.

The vast majority of scientists agree that climate change presents a significant threat to society and that human activity, particularly the generation of greenhouse gases, contributes to a changing climate. Greenhouse gases trap heat in the atmosphere, causing earth's average temperatures to rise and leading to shifts in weather patterns that can have profound impacts. The West Coast of the United States, including California, has been shown to be particularly affected by global climate change with both economic and societal implications. The Sacramento area is projected to have more extreme heat waves, and less overall precipitation yet more extreme storms. These changes present challenges such as increased fire risks, air quality problems, decreased water supply, increased flooding risks, stresses to the agricultural industry, and significant public health impacts.

The state's landmark Global Warming Solutions Act of 2006, Assembly Bill 32 (AB 32), requires the state to reduce greenhouse gas (GHG) emissions to 1990 levels by the year 2020. This is the first step towards meeting the Governor's longer term goal of 80% reduction in GHG emissions below 1990 levels by 2050 (Executive Order S-3-05), as urged by international scientists. Sacramento County and other local governments play an integral role in meeting the AB 32 mandate as well as preparing for the consequences of a changing climate.

The Sacramento County Climate Action Plan (CAP) provides a framework for reducing GHG emissions and managing water and other resources to best prepare for a changing climate. It defines an overall strategy to address climate change, including:

- Working collaboratively with other jurisdictions and leveraging existing programs and resources

- Reducing GHG emissions associated with the County's own operations as well as taking actions that facilitate GHG emissions reduction in the community

- Establishing priorities based on a number of factors, such as cost-effectiveness and co-benefits obtained

- Addressing projected vulnerabilities associated with climate change where cost-effective or required

This Phase 1 CAP summarizes actions the County has already taken within its jurisdictional control and identifies a menu of possible future actions to be considered**.** The Phase 1 CAP will be adopted concurrent with the adoption of the 2030 General Plan. Phase 2 of the CAP – to be adopted one year following the County's 2030 General Plan adoption – will present a prioritized list of recommended actions, based on economic and other analyses, and provide a schedule and cost for implementation.

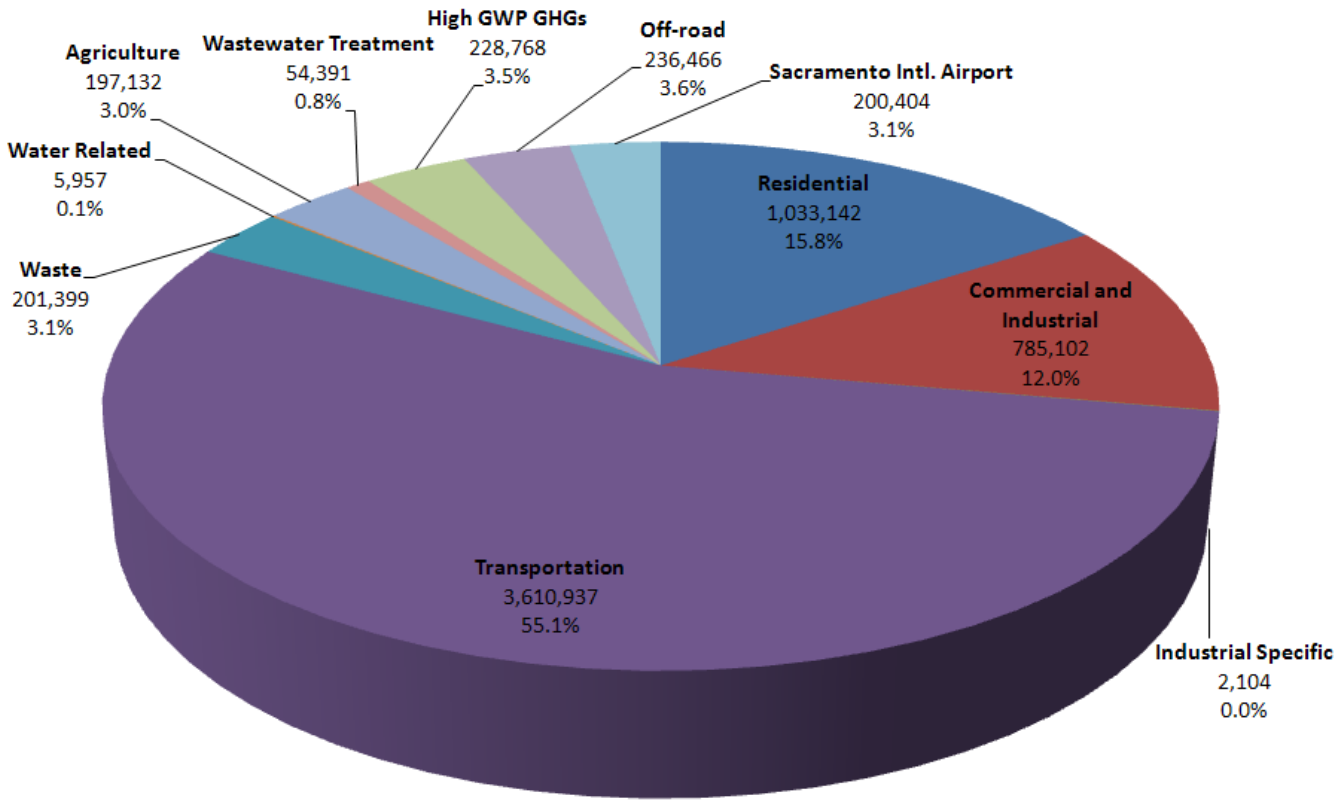
Sacramento County's GHG Inventory and Emissions Reduction Target

Sacramento County is committed to working with regional partners to reduce GHG emissions to 1990 levels by 2020 as required by AB 32. Furthermore, the County signed the United States Cool Counties Climate Stabilization Declaration in May 2008 and in doing so, became the eighth county in California to pledge to conduct an inventory of its GHG emissions and reduce emissions to 80% below 1990 levels by 2050 (consistent with the Governor's Executive Order S-3-05). Sacramento County completed its inventory of GHG emissions to assess emission sources and quantities using data from 2005. Emissions were inventoried and categorized for the entire county, for the unincorporated area, and for government operations. The inventory provides useful information for selecting and prioritizing actions to reduce emissions, and it serves as a baseline for measuring progress toward meeting the AB 32 mandate. The California Air Resources Board (CARB), the lead agency for implementing AB 32, has recommended in their 2008 Scoping Plan that local governments adopt GHG reduction targets for municipal operations that align with the target proposed for State government operations which is a 15% reduction in emissions from current levels by the year 2020. In addition, the CARB 2008 Scoping Plan recommends that local governments move

towards establishing the same reduction goals for community-based emissions. These GHG reduction goals for local government will help place California on the path to meeting the longer term goal of an 80% reduction in emissions below 1990 levels by 2050.

Energy consumption (for transportation and for heating, cooling, and other power needs in buildings) is by far the greatest source of GHG emissions in Sacramento County, just as it is in the U.S. and California as a whole. For the unincorporated county, over half of the 2005 baseline GHG emissions (55%) were from cars, trucks, and other on-road vehicles, while almost one third (28%) were from residential and commercial/industrial electricity and natural gas use. Figure ES-1 is a graphical representation of the results.

Figure ES-1. 2005 Unincorporated Sacramento County Community GHG Emissions



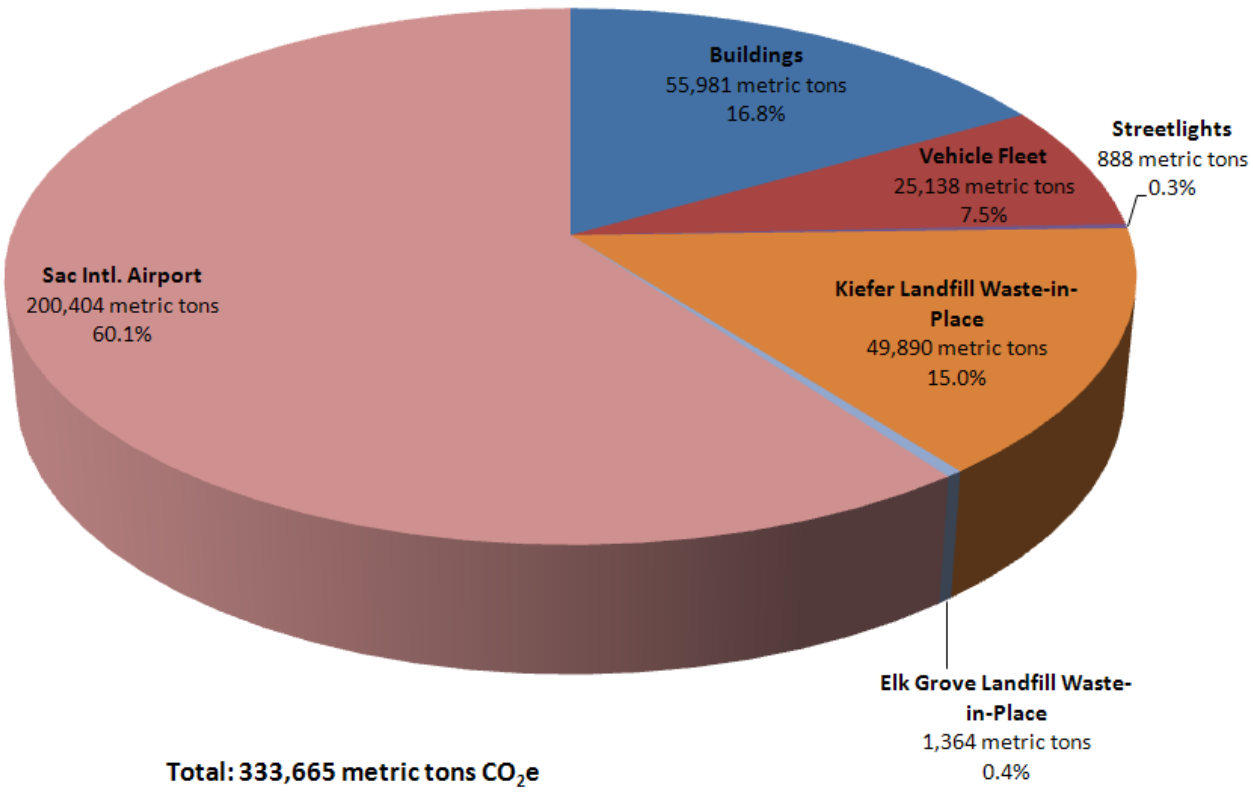
Total: 6,555,802 metric tons CO2e

The total 2005 baseline GHG emissions from County government operations account for about 5% of the unincorporated county emissions and 2% of countywide emissions. The most significant sources of County government GHG emissions are listed below:

- 60% of emissions are from the Sacramento International Airport (including aircraft emissions which are not under the County's control)
- Nearly 17% of emissions are associated with energy used in County government buildings
- 15% of emissions are from Kiefer Landfill
- About 7.5% of emissions are associated with the County's vehicle fleet

Figure ES-2 is a graphical representation of the results.

Figure ES-2. 2005 Sacramento County Government Emissions



Actions to Address Climate Change

Transportation

Since transportation accounts for more greenhouse gas emissions than any other sector in the County, reducing GHG emissions from this sector is critical. Vehicle emissions are determined by three factors: vehicle fuel efficiency, the type of fuel used (for example, natural gas burns cleaner and produces less harmful GHG emissions than gasoline or diesel), and vehicle miles traveled (VMT). Actions that reduce transportation GHG emissions typically yield other benefits such as improved air quality and a healthier community lifestyle.

There are many factors over which County government has no or limited control, such as: auto fuel efficiency, alternative fuels, or choices that individual residents make regarding transportation use. However, the County influences emissions from transportation in several ways. As the land use planning authority for the unincorporated county (excluding the incorporated cities), Sacramento County determines land use patterns, which in turn, affect transportation patterns and therefore associated GHG emissions. The County also plans and oversees roads and pedestrian and bicycle facilities in the unincorporated portion of the county. The road, trail and bicycle systems influences people's mode of travel as well as traffic flow (flowing traffic generates less emissions than does stop and go traffic). In addition, Sacramento County owns and controls a large fleet of cars, trucks, and heavy equipment, owns and operates four airports, including the Sacramento International Airport, and manages the aviation activities at McClellan Airport through its Economic Development Department.

The Phase 1 CAP identifies a number of ways the County has already reduced GHG emissions related to transportation or is planning such reductions. For example, Sacramento County:

- Increased fuel efficiency and alternative fuel use in its own fleets
- Facilitates the use of alternative fuel vehicles by operating natural gas fueling stations and providing electric vehicle chargers at its downtown garage
- Reduced vehicle miles traveled by its employees and customers by providing carpool/transit incentives for its employees and decentralizing its customer service centers

- Created a Sustainable Infill Program and began preparing master plans for redevelopment and revitalization of three of the fourteen commercial corridors (e.g., North Watt Avenue) as transit-oriented, smart growth projects

The Phase 1 CAP identifies a number of additional actions the County could take to reduce transportation-related GHG emissions such as:

- Gradually converting all the County's fleet to vehicles that are more fuel efficient and use alternative fuels (as financially feasible)

- Increasing designated parking in County-owned parking lots for alternative fuel vehicles and amending the zoning code to require dedicated parking for carpools and alternative fuel vehicles in retail and other commercial projects

- Promoting transit-oriented development to reduce reliance on cars as the primary mode of travel

- Implementing projects to facilitate and encourage more walking and biking

Energy

After transportation, energy used in homes and businesses (for heating, cooling, lighting, etc.) is the next largest source of GHG emissions in Sacramento County. The emissions produced depend on the amount and type of energy used (e.g., electricity or natural gas) and the primary energy source used to create the power. Most energy GHG emissions are created from fossil fuels; of those, natural gas burns the cleanest. Electricity produced by renewable energy sources (e.g., hydroelectric, wind, or solar) produces negligible greenhouse gases.

Sacramento County directly influences energy used in its own facilities, and to some degree in its leased facilities. It also can influence energy used in new and remodeled buildings throughout the unincorporated County through requirements in the planning and building permit processes. It currently does not have the ability to influence energy use in existing buildings, which account for a large share of the building stock in the unincorporated county, and presumably emissions produced.

The County has taken a number of steps to improve energy efficiency and to promote renewable energy sources: For example:

- Sacramento County has improved the energy efficiency of its own operations such as through its Green Information Technology (IT) program, upgrading 10 of its buildings, converting the lighting in most of its traffic signals to light-emitting diode (LED), and implementing green building standards in several County buildings currently being constructed

- Sacramento County encourages SMUD-approved solar projects on residential buildings by waiving permit and plan review fees

- Sacramento County collaborates with SMUD, the City of Sacramento and other regional partners to pursue grant funding for energy efficiency and renewable energy programs and projects

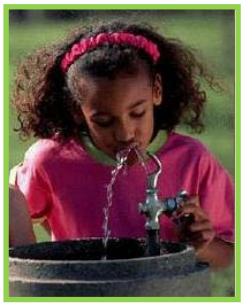
The Phase 1 CAP identifies additional ways the County could improve energy efficiency and promote renewable energy sources. For example, Sacramento County could:

- Work with the City of Sacramento to establish a regional green building task force to develop green building recommendations that apply to new and existing buildings, then adopt a green building ordinance

- Establish a low-interest loan program for property owners to fund solar and energy efficiency projects for existing residential and commercial properties

- Further improve the energy efficiency of its own buildings and operations by conducting energy audits and eventually upgrading all buildings and operations

- Ensure that by 2020, 33% of its own electricity purchases come from renewable sources (consistent with the California Air Resources Board's 2008 Scoping Plan for AB 32 compliance)



Water

Energy and water are interconnected; energy is used to pump, treat, and deliver water supplies and treat wastewater and water is used to produce energy (both directly through hydroelectric plants and indirectly for cooling at thermoelectric power plants). Therefore, improving water efficiency will reduce energy demand and

improving energy efficiency will reduce water demand.

Effective water management is also essential given the predicted risks of increased droughts, increased flooding (due to more extreme, though less-frequent storm events), and potential water quality problems associated with rising sea levels and salt water intrusion into the Sacramento-San Joaquin Delta. All of these climate change-related risks come at a time when the State is already challenged to provide enough water to meet the needs of its growing population.

The Sacramento County Water Agency (SCWA), one of over 25 water purveyors in the county, owns and operates the potable water delivery system for about 180,000 residents using surface and groundwater resources. The County's Department of Water Resources (County DWR) operates and maintains the SCWA's water supply infrastructure. The County DWR also owns and operates the stormwater drainage system in the unincorporated county and, as such, is responsible for flood protection and stormwater pollution reduction. The County has no jurisdiction over operations by the other water purveyors, the Sacramento Regional County Sanitation District (SRCSD), or the cities and other agencies involved with managing water resources in the county.

Sacramento County has taken a number of actions to reduce GHG emissions, improve water reliability, protect water quality, and reduce flooding risks. For example:

- SCWA supports a full-time water conservation coordinator and promotes water conservation through metered billing, a tiered rate structure, and customer education and water audits

- SCWA is increasing its water supply and improving reliability through a joint project with the East Bay Municipal Utility District (EBMUD) by the construction of a new surface water pipeline and water treatment plant

- SCWA partners with the SRCSD on a recycled water program; SRCSD produces recycled water and the SCWA distributes the water to select customers for non-potable uses such as irrigation

- County DWR established the award-winning River Friendly Landscaping Program, an outreach program for homeowners and landscape professionals, to promote practices with many environmental benefits, including reduced water use, improved water quality, and decreased GHG emissions through less use of gas-powered equipment and reduced waste to the landfill

- Sacramento County encourages new and redevelopment projects to incorporate features that reduce runoff and promote infiltration and groundwater recharge

The Phase 1 CAP identifies additional actions the County could take with respect to water resources such as:

- Conducting water audits/efficiency studies at County operations and facilities (likely in conjunction with the energy audits mentioned previously for the Energy section)
- Ensuring that water use efficiency is addressed in any green building program standards or ordinances
- Creating policies and standards for graywater (also known as grey water) reuse
- Working with others in the region to study expanded groundwater and surface water storage; sea-level rise impacts; and monitoring to improve dam operations for drinking water storage while minimizing flood risks

Waste Management and Recycling

Sacramento County's waste management operations contribute about 3% of the total unincorporated County's community GHG emissions. The County provides comprehensive waste management in the unincorporated area through its Department of Waste Management & Recycling (DWMR). The County provides waste collection services to 150,000 residential customers. Through the Sacramento Regional Solid Waste Authority (SWA), a joint powers agency created by the County and the City of Sacramento, the County contracts with franchised haulers to collect commercial solid waste and recyclables. In addition, the County operates Kiefer Landfill, the only active municipal solid waste disposal facility in Sacramento County, and the North Area Recovery Station (NARS), which sorts waste and recyclables.

Sacramento County already reduces GHG emissions associated with waste management in a number of significant ways. For example:

- Sacramento County diverts 58% of its waste from landfills through waste reduction and recycling programs such as its residential recycling program and SWA's requirement that franchised haulers achieve a 30% recycling rate

- DWMR uses alternative fuels on most of its waste collection vehicles. Of their 120 waste collection vehicles, 35 are dedicated liquefied natural gas (LNG) and 60 are dual-fuel vehicles running on 80% LNG and 20% diesel

- Extensive environmental controls are in place at Kiefer Landfill to collect landfill gases. Most of those gases are converted to energy at a plant that delivers 14.0 mega watts of green electricity to SMUD, enough to power almost 9,000 homes

- Sacramento County trains people on how to compost at home and implements other education programs to promote waste reduction and recycling. DWMR and SWA provide outreach to businesses to help them recycle

The Phase 1 CAP identifies a potential action to further reduce GHG emissions associated with the County's waste management services:

- The SWA plans to establish a local composting facility to expand the region's capacity to process organic waste

Agriculture and Open Space

Agriculture accounts for about 3% of the total GHG emissions for unincorporated Sacramento County, based on emissions estimates from livestock digestion, manure management, and fertilizer use. However, crops and orchards, as well as trees and vegetation in open space, can remove carbon dioxide (the main greenhouse gas) from the atmosphere. In addition, certain crops can be used to create biofuels, which produce fewer GHGs than fossil fuels. A changing climate is expected to stress the vital agricultural industry in Sacramento County, due to higher air temperatures, new pest problems, reduced water, and other factors. All of this comes at a time when the industry is already under heavy economic strain.

The County's General Plan sets a strong policy for continued protection of agriculture, open space and other natural resources in Sacramento County. The Land Use Element of the General Plan contains a number of key strategies, including rigorous standards that must be met to convert agricultural or open space uses to urban uses. The County Agricultural Commissioner generates crop reports each year which provide a good barometer of the evolving industry, regulates pesticide use in the county, and provides other services to ranchers and farmers. In addition, the County's Planning and Community Development and Regional Parks Departments influence open space in the county through habitat conservation planning and through management of the 15,000-

acre countywide system of parks, recreational sites, trails, waterways, and open space, including the American River Parkway.

Sacramento County has already taken steps to preserve trees and open space and to support sustainable agriculture, which lowers agricultural GHG emissions while yielding other benefits such as reduction or elimination in fertilizer and pesticide use and improved water quality. For example, the County:

- Collaborates with several groups (such as resource conservation districts) to promote and support sustainability, agricultural marketing and resource conservation

- Leads the effort with several agencies to develop a South Sacramento Habitat Conservation Plan (SSHCP), which provides for conservation while accommodating growth in the 341,270-acre SSHCP area

- Promotes the preservation of various trees through ordinances and requires landscaping in new development

- Collaborates with the Sacramento Tree Foundation to expand urban forests and optimize the benefits of tree canopies

The Phase 1 CAP identifies a number of additional actions related to agriculture and open space that could reduce greenhouse gases. For example, Sacramento County could:

- Further promote sustainable agricultural practices and availability of locally-grown foods for county residents

- Quantify the carbon sequestration/GHG emission reduction and other benefits of the County's urban forest and open space areas

- In addition to existing partnerships to promote tree planting, work with the Sacramento Tree Foundation, local watershed councils and others to develop new programs and secure additional funding for planting in public rights-of-way

- Encourage residents, businesses, agencies, and institutions to invest in greenhouse gas-reducing projects that sequester carbon to offset their personal or corporate greenhouse gas emissions

Chapter 1
Introduction

The Sacramento County Climate Action Plan (CAP) provides a framework for reducing greenhouse gas (GHG) emissions and managing water and other resources to best prepare for a changing climate.

This document, Phase I of the CAP, summarizes background information, including the legislative mandate and environmental issues driving the need for the plan and how the plan dovetails with the County's commitment to sustainability. It describes Sacramento County's goals and overall strategy for addressing a changing climate, summarizes what the County has already done or is doing, and identifies possible future actions. Phase 2 of the CAP will identify and prioritize recommended actions and present a schedule for implementation.

Key Legislative and Regulatory Mandates

Assembly Bill 32 (AB 32)

In September 2006, Governor Schwarzenegger signed AB 32, the Global Warming Solutions Act of 2006. This landmark bill requires California to reduce GHG emissions to 1990 levels by the year 2020. (For more about GHGs and climate change, see the section later in this chapter entitled *A Changing Climate and its Impacts*.) The California Air Resources Board (CARB) is the lead agency for implementing AB 32 and has developed a plan (CARB's 2008 Scoping Plan) for what local governments and others must do to comply. Local governments play an integral role in achieving the target emission reductions through their discretionary land use and transportation planning authority as well as in other sectors such as energy, waste reduction and recycling, and water use. (This is discussed in more detail in the Chapter 1 section entitled *The County's Role in Addressing a Changing Climate and Sustainability* and in Chapter 3.)

California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) requires that a project's potential environmental impacts be considered and ways to mitigate those impacts be identified before approving actions that could harm the environment (for example, before approving a development project or adopting a County land use plan). When impacts could be significant, an Environmental Impact Report (EIR) is prepared and is circulated to obtain input from the public and other agencies. The need to consider greenhouse gas related impacts is presenting a new challenge under CEQA, but rulings from the state attorney general's office reinforce the need to do so.

The general planning process presents a powerful opportunity to carefully consider and shape future land use patterns and ensure that development is consistent with AB 32. As the Air Resources Board noted in its recent AB 32 Scoping Plan, "[l]ocal governments are essential partners in achieving California's goals to reduce greenhouse gas emissions."

- Edmund G. Brown, Jr.
Attorney General

The draft EIR prepared for the update of the Sacramento County General Plan (General Plan) identified the need for a Sacramento County Climate Action Plan. The General Plan is the overarching County land use document and the blueprint for the County's future. Its planning horizon is the year 2030, which encompasses the AB 32 target year of 2020, and it must address climate change. Sacramento County also recognizes the substantial environmental and administrative benefits of a "big picture" approach to climate change for the General Plan update rather than addressing climate change on a project by project basis.

Senate Bill 375 (SB 375)

SB 375 connects land use, transportation and AB 32 implementation. SB 375 establishes a process for developing regional GHG emission targets aimed at reducing vehicle miles traveled. It also requires all metropolitan planning organizations, such as the Sacramento Area Council of Governments (SACOG), to align their regional transportation, housing, and land use plans and prepare a "sustainable communities strategy" to conform with the regional GHG target. As part of this process, Sacramento County will be allocated a future GHG emissions target that must be considered in future development plans.

A Changing Climate and its Impacts

The vast majority of scientists agree that climate change presents a significant threat to society and that human activity, particularly the generation of greenhouse gases, contributes to a changing climate. These gases are released into the atmosphere and act as global insulators. Energy from the sun warms the earth's surface, which in turn, radiates heat back toward space. Accumulated greenhouse gases in the atmosphere absorb and trap the heat causing temperature to rise. Many greenhouse gases, such as water vapor, carbon dioxide, methane and nitrous oxide, 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.

For information about global climate change (including regional predictions) visit the website of the Intergovernmental Panel on Climate Change (IPCC): http://www.ipcc.ch/index.htm. The IPCC is a scientific body established by the World Meteorological Organization (WMO) and the United Nations; it assesses and summarizes the latest scientific research related to climate change.

Carbon dioxide, by far the most commonly emitted greenhouse gas, is released primarily by burning of fossil fuels (e.g., oil, coal and natural gas). It is also emitted from chemical reactions such as in the manufacture of cement. *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.

Energy consumption (for transportation as well as heating, lighting, etc. in buildings) is by far the greatest source of GHG emissions in the United States (US) as a whole, as well as in California and Sacramento County. The quantity of emissions produced depends on the amount and type of energy used. Currently, fossil fuels provide most of the energy used in the US; of these, coal produces the most GHGs and natural gas the least. Non-fossil fuel energy sources such as hydroelectric, wind, and solar power result in negligible GHG emissions.

Greenhouse gases trap heat, but climate change involves more than rising temperatures. Weather patterns are predicted to change, and these changes vary geographically. Reducing GHGs will help—and is considered essential--but will not prevent changes since measurable increases in temperature have already occurred and have set in motion other changes.

The Sacramento region is projected to have more frequent, longer, and more-extreme heat waves and longer periods of drought. Despite predictions for less overall precipitation, the region is also projected to have more extreme storms. These changes, in turn, translate into other challenges such as:

- Spread of pests and infectious diseases into new areas
- Health impacts associated with heat waves
- Increased fire risk
- Air quality problems
- Decreased water supply
- Greater risks of flooding due to more extreme storm events

Sacramento County is particularly vulnerable to the potential impacts of climate change given the region's already high summer temperatures, flooding risks, and water supply challenges. Measured precipitation changes as well as the projected increases in temperature, transmission of infectious diseases and air pollution levels could significantly impact public health and mortality rates. The extensive Sacramento-San Joaquin Delta levee system could suffer extensive and irreversible damage with a resultant loss of life and economy. Sacramento County's agriculture industry may be impacted by changes in temperature and rainfall patterns and an increase in pests and diseases. Sacramento County's water supply is already facing challenges and climate change could exacerbate the problem by reducing the Sierra snow pack.

The County's Role in Addressing a Changing Climate and Sustainability

County Functions related to Climate Change

Sacramento County recognizes that local governments are on the front line, both in reducing GHG emissions and preparing the community for the impacts of a changing climate. For example:

- Sacramento County has direct authority over land use decisions within the unincorporated County (cities make those decisions in the incorporated areas.) Land use patterns have a direct impact on transportation needs and options, which, in turn, affect energy consumed and GHG emissions associated with

transportation. Land use planning also plays a role in adapting to climate change, since growth can be planned in less flood-prone areas, for example.

- Sacramento County has direct authority over approving new building and development projects in the unincorporated County (cities make those decisions in the incorporated areas); building and development standards directly affect the energy and water efficiency of new buildings. The County can also affect other areas that relate to climate change. For example, development standards address stormwater management, which affects flood risks and water resource management. Landscaping and tree preservation requirements can affect the number of trees—which provide shade and also sequester carbon dioxide.

- Sacramento County provides essential services to the community related to emergency preparation, flood response, social services, water supply, solid waste management, and roads. Projected impacts from climate change will increase the demand for many of these services. In addition, how the services are carried out can affect resource use and County GHG emissions.

- Sacramento County sets an example for the community by ensuring that its employees perform their jobs and manage facilities and operations in a sustainable manner.

Climate Change in the Context of Broader Sustainability Issues

> *"Sustainability is meeting the needs of the present without compromising the ability of future generations to meet their own needs."*
>
> *- United Nations World Commission on Environment and Development.*

Sacramento County is dedicated to improving the livability and quality of life for all its community members for now and in the future. Addressing the myriad of challenges posed by population growth, escalating demands on finite resources, increasing costs, and the impacts of a changing climate requires a shift in long-standing practices and thinking related to development and consumption. Cost-saving measures must be undertaken to use resources more efficiently, streamline systems, and reduce demand on natural resources such as non-renewable energy sources, water, and land.

Addressing climate change is an important part of ensuring a sustainable future. In addition, many of the actions that address climate change (such as those aimed at conserving non-renewable energy sources and conserving water) are necessary for a sustainable future regardless of climate change mandates.

Many of the actions that address a changing climate provide multiple benefits beyond those directly related to the specific issue addressed (such benefits are referred to as co-benefits). For example, many actions that reduce emissions of GHGs also reduce emissions of conventional pollutants and that also translates to public health benefits. In addition, clean energy policies provide a powerful economic stimulus.[1] As another example, planting or preserving trees reduces GHGs in the atmosphere (by sequestering carbon dioxide) and provides shade (mitigating impacts of hot summers); but trees also have benefits with respect to stormwater management and aesthetics.

The County's Leadership on Climate Change and a Sustainable Future

Sacramento County is committed to providing the leadership needed to facilitate the transition towards a sustainable future where economic growth and prosperity can be achieved while enhancing, protecting, and conserving quality of life, natural resources and open space. First and foremost, Sacramento County is taking steps to incorporate sustainable practices into County operations and programs. It is recognized that wise investments in innovative solutions to conserve resources and increase efficiencies will yield economic returns.

In a time of dwindling economic resources, regional leadership and collaboration are essential if ambitious regulatory mandates are to be met. Sacramento County has been a leader in creating and fostering regional partnerships to leverage limited resources and in implementing several energy efficiency measures to save money. Here are just a few examples of how Sacramento County has taken a proactive approach to educate, secure and share resources, and promote coordination and consistency in efforts to reduce greenhouse gas emissions and prepare for the future.

- In 2008, Sacramento County partnered with the Sacramento Municipal Utility District (SMUD) to create the Sacramento Area Green Partnership (SAGP), a collaborative of local utilities, government agencies, utilities, special districts, and others that provides a forum for regional information sharing on climate change

issues. The SAGP pursued grants and arranged for local agency cost-sharing matches to complete the first countywide emissions inventory.

- Sacramento County is a founding member of Climate Communities, a national coalition of cities and counties established in 2007 that seeks to influence federal climate policy and secure funding for local governments for climate protection efforts.

- In 2008, Sacramento County joined other counties in the state and across the nation in signing the Cool Counties Climate Change Stabilization Declaration. This commitment calls for a reduction in unincorporated county and government emissions to 80% below 1990 levels by 2050 and involves working with regional partners to develop and implement plans to reduce emissions and build resilience to the projected impacts of climate change.

"The Sacramento Green Partnership is helping to ensure that the public agencies within Sacramento County are sharing the best information about climate change and greenhouse gas reduction strategies, and building consistency in their planning efforts."

- Kristine Mazzei
Valley Vision/Green Capital Alliance

- Sacramento County Airports System is one of only 15 airport systems in the US to sign the "Aviation Industry Commitment to Action on Climate Change" declaration in April 2008.

Chapter 3 describes many other actions that the County has taken to address climate change and ensure a sustainable future.

Strategy for Addressing Climate Change

Sacramento County's overall strategy for addressing climate change is to:

- Work collaboratively with stakeholders (including other jurisdictions in the region, local utilities like SMUD and Pacific Gas &Electric (PG & E), special districts such as the Sacramento Metropolitan Air Quality Management District (SMAQMD), state agencies such as the CARB, the development community and environmental organizations) towards achieving the AB 32 emission reduction target for the entire county.

- Inventory existing GHG emissions to identify the sources and quantities of GHG and to establish baseline data. Continue to track GHG emissions at least every three years to measure progress toward reduction goals.

- Lead by example by reducing GHG emissions associated with the County's own operations. In addition, implement measures that facilitate actions on the part of the community and also regulate future development to mitigate GHG emissions.

- Leverage existing programs, investments, resources, and accomplishments that Sacramento County has already made that address climate change and seek to do more within existing resources.

- Establish priorities for actions that reduce GHGs considering the baseline and subsequent emissions inventories, cost-effectiveness, ease of implementation, and the extent to which the actions produces other benefits besides those related to climate change.

- Add, suspend, or modify implementation measures as appropriate based on on-going evaluations and priority setting.

- Address projected vulnerabilities associated with climate change; as resources allow or as required, take cost-effective actions that would lessen the projected impacts or yield other benefits. In particular, take steps to conserve and effectively manage water resources, which are essential for growth but are already limited.

A Phased Approach to the Climate Action Plan

Phase 1: This document

This first phase of Sacramento County's Climate Action Plan summarizes in a single document actions that the County has already taken or is taking that address climate change (by reducing GHG emissions and/or proactively addressing regional challenges—such as reduced water supply). This Phase 1 CAP also identifies additional actions that could be taken.

This Phase 1 plan describes actions the County is taking, or could take, related to its own operations as well as actions the County can take that affect GHG emissions within the broader community that it serves.

With respect to County government operations, this Phase 1 CAP focuses on actions that save money, conserve resources such as energy and water, and provide opportunities to use more renewable energy in building operation and vehicle fleet management. The plan identifies existing programs, investments, initiatives, and accomplishments that Sacramento County has already made and calls for County departments to do more within existing resources, such as by integrating sustainability measures into policies and practices.

To address community GHG emissions (which are primarily associated with energy used in transportation and buildings) as well as resource use, the plan describes actions the County can take in its role as a land use planning authority and service provider. This Phase 1 CAP describes what the County can do to effectively integrate climate protection into planning and resource management and to lead the way in establishing regional green building policies and regulations. Existing innovative planning strategies such as the County's sustainable infill program will promote smart and pedestrian-friendly "green" communities, while curbing vehicle emissions and revitalizing the local economy.

To control emissions in the County that are generated by activities outside of Sacramento County's jurisdiction (such as wastewater treatment or regional transit), the plan identifies potential ways to work (or continue working) collaboratively with regional partners to seek and implement solutions.

Next Steps

Upon adoption of the Phase 1 CAP, anticipated to be concurrent with the adoption of the General Plan and General Plan EIR, the next steps are as follows:

- County staff will further research, reevaluate, and refine GHG reduction measures and determine which actions would be the most cost-effective and feasible to implement based on estimated emission reductions, existing staff resources, available funding, and program priorities.

- After the additional analysis is completed, the County will seek feedback and input from stakeholders regarding actions needed to address climate change. Sacramento County can assert its leadership but cannot meet the GHG emission reduction targets of AB 32 without the support and involvement of businesses, residents, and other stakeholders.

- Following the stakeholder involvement and analysis of additional actions suggested by stakeholders, County staff will rank and prioritize actions to include in the Phase 2 CAP. The Phase 2 CAP will include an overall implementation timeline for the various actions, based on ease of implementation, available funding and staff resources, and other factors. It will also include a methodology and process for measuring and tracking emission reductions.

- Each year, the County will quantify and report progress towards reducing GHG emissions and will describe the effectiveness of individual CAP actions. At least once every three years, the annual progress report will include an updated emissions inventory to measure progress toward the emission reduction targets.

- The CAP will be revised as needed based on the progress reports.

[1] See http://www.ucsusa.org/global_warming/solutions/big_picture_solutions/california-and-western-states-global-warming-101.html. As explained there, "Multiple studies modeling the economic impacts of California's global warming policies project economic benefits, above and beyond the clear public health and environmental co-benefits of reducing global warming pollution."

Chapter 2
Sacramento County's Contribution and Vulnerability to Climate Change

Sacramento County contributes to greenhouse gas generation in the course of delivering services to the community and constructing and operating essential buildings, roads and infrastructure. Residents in the unincorporated area likewise add to GHG emissions through everyday activities such as driving cars and using electricity in their homes and work places. This chapter quantifies the County's baseline contribution and sources of emissions so that the County can measure progress toward its goal of reducing emissions to 1990 levels by 2020 in compliance with AB 32. The County will track progress in meeting the targeted reductions by continuing to inventory County emissions at least every three years.

This chapter also discusses the County's vulnerability to climate change, in terms of expected changes to temperature and precipitation and likely impacts on energy demand, water supply and public health. Information presented in this chapter was used as a basis for selecting and presenting potential actions in Chapter 3 to reduce greenhouse gas emissions and prepare for and adapt to a changing climate.

Sacramento County's Carbon Footprint

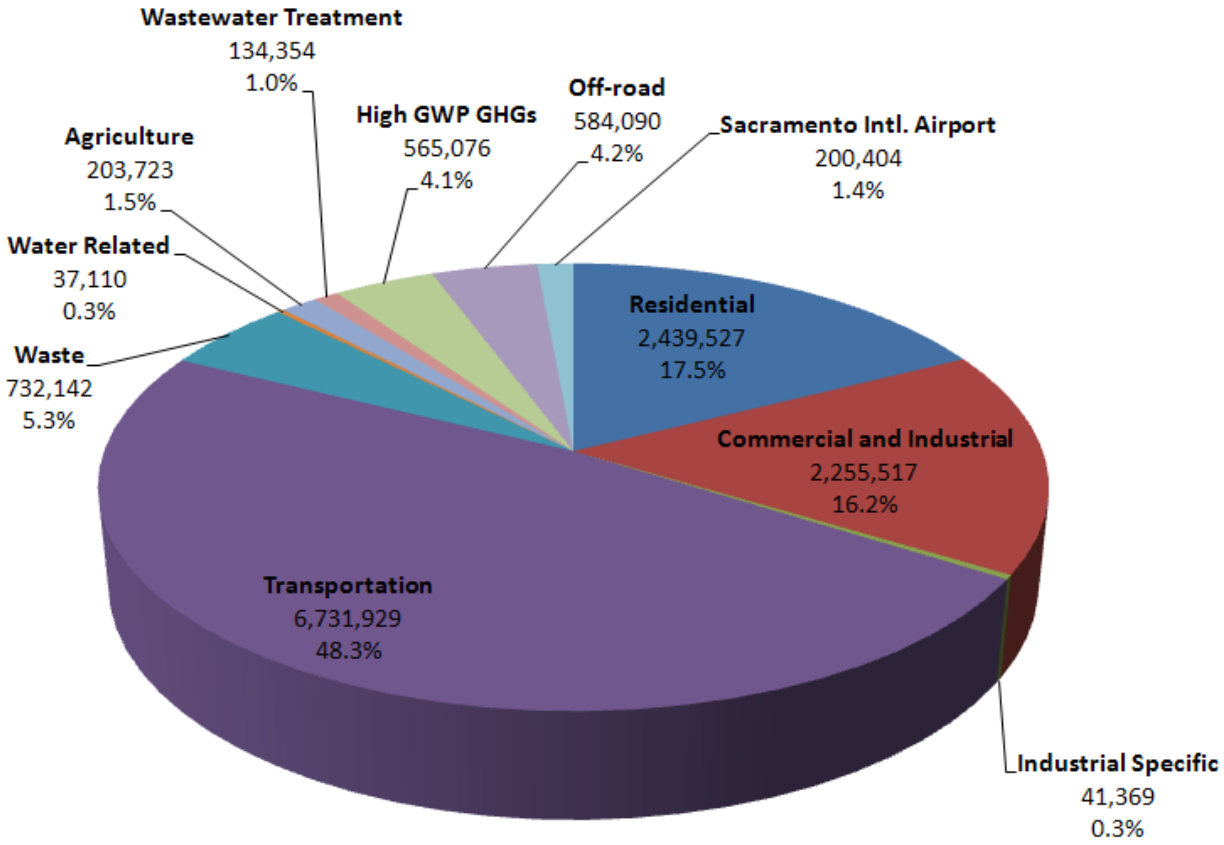
The amount of greenhouse gases that an individual, entity or product directly or indirectly emits is referred to as its carbon footprint. Because carbon dioxide is the most prominent GHG in the atmosphere, it is commonly used as the metric for measuring GHG emissions (other GHG emissions, such as methane, are typically converted to "equivalent CO_2, or "CO_2e"). This is useful for standardizing and comparing emissions from different sources and across sectors. The first step in developing a plan to reduce a community's carbon footprint is to inventory the sources and amount of greenhouse gases generated by the community. The County retained ICF Jones and Stokes to prepare an inventory of unincorporated County emissions for the year 2005. The year 2005 was chosen as a "baseline" because the CARB selected the same year for its 2008 Scoping Plan, and it was also a year for which the County could supply the most complete data set. In some cases, where data was not available, 2006 data was used. Consistent with other agencies in the country and state, the County's inventory was

completed using the Local Governments for Sustainability (ICLEI,) Clean Air and Climate Protection (CACP) software and following the Intergovernmental Panel on Climate Change (IPCC) and ICLEI protocols. The inventory was completed originally in January 2008 and refined in December 2008 when inventories were also prepared for all of the incorporated cities in the county. This chapter summarizes the most recent results and assumptions; the full report is available on the County's Climate Change website (ICF, 2009).

The inventory report presents countywide emissions first, and then separates out the unincorporated County and incorporated City community emissions individually. Finally, the emissions from government operations are presented as a subset of each jurisdiction's community emissions. These results are summarized in the following sections.

Countywide Inventory The total 2005 countywide GHG emissions are estimated at nearly 14 million metric tons CO_2e (see Figure 2-1). These results are presented in this plan for informational and relative comparative purposes only, since Sacramento County can only reduce emissions within its jurisdictional control.

Figure 2-1. 2005 Countywide GHG Emissions



Total: 13,925,241 metric tons CO_2e

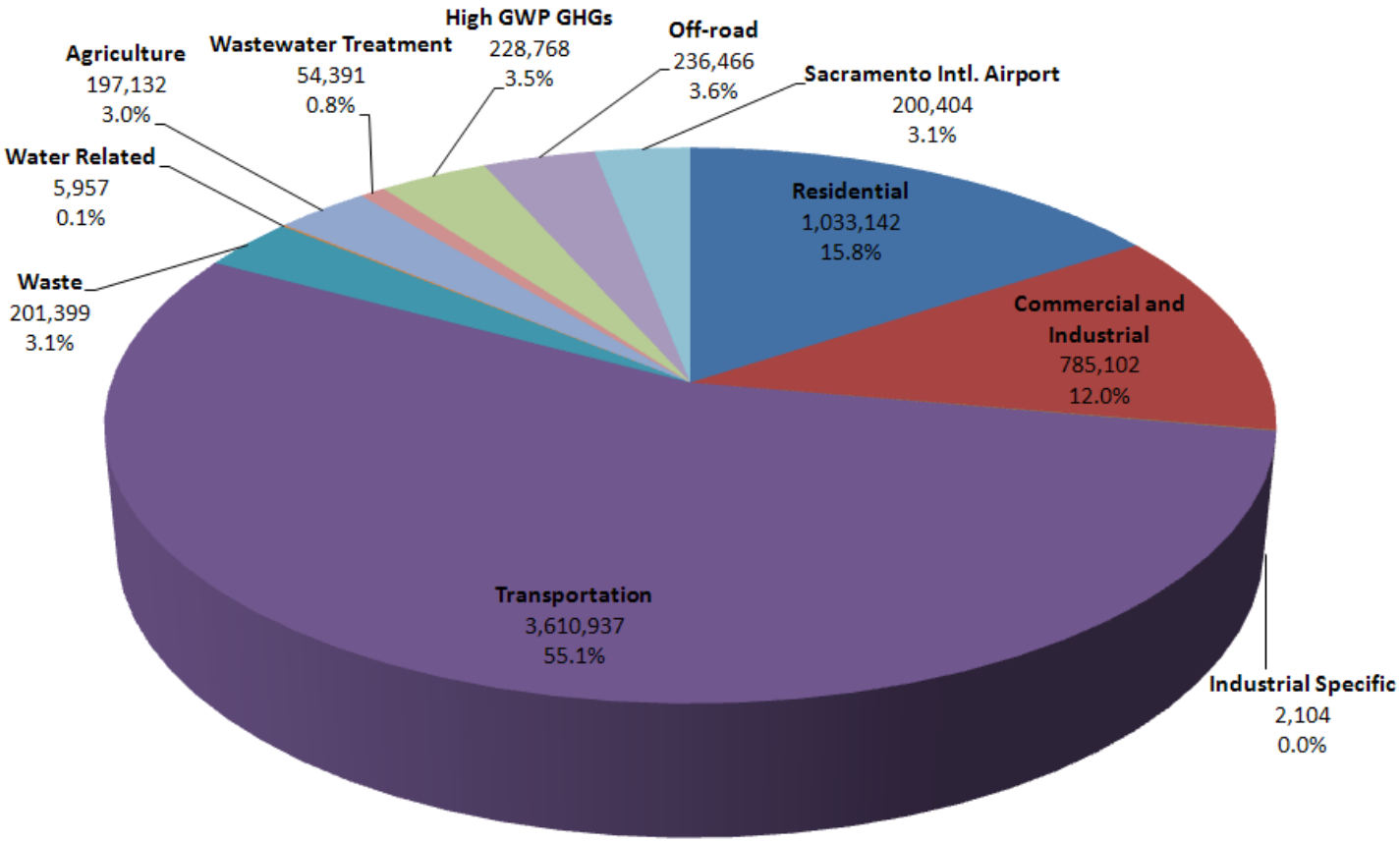
Unincorporated County Community Inventory. The estimated 2005 GHG emissions from the unincorporated county community total over 6.5 million metric tons CO_2e; just less than half of all countywide emissions. The sources of these emissions are presented in Table 2-1. Figure 2-2 is a graphical representation of the results.

Table 2-1. 2005 Unincorporated Sacramento County Community GHG Emissions

Source	Description	CO_2e (metric tons)	Percent
On-Road Transportation	Fuel consumption for cars, trucks, etc.	3,610,937	55.1
Residential Energy Use	Electricity, natural gas and wood consumption (fireplace burning) in residences	1,033,142	15.8
Commercial and Industrial Energy Use	Electricity, natural gas and fuel consumption in commercial and industrial facilities	791,059	12.1
Off-Road Transportation	Fuel consumption for construction equipment, boats, rail operation, etc.	236,466	3.6
High GWP gases[1]	Refrigerant use (fluorinated gases)	228,768	3.5
Waste	Solid waste generation and waste-in-place (waste in landfills accumulated over the landfill's lifetime)	201,399	3.1
Airport	Ground operations and aircraft	200,404	3.1
Agriculture	Livestock, manure management and fertilizer use	197,132	3.0
Wastewater Treatment	Chemical and biological treatment of wastewater	54,391	0.8
Industrial-Specific	Electricity, natural gas and fuel consumption for large stationary point-sources (boilers, incinerators and internal combustion engines)	2,104	0.0
Total		**6,555,802**	**100**

[1] The Global Warming Potential (GWP) of a gas is its potential to trap heat in the atmosphere as compared to carbon dioxide (CO_2 has a GWP of 1). Over time, GWP of a gas usually decreases, but with high GWP gases such as fluorinated gases, it takes a long time for them to break down. Such gases are also typically created exclusively by humans and not found in nature, so there are no natural sinks to remove them.

Figure 2-2. 2005 Unincorporated Sacramento County Community GHG Emissions



Total: 6,555,802 metric tons CO2e

The main results of the unincorporated County community inventory, along with key assumptions and sources of data are summarized below:

- Consistent with national and statewide data, on-road transportation (burning of diesel/gasoline in cars, trucks and buses) is the largest source of all community emissions (55%). Emissions from aircraft were accounted for separately in the airports category and rail was not included in this inventory.

- Residential and commercial/industrial electricity and natural gas use is responsible for almost one-third (28%) of the total GHG emissions. This is based on available utility records; therefore emissions from non-utility based private

fuel consumption such as propane, diesel generators, and bottled natural gas could not be quantified. Also, emissions resulting directly from the production of products, such as cement, could not be quantified.

- GHG emissions from waste, high global warming potential gases, off-road vehicles and the Sacramento International Airport each represent about 3% of the total. The emissions from the airport are based on the EIR prepared for the 2007 master plan (Terminal B expansion) and include aircraft emissions. These emissions are not under the control of Sacramento County and may be modified in future phases of this plan.

- Agricultural GHG emissions, also 3% of the total, were based on estimates of the methane, nitrous oxide and other gases produced by livestock digestion, manure management and fertilizer use only. Agricultural emissions from soil and crop management (including direct emissions from operating farm equipment and burning fields and indirect emissions from water use) were not quantified.

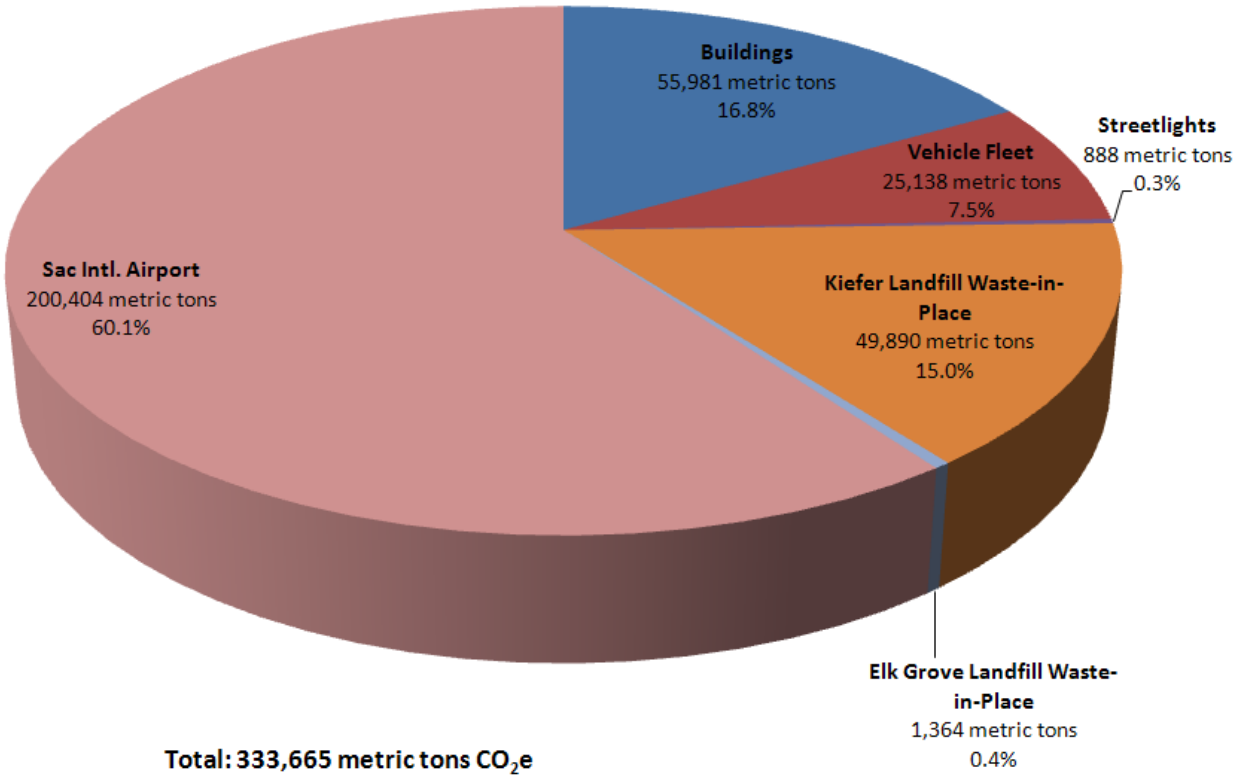
- Various other emissions are not accounted for, including energy use for water supply treatment and distribution. These emissions are difficult to quantify since there are over 25 individual water purveyors in the county.

County Government Inventory The total 2005 GHG emissions from County government operations account for almost 334,000 metric tons CO_2e, which is about 5% of the unincorporated county emissions and 2% of countywide emissions. These are separated into the emission-source categories described in Table 2-2. This table also tabulates the results which are shown graphically on Figure 2-3.

Table 2-2. 2005 Sacramento County Government Emissions by Source

Source	Description	CO_2e (metric tons)	Percent
Sacramento International Airport	Ground operations and aircraft	200,404	60.1
Building Energy Use	Electricity, natural gas and fuel consumption in County government facilities	55,981	16.8
Kiefer Landfill Waste-in-Place	Waste in Kiefer Landfill (based on accumulation over its lifetime)	49,890	15.0
Vehicle Fleet	Fuel consumption (gas, diesel) for government cars, light trucks and heavy vehicles/equipment	25,138	7.5
Elk Grove Landfill Waste-in-Place	Waste in closed Elk Grove Landfill	1,364	0.4
Streetlight and Traffic Signal Energy Use	Electricity consumption for streetlights and signals	888	0.3
Employee Commute	Fuel consumption for cars and trucks from commuting County employees	Not available	--
Waste	Waste generation from government operations	Not available	--
Total		**333,665**	**100**

Figure 2-3. 2005 Sacramento County Government Emissions



The primary results of the County government inventory, along with key assumptions and sources of data are summarized below:

- The airport emissions represent over 60% of the total. This is based on data from the EIR prepared for the 2007 Sacramento International Airport master plan (Terminal B expansion) and includes ground operations as well as aircraft emissions. Aircraft emissions (which represent 162,880 of the 200,404 metric tons CO_2e attributable to the airport) are not under the direct control of Sacramento County and emissions totals for the airport may be modified in future phases of this plan.

- Operation of County government buildings accounts for the next largest share of the emissions at almost 17%.

- Emissions from the Kiefer Landfill are estimated at 15% of the total emissions.

- Operation of the County fleet is responsible for over 7% of all GHG emissions.

- Operation of streetlights (emissions from the electricity used in county-owned streetlights) is a very small portion of the total (less than 1%).

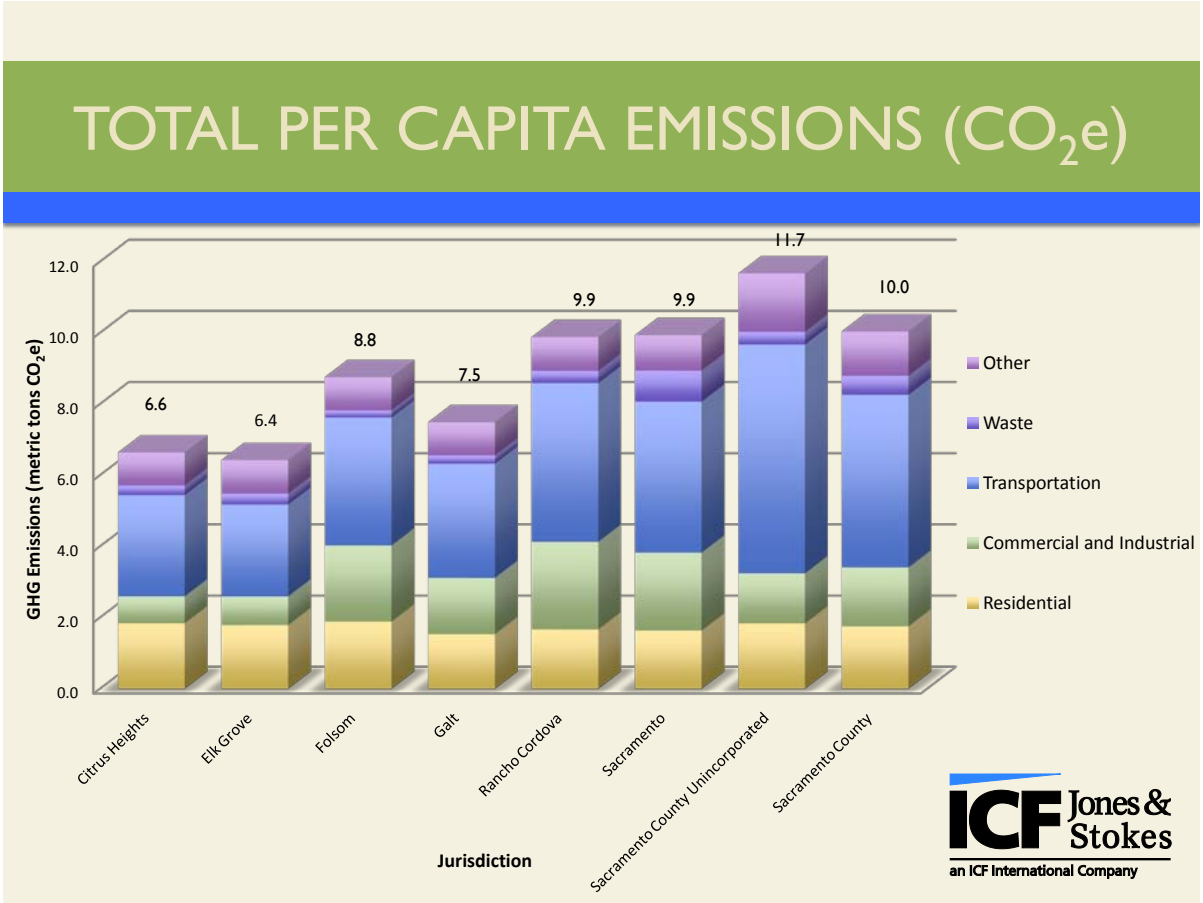
- Emissions from County employee commute and waste generation from County operations were not quantified due to a lack of data. Chapter 3 .2 recommends, as a potential future action, conducting an employee survey to gather this data for future iterations of the inventory.

- Emissions associated with water use in buildings, landscaping and field operations were not included in this inventory.

Unincorporated County Emissions Compared to Other Cities in the County

The 2005 baseline inventory concluded that the transportation sector is the largest contributor of GHG emissions for all jurisdictions in the county, followed by energy use (residential, commercial and industrial). The total and per capita emissions varied between agencies depending on the magnitude of the transportation emissions. For the County as a whole (all cities combined with unincorporated areas), the study concluded that the annual countywide per capita emissions (10 metric tons CO_2e per person) are similar to that of other California jurisdictions.

Figure 2-4. 2005 Total Per Capita Emissions By Jurisdiction



Sacramento County's Emissions Reduction Targets

The CARB's 2008 Scoping Plan recommends that local governments adopt GHG reduction targets for their municipal operations that align with the target proposed for State government operations which is a 15% reduction in emissions from current levels by the year 2020. In addition, the CARB Scoping Plan recommends that local governments move towards establishing that same goals for community-based emissions. These GHG reduction goals for local government will help place California on the path to meeting the longer term goal of an 80% reduction in emissions below 1990 levels by 2050.

Based on its 2005 emissions inventory, Sacramento County must reduce community emissions from the unincorporated county to 5,572,432 million metric tons of CO_2e and

government emissions to 283,615 million metric tons of CO_2e. These reduction amounts may be adjusted in future versions of the CAP.

Reporting and Registering GHG Emissions

The County joined the California Climate Action Registry (Registry) in December 2006 and has since earned the Registry's distinction of Climate Action Leader™. The Registry is non-profit public/private partnership that serves as a voluntary GHG registry to encourage early actions to reduce GHG emissions. As a registry participant, the County agreed to calculate and submit its annual GHG emissions for public reporting following certification using Registry standards and protocols by an independent, State approved third party verifier. Emissions must include direct emissions from stationary, mobile, process and fugitive sources, as well as indirect emissions associated with electricity use. In the first three years, only carbon dioxide emissions are inventoried, but subsequently emissions from six greenhouse gases will be counted.

The County's 2006 and 2007 government operations GHG emissions have been verified and are available to the public via the Registry's website (http://www.climateregistry.org/). For 2007, the County reported 48,707 metric tons CO_2e (direct emissions from County-owned mobile and stationary sources [e.g., fleet, buildings and streetlights]) and 51,832 metric tons CO_2e (indirect emissions from power purchases). This combined total of 100,539 CO_2e reported in 2007 to the Registry did not include emissions from aircraft nor waste-in-place emissions from Kiefer and Elk Grove Landfills.

As required by AB 32, the CARB has developed standards and protocols for reporting and verifying GHG emissions. The agency has incorporated the standards and protocols developed by the Registry where appropriate and to the maximum extent feasible.

Vulnerability to Climate Change

In addition to reducing GHG emissions, Sacramento County needs to prepare for and adapt to a changing climate. Even if the County were to offset all of its emissions, there are predicted climatic changes in store that will adversely impact the County if steps are not taken to prepare for and adapt to the changes.

The projected impacts of climate change will vary geographically. Projected impacts to the Sacramento region include:

- Variable Precipitation - Reduced Sierra snowpack, earlier snow melt, higher stream and river flows, and extended drought periods punctuated by intense precipitation events

- Heat Waves - More frequent, longer, and more-extreme heat waves and associated health impacts. If temperatures increase to the higher end of the predicted range, then the average July temperature in Sacramento will increase from 94 to 102 degrees and could get as hot as 122 degrees in an extreme event[1]

- Wildfires - Increased wildfire risk and associated air quality and health problems

- Air Quality – Increased production of smog. The higher the temperature, the more rapid the production of air pollutants, especially ozone

- Water Supply - Decreased water supply with implications for agriculture and community residents

- Flooding - Greater risks of flooding due to more extreme storm events and due to levee stress from rising sea levels

- Water Quality - Potential water quality problems associated with sea level rise (e.g., increased salinity in receiving waters) and higher river and stream flows

- Agriculture – Decreased production from livestock and crops sensitive to temperature increases and decreased water supply and increase in various pests

A changing climate has the potential to induce stresses to the human, built, and natural systems within the Sacramento region. Table 2-4 identifies some of the current and expected impacts to various systems. The actions in Chapter 3 are designed to address these vulnerabilities and will be further evaluated and refined in a risk-based decision analysis for the Phase 2 CAP.

Table 2-4. Potential Climate Change-Related Impacts to Sacramento County Human, Natural, and Built Systems

Vulnerable Sector/System	Current and Expected Impacts
Agriculture	Multiple and interacting stresses including: • Decreased water supply • Invasive noxious weeds • Decreased chill hours and earlier ripening periods (particular impacts to wine grapes) • Stress on dairy cows reducing milk production • Increased threats from pests and pathogens
Public Health and Safety	• Increased brushfire/wildfire potential • Diminished air quality (Higher temperatures increase frequency, duration, and intensity of conditions conducive to air pollution formation. Fires increase pollutants) • Risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress due to temperature increases and heat waves. By mid-21st century extreme heat events could cause 2-3 times more heat related deaths. This could disproportionally affect the poor who may lack access to air conditioning and medical assistance • Increased risk of food-borne illnesses, and threats to food availability as a result of agricultural pests and diseases • Public safety risks from increased flooding • Adverse drinking water quality impacts from increased flooding, runoff, and erosion following intense precipitation
Energy Supply	• Power outages due to potential reduction in hydropower and increased demand • Higher temperatures will increase electricity demand due to higher air conditioning use • Reduced reliability
Levees	• Levee stresses due to increased sea level rise; vulnerable levees in the Delta; stormwater management due to faster snowmelt or increased precipitation
Water Supply	Decreased supply due to: • Reduced snowpack in the Sierras (more precipitation will fall as rain instead of snow, and snow will melt earlier, reducing the snowpack by as much as 79-90 percent) • More frequents droughts • Potential for increased salinity in Delta water (sea level rise could result in salt water intrusion) • Diminished groundwater and lowered cones of depression • Increased demands due to even hotter, drier summers coupled with projected population growth

Table 2-4. Potential Climate Change-Related Impacts to Sacramento County Human, Natural, and Built Systems (continued)

Vulnerable Sector/System	Current and Expected Impacts
Natural Habitat	• Damage to/loss of special status species • Impacts to vegetation from pests, diseases, and fire • Shifting vegetation as natural habitats are altered • Changes in lake and stream ecology – increased water temperatures create stress on cold water species (e.g. trout and salmon)
Transportation Infrastructure	• Road buckling during heat waves • Increased need to manage brush fires along roadways • Erosion around bridge footings from increased flooding
Recreation	• More frequent drought conditions will impact river levels and water recreation • Species loss affecting hunting, fishing, and bird watching • Reduced predictability of outdoor events

[1] This is based on adding the temperature increase to current averages and highs in a strictly linear way. The predicted range of temperature increase was cited earlier in the chapter.

Chapter 3
Actions To Address Climate Change

3.1 Introduction

This chapter of the Sacramento County Climate Action Plan describes actions already being taken by the County and possible future actions to address climate change and meet regulatory mandates. The actions include those designed to reduce GHG emissions associated with the various sources identified in the County's 2005 baseline emissions inventory (see Chapter 2). The actions also include those that will help the County prepare for and adapt to the projected impacts of climate change on the community's resources – such as energy and water supply, air quality and health, and agricultural production – and resulting impacts on the economy (see Chapter 1). There are many cases where taking action now is cost-effective and would lessen the impact, or where the issue is evident even without the added challenge of climate change (for example, water resources are already limited and air quality is already impaired due to a growing population).

Actions are presented in this chapter in five main sectors:

- Transportation and Land Use
- Energy
- Water
- Waste Management and Recycling
- Agriculture and Open Space

For each sector, this chapter describes how that sector affects and is affected by climate change, the County's role, overall goals, and existing, continuing and potential future County actions. In addition, each action is coded to describe whether it affects only County government operations or potentially the community as a whole. The end of each section a summary table is included for an "at-a-glance" review of all actions pertaining to that sector.

3.2 TRANSPORTATION AND LAND USE

Introduction

Transportation accounts for more greenhouse gas (GHG) emissions than any other sector in the County, so reducing GHG emissions from this sector is critical. As explained in Chapter 2, vehicle emissions comprised just over 55% of total GHG emissions in the County in 2005 and 7.5% of the emissions associated with County government operations. GHG emissions associated with the Sacramento International Airport comprise 3% of the County total and 60% of those associated with County government operations (however, the County has no control over aircraft emissions included in the airport emissions total).

In California, passenger vehicles account for 76% of on-road transportation emission sources; heavy duty vehicles account for the remaining 24%.[1]

Vehicle emissions are determined by three factors:

- **Vehicle fuel efficiency –** Vehicle fuel efficiency can be measured two ways. Traditionally it is measured as vehicle miles traveled per gallon (vmpg), which is determined by emission limits set by state and federal standards, the type of vehicle driven, and to a lesser extent by how the vehicle is driven (for example, idling time affects GHG emissions). However, vehicle fuel efficiency can also be measured by *passenger* miles traveled per gallon (pmpg). As used here, the term passenger includes the driver. For instance, a car achieving 40 mpg that is only carrying one passenger (40 pmpg) is actually less efficient than a car achieving 20 mpg carrying four passengers (80 pmpg). Improving both vmpg and pmpg is essential to reducing GHG emissions.

- **Carbon content of vehicle fuel used –** Most vehicles on the road today use gasoline or diesel fuel, both of which result in significant carbon dioxide emissions (19.4 pounds/gallon and 22.2 pounds/gallon, respectively. [2]) Transitioning to lower-carbon or zero carbon fuels helps reduce greenhouse gas emissions. In 2007, Governor Schwarzenegger issued an Executive Order requiring a low carbon fuel standard that reduces the carbon intensity of transportation fuels sold in California. The CARB is currently undergoing the regulatory process to put the new standard into effect that will require by 2020, a 10 percent reduction in the carbon content of all passenger

vehicle fuels sold in California. While increasing the efficiency of vehicles powered by fossil-fuels can lead to significant GHG reductions, switching to alternative fuel sources (such as electricity, biofuels, fuel cells and other sources) can result in even more substantial reductions and/or potentially the total elimination of GHG emissions.

- **Vehicle miles traveled (VMT) -** Reducing VMT is another way to reduce emissions, and according to the CARB, may be the most difficult to achieve as population growth continues in the region. Local governments have the most direct influence on total VMT, as VMT is largely a function of how communities are planned and developed. Maximizing pmpg by actions such as carpooling, also reduces VMT.

Sacramento County will evaluate and implement feasible and cost-effective actions that address these factors to reduce GHG emissions.

Land Use and Transportation

The predominant land use and development trends of the post-war period often emphasized segregated land uses and relatively low development densities and intensities. As a result, distances between uses (such as homes, jobs, stores, parks, schools, etc.) increased, leading to a growing reliance on automobiles to meet daily needs. In turn, both total VMT and VMT *per capita* have increased, leading to rising GHG emissions and reduced air quality, as well as a greater portion of household income devoted to transportation costs and increasing public funds dedicated to construction, operation and maintenance of roadway and parking infrastructure. From 1997 to 2005, Sacramento County's population grew by 22.9%, from 1.12 million to 1.370 million. In the same period, VMT in Sacramento County increased by 27.4%, from 25.23 million miles to 32.15 million miles[3].

As VMT is directly tied to how communities are planned and developed, reducing VMT will require changes to and coordination of land use and transportation policy and practice. Channeling new development to urban areas and increasing overall land use mix and connectivity can increase walking, bicycling, and transit use and reduce per capita transportation-related emissions[4]. Shifting development patterns to an emphasis on compact development and complemented by smart transportation policies, can significantly reduce carbon emissions. For example, compact development clustered around transit lines can reduce VMT per capita from 20% to 40%[5]. Mixing compatible uses and developing more compactly yields permanent GHG reduction benefits that compound over time as this development pattern comprises a greater and greater proportion of the community's total land use.

The County's Role in Transportation

Sacramento County has no or limited control over the availability of fuel efficient cars and alternative fuels, or the choices County residents and cities in the region make about transportation. However, the County influences emissions from the transportation sector in a number of ways.

Vehicle miles traveled are largely a function of land use patterns, and Sacramento County is responsible for land use planning in the unincorporated county. The County's General Plan provides a blueprint for how the unincorporated County will develop, and includes a map identifying the envisioned future land use (single-family residential, commercial, agriculture, etc.). Therefore, the General Plan will affect future transportation patterns and GHG emissions.

Individual developments contribute GHG emissions. Sacramento County's Planning and Community Development Department is responsible for planning, reviewing, and approving development in the unincorporated county as guided by the General Plan. The County's Department of Environmental Review and Assessment (DERA) ensures compliance with CEQA by determining potential environmental impacts (such as GHG emissions) associated with proposed development and requiring mitigation measures.

The County's Department of Transportation (SACDOT) plans and oversees construction and improvement of roads, bridges, and pedestrian and bicycle facilities as needed to serve new and existing development. The street network and the extent of pedestrian and bicycle facilities can influence vehicle miles traveled, and therefore GHG emissions. The street and traffic signal systems also affect traffic congestion and traffic flow, which also affect fuel efficiency and GHG emissions. The GHG impacts from street signals and street lights are discussed in Chapter 3.3 Energy.

Sacramento County can affect GHG emissions associated with vehicle use in several other ways. The County can choose fuel-efficient and alternative-fuel vehicles in its own fleet, which includes thousands of light vehicles and trucks and hundreds of heavy duty trucks and equipment, used by County employees in the course of their jobs. The County can also help reduce GHG emissions associated with employee commutes by providing incentives and options for carpooling and transit. It can also reduce or eliminate customer commute time by locating County services in convenient locations throughout the County and providing on-line computer services.

Sacramento County Airport System (SCAS) owns and operates four airports in the county, including Sacramento International Airport, which services about ten million passengers annually with 12 airline companies. The satellite airfields are Mather, Franklin Field and Executive Airport. SCAS also manages the aviation activities at McClellan Airport on behalf of the County's Economic Development Department. As explained previously, GHG emissions associated with airport and aircraft emissions comprise over 60% of the GHG emissions associated with County government operations. The Sacramento County Board of Supervisors approved a comprehensive master plan update for the Sacramento International Airport in August 2007, and SCAS is in the process of completing master plans or will be completing master plans for Mather and a combined master plan for Executive and Franklin. The master plans will identify specialized GHG mitigation actions for County ground operations. In addition, SCAS works with the airlines to encourage actions on the ground to minimize environmental impacts but has no direct control over airline operations and cannot prescribe mitigation measures for their activities.

Sacramento County has no direct influence over the Sacramento Regional Transit District (RT), railroad companies, or the many commercial transportation businesses operating in the county. However, as a land-use planning agency, the County can facilitate efficient public transit by planning higher density/intensity development near transit stations and stops. In addition, the County can support regional rail by locating appropriate uses (e.g. industrial, warehouses, etc.) near major freight corridors.

The public roads and highways in the county are planned, constructed, owned and operated by various agencies in addition to the County, including the Federal Highways Administration, Caltrans, and the incorporated cities. SACDOT's jurisdiction is limited to maintaining the roads and bridges in the unincorporated area and to some designated county roads traversing the cities. The County and each of the other agencies can also implement policies and programs to maximize energy and water use efficiency in all its operations, including street maintenance. Sacramento County's practices in this regard are described in the Energy and Water sections of this chapter.

Goals

The County is committed to achieving three goals to mitigate GHG emissions in compliance with state mandates:

- 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
- Reduce total vehicle miles traveled per capita in the community and the region

Co-Benefits

Improving the fuel efficiency reduces GHG emissions and air pollution harmful to human health. More fuel-efficient vehicles also save the owner and/or operator money by reducing fuel consumption.

Reducing VMT is essential to achieving necessary GHG emission reductions, but also can result in other concurrent benefits, including:

- Reduced congestion, roadway and parking costs[6]
- Reduced injuries and deaths from collisions
- Reduced generation of toxic air contaminants and improved air quality
- Reduced cardio-respiratory diseases, asthma and premature deaths caused by toxic air contaminants
- Increased walking, bicycling and transit use will yield increased rates of physical activity and reduced rates of chronic diseases related to inactivity and obesity

Health Co-Benefits

When vehicle trips are replaced by increased walking, bicycling and transit use, the community can benefit from improved air quality, higher rates of physical activity, and reduced rates of chronic diseases related to inactivity and obesity.

Actions to Address Climate Change

Existing and potential actions that reduce GHG emissions are described below with respect to three categories, each of which directly relates to one of the goals for mitigating transportation-related emissions.

Also, all existing and potential actions are coded to indicate whether the action applies to Sacramento County government operations (G) or to the entire community (C).

Existing Actions that Increase Fuel Efficiency

The actions described below to increase fuel efficiency include those that improve vehicle miles traveled per gallon of fuel as well as those that improve efficiency by increasing the passenger miles traveled per gallon of fuel (i.e. carpools).

County Light-Duty Fleet Conversion Program (G)

The County's Department of General Services has already converted about 7.5% of its light-duty fleet (which totals 3,000 cars, vans, SUVs and small trucks servicing 54 County departments) to more fuel-efficient vehicles (gas/electric hybrids). The County's policy is to replace cars and light trucks every 12 years or 120,000 miles, whichever occurs first, and to replace them with hybrid vehicles. Non-safety vehicles are replaced with hybrids as budgets allow.

County Employee Carpool Incentives (G)

As an incentive to carpool, the County provides employee parking at a reduced monthly rate for carpools. In addition, carpools receive priority on the parking lot waiting list.

Existing Actions that Increase Use of Alternative Fuels

Alternative Fuel Vehicles for County Heavy-Duty Fleet (G)

The County's Department of General Services has acquired 20 large trucks that run on alternative fuels. This accounts for 5% of its heavy fleet. In addition, the County's Department of Waste Management and Recycling (DWMR) owns and operates a fleet of approximately 120 waste collection vehicles of which 35 are dedicated liquefied natural gas (LNG) and 60 are dual-fuel vehicles running on 80% LNG and 20% diesel.

Inherently Low Emission Vehicle Program (ILEAV) (G)

SCAS was one of ten airports that received a grant from the Federal Aviation Administration in September 2001 to expand the use of clean fuel vehicles and associated infrastructure. SCAS was one of six airports that ultimately completed the grant program in 2005. At Sacramento International Airport, 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. The associated infrastructure allows airport tenants to implement similar initiatives. The ILEAV Program provided valuable data that the FAA is using to assist airports throughout the country in the expanded use of clean fuel technologies.

Alternative Fuel Stations (G)

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. The County also operates a LNG station in North Highlands and a mobile LNG fueling truck at the Branch Center complex. In the County downtown parking structure, there are two conductive chargers and one inductive charger for electric vehicles. At Sacramento International Airport, SCAS performed a power upgrade that included electrical changing stations for electric ground service equipment vehicles.

Designated Parking for Alternative Fuel Vehicles (C)

The County designated parking spaces for electric vehicles in several County-owned parking lots.

Existing Actions that Reduce Vehicle Miles Traveled

County Employee Transportation Program (G)

The County implements an employee incentive program to promote carpooling and public transit use. An employee can purchase a RT monthly pass for $35, a significant savings from the normal price of $100.

Bike Lockers and Other Secure Bike Storage (G)

Many County facilities provide bike lockers, which range from caged areas that are electronically-controlled or box-type lockers. In general, new County building projects include areas for bike lockers.

Flexible Employee Work Schedules (G)

The County allows its employees to participate in the 9/80 program where employees complete 80 hours of work in a 9-day period and have the 10th day off. This reduces VMT for employees who drive to the workplace.

SCAS Jet Fuel Farm (G)

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. In recognition of this effort, the SMAQMD issued an Emission Reduction Credit certificate. The SCAS subsequently used the certificate to reduce the CEQA-mandated air quality mitigation fees that were assessed for anticipated construction equipment associated with Sacramento International Airport's Terminal Modernization Program now underway.

Integrate Intelligent Transportation Systems (ITS) Technology (C)

The Traffic Operations Center (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 RT 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 in return reduces vehicle emissions.

Convenient County Service Locations (C)

The County established convenient customer service centers throughout the county which helps to reduce VMT. Service centers currently operate in the north and east areas of the county. 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.

Transit Oriented Development in County Infill Corridors (C)

The County's Draft 2030 General Plan calls for revitalizing and intensifying 14 key older commercial corridors within the unincorporated county. Currently, these corridors are characterized by numerous vacant and underutilized properties, include predominantly low-intensity commercial and light industrial development, and feature few residential uses. These corridors (along with freeways and state highways) function as the County's major transportation facilities and carry tremendous automobile and transit traffic. Therefore, planning more dense/intense development along these corridors, particularly residential and mixed-use development, will facilitate high quality transit service by providing more potential riders. In addition, by providing more residents near commercial and employment uses, the future redevelopment will facilitate residents being able to walk, bike or take transit (rather than drive) to meet their daily needs.

The County plans to adopt individual plans for each corridor to provide for coordinated changes to land use, transportation, infrastructure, etc. Three corridor planning processes are currently underway: North Watt Avenue, Florin Road, and Fair Oaks Boulevard in Carmichael. These plans will be adopted in the near future.

Incentives for Increased Density and Mixed Land Use Developments (C)

Through the update to its General Plan, the County is currently exploring ways to increase average density and mix of land uses as a way to shorten distances between destinations and reduce per capita vehicle miles traveled. Actions being explored include: providing more flexibility regarding Level of Service (LOS) standards; implementing new models to evaluate LOS (measuring overall mobility rather than vehicle throughput); and more accurately capturing reductions in VMT from mixed use and transit oriented development

Bicycle and Pedestrian Master Planning (C)

Sacramento County completed a Pedestrian Master Plan that identified over $300 million in pedestrian infrastructure needs within the unincorporated County, including ways to bridge rivers, cross freeways, and develop complete streets. The County is now updating the Bicycle Master Plan. It is surveying current conditions for safety and convenience; developing a bikeability index; and identifying high priority improvement projects and implementation plan. A Bicycle Advisory Team was created to provide input and perspective in developing and prioritizing the Master plan, and the County consults with groups such as Sacramento Area Bicycle Advocates regarding bicycling

needs and safety. The draft plan is expected to be released in spring 2009 for public and environmental review.

Potential Actions to Increase Vehicle Fuel Efficiency

Provide Training for Employees to Reduce Emissions (G)
Implement employee training to reduce emissions through improved driving practices (such as related to the amount of idling, braking, coasting, starts and stops). Prioritize training for employees operating trucks and equipment most subject to stop-and-start operation.

Develop County Employee Carpool-at-Work Incentives (G)
Provide incentives to encourage employees in all departments to carpool to off-site meetings and field activities.

Lobby for Improved Fuel Efficiency Standards (C)
The County's Legislative Advocate will work alongside staff from other cities and counties in the region to encourage new or revised state or national legislation to promote manufacture, availability and purchase of more fuel efficient vehicles. Examples of legislation include increased CAFE (corporate average fuel efficiency) standards for cars and light trucks and tiered vehicle registration fees to encourage the purchase of fuel-efficient vehicles.

Require Designated Parking for Carpool Vehicles in Non-County Parking Lots (C)
Amend zoning code to require retail and other commercial uses (including employment centers) in the unincorporated county to provide dedicated parking spaces for carpool vehicles.

Potential Actions to Increase Use of Alternative Fuels

Expand Fleet Conversion Program (G)
Implement a multi-year phased program to convert the County's fleet to vehicles and equipment powered by low-carbon fuels, electricity, fuel cells or other technologies as they become financially feasible.

Increase Designated Parking for Alternative Fuel Vehicles in County Parking Lots (G)
Increase designated parking space in County-owned parking lots for alternative fuel vehicles.

Require Designated Parking for Alternative Fuel Vehicles in Non-County Parking Lots (C)
Amend zoning code to require retail and other commercial uses (including employment centers) in the unincorporated county to provide dedicated parking spaces for alternative fuel vehicles.

Address Alternative Fuel Stations in New Development (C)
Require master plans and developments in new growth areas to address site selection for alternative fueling stations and electrical vehicle charging stations.

Potential Actions to Reduce Vehicle Miles Traveled

Conduct Employee Commute Survey (G)
As recommended by the County GHG Inventory[7], a survey of employee commute actions would provide necessary data for estimating VMT and corresponding GHG emissions for this activity; this data could then be added retroactively to the 2005 GHG baseline. Additionally, the survey would provide data about participation in the various employee incentive programs, suggestions for improvements and modifications to that program, and possibly employee ideas for updates to the County's Bicycle and Pedestrian Master Plans.

Improve County Employee Transportation Program (G)
Increase the visibility of the County Employee Transportation Program Coordinator and the number of employees participating. Expand the program to encourage alternative modes of transportation for both home-to-work and at-work travel. Implement improvements to the program based on the feedback from the employee commute survey. Consider creating a bicycle fleet pool for downtown, McClellan, Airports, and Bradshaw Campus employees.

Develop Employee Shuttle System (G)
Create a shuttle system between County offices, other agency offices frequently visited by employees (e.g., Cal EPA building, Caltrans) and services not served by transit. For example, provide shuttle service between the County Administration Center downtown

and County's Bradshaw complex, or Bradshaw complex and the nearest RT light rail station.

Provide Additional Bike Lockers and Other Secure Bike Storage in County Buildings and Parking Lots (G)

Identify, prioritize and install additional bike storage facilities in County buildings and parking lots based on the feedback from the employee commute survey. Adequacy of facilities could be determined based on employee surveys or a percentage of maximum occupancy.

Utilize GPS to minimize travel distances on County-owned vehicles (G)

Utilize GPS and other route-efficiency software to minimize travel distances on County-owned vehicles

Expand Use of Teleconferencing and Other Virtual Meeting Tools (G)

Create or add to existing County policy to encourage employees to use more teleconferencing and webcast capabilities, thereby reducing the number of off-site meetings/conferences and associated VMT. The policy could specify that if off-site meetings are necessary, first choice should be to choose location near public transit or carpool to the meeting.

Provide Incentives for Increased Density and Mixed Land Use Developments (C)

Evaluate options to increase the average density and mix of land uses in order to reduce distances between destinations and reduce per capita vehicle miles traveled. For example, possible incentives to increase density include: removing zoning and other barriers to mixed-use and higher intensity development; or creating fees.

Promote Transit Oriented Development (C)

As discussed previously, the County is requiring transit oriented development (TOD) for redevelopment in its fourteen infill corridors.

Promote TOD in other areas of the unincorporated county by:

- Adjusting zoning to increase residential densities near existing and planned transit stations to ensure adequate ridership
- Requiring a minimum percentage of residences to be located within ¼ mile of a transit stop
- Requiring a minimum level of connectivity for new street and subdivision designs and include a maximum block length

- Reducing parking requirements along enhanced transit corridors, including bus rapid transit (BRT) and light rail

Implement Bicycle and Pedestrian Master Plans (C)

Implementing the Pedestrian Master Plan and soon-to-be completed Bicycle Master Plan would greatly reduce barriers to walking and biking and would also increase mobility for all users of the roadways. Converting automobile trips to bicycling and walking reduces VMT and provides a cost-effective way to address congestion, traffic safety, air quality, provides health benefits and a more livable community.

Integrate Intelligent Transportation Systems (ITS) Technology (C)

Upgrade and integrate existing traffic signal coordination through an interconnected signal system. This project will replace and upgrade cameras, cabinets, and controllers for approximately 100 signals on six major corridors. These upgrades, which modify traffic signal timing and improve monitoring of real-time traffic conditions, will benefit traffic operation.

Require Secure Bike Storage Facilities for Non-County Buildings and Parking Lots (C)

Amend zoning code to require retail and other commercial uses (including employment centers) in the unincorporated county to provide adequate, dedicated and secure bike storage facilities. Adequacy could be determined based on a percentage of maximum occupancy.

Study/Develop Pricing Policies and Structures to Discourage Car Travel (C)

Study the cost/benefit of implementing new policies to make the cost of driving reflect the full costs to society. Examples might include:

- Parking costs and road pricing systems that provide a disincentive for driving and in turn provide revenue for building infrastructure.
- Assessing a fee for employment uses that provide an excess of parking spaces, or that opt out of the employee transit pass program offered by RT. Use revenue from this fee to fund transit.

Develop and implement programs as warranted based on recommendations of the study.

Adopt "Complete Streets" Policy to Accommodate All Modes (C)

Adopt and implement "complete streets" policy to facilitate all modes of travel (public transit, cars, bicyclists, pedestrians) as safely as possible on existing and new streets under County jurisdictional control. This action will help improve pedestrian infrastructure, such as ensuring that sidewalks are continuous and complete, and improving the Americans with Disabilities Act (ADA) access at intersections.

Develop a "Safe Routes to School" (SR2S) Program (C)

Sacramento County has been very involved in both the Federal (SRTS) and State (SR2S) sponsored "Safe Routes to School" programs. Aside from the three successful completed SR2S projects, the County is currently assisting with three new SR2S applications for school grants program and an additional project is currently funded and work is in progress.

Table 3.2-1:
Summary of Existing and Potential Actions in Transportation and Land Use

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Existing Actions that Increase Fuel Efficiency										
County Light-Duty Fleet Conversion Program	Existing	County Government	♦			♦			♦	
County Employee Carpool Incentives	Existing	County Government	♦			♦			♦	
Existing Actions that Increase Use of Alternative Fuels										
Alternative Fuel Vehicles for County Heavy-Duty Fleet	Existing	County Government	♦			♦			♦	
Inherently Low Emission Vehicle Program	Existing	County Government	♦			♦			♦	
Alternative Fuel Stations	Existing	County Government	♦			♦			♦	
Designated Parking for Alternative Fuel Vehicles	Existing	Community	♦			♦			♦	
Existing Actions that Reduce Vehicle Miles Traveled										
County Employee Transportation Program	Existing	County Government	♦			♦			♦	
Bike Lockers and Other Secure Bike Storage	Existing	County Government	♦			♦			♦	
Flexible Employee Work Schedules	Existing	County Government	♦			♦			♦	
SCAS Jet Fuel Farm	Existing	County Government	♦			♦			♦	
Integrate Intelligent Transportation Systems Technology	Existing	Community	♦			♦			♦	

Table 3.2-1 (continued):
Summary of Existing and Potential Actions in Transportation and Land Use

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Existing Actions that Reduce Vehicle Miles Traveled (continued)										
Convenient County Service Locations	Existing	Community	♦			♦			♦	
Transit Oriented Development in County Infill Corridors	Existing	Community	♦	♦	♦	♦	♦		♦	
Incentives for Increased Density and Mixed Land Use Developments	Existing	Community	♦	♦	♦	♦	♦		♦	
Bicycle and Pedestrian Master Planning	Existing	Community	♦			♦			♦	
Potential Actions to Increase Vehicle Fuel Efficiency										
Provide Training for Employees to Reduce Emissions	Potential	County Government	♦			♦			♦	
Develop County Employee Carpool-at-Work Incentives	Potential	County Government	♦			♦			♦	
Lobby for Improved Fuel Efficiency Standards	Potential	Community	♦			♦			♦	
Require Designated Parking for Carpool Vehicles in Non-County Parking Lots	Potential	Community	♦			♦			♦	
Potential Actions the Increase Use of Alternative Fuels										
Expand Fleet Conversion Program	Potential	County Government	♦			♦			♦	

Table 3.2-1 (continued):
Summary of Existing and Potential Actions in Transportation and Land Use

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Potential Actions the Increase Use of Alternative Fuels (continued)										
Increase Designated Parking for Alternative Fuel Vehicles in County Parking Lots	Potential	County Government	♦			♦			♦	
Require Designated Parking for Alternative Fuel Vehicles in Non-County Parking Lots	Potential	Community	♦			♦			♦	
Address Alternative Fuel Stations in New Development	Potential	Community	♦			♦			♦	
Potential Actions that Reduce Vehicle Miles Traveled										
Conduct Employee Commute Survey	Potential	County Government	♦			♦			♦	
Improve County Employee Transportation Program	Potential	County Government	♦			♦			♦	
Develop Employee Shuttle System	Potential	County Government	♦			♦			♦	
Provide Additional Bike Lockers and Other Secure Bike Storage in County Buildings and Parking Lots	Potential	County Government	♦			♦			♦	
Utilize GPS to minimize travel distances on County-owned vehicles	Potential	County Government	♦			♦			♦	
Expand Use of Teleconferencing and Other Virtual Meeting Tools	Potential	County Government	♦			♦			♦	
Provide Incentives for Increased Density and Mixed Land Use Developments	Potential	Community	♦	♦	♦	♦	♦		♦	

Table 3.2-1 (continued):
Summary of Existing and Potential Actions in Transportation and Land Use

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Potential Actions that Reduce Vehicle Miles Traveled (continued)										
Promote Transit Oriented Development	Potential	Community	♦	♦	♦	♦	♦		♦	
Implement Bicycle and Pedestrian Master Plans	Potential	Community	♦			♦			♦	
Integrate Intelligent Transportation Systems Technology	Potential	Community	♦			♦			♦	
Require Secure Bike Storage Facilities for Non-County Buildings and Parking Lots	Potential	Community	♦			♦			♦	
Study/Develop Pricing Policies and Structures to Discourage Car Travel	Potential	Community	♦			♦	♦		♦	
Adopt "Complete Streets" Policy to Accommodate All Modes	Potential	Community	♦			♦			♦	
Develop a "Safe Routes to School" Program	Potential	Community	♦			♦			♦	

3.3 ENERGY

Introduction

Next to transportation, energy used in homes and businesses (for heating, cooling, lighting, etc.) is the largest source of GHG emissions in Sacramento County. The emissions produced depend on the amount and type of energy used (e.g. electricity or natural gas) and the primary energy source used to create the power. Most energy GHG emissions are from fossil fuels: of those, natural gas burns the cleanest. Electricity produced by renewable energy sources (e.g. wind, hydroelectric or solar) produces negligible GHG emissions.

The United States depends on foreign sources for a large portion of its energy needs. In 2007, for example, 48% of the country's petroleum was imported, making the U.S. the world's largest petroleum consumer. (EIA, 2009) In California, 85% of the energy comes from fossil fuels (oil, natural gas and coal). (CEC. 2005) For every gallon of oil, cubic foot of natural gas or pound of coal burned to create energy, GHG emissions are emitted into the atmosphere and contribute to climate change. With greater international demand for energy and lower projected supplies of fossil fuels, the nation needs to transition to domestic sustainable sources of energy to secure a reliable energy future, stabilize energy prices and reduce GHG emissions.

In Sacramento County, 28% of the GHG emissions are attributed to residential and commercial/industrial electricity and natural gas use. For Sacramento County operations, nearly 17% of GHG emissions are attributed to energy used in buildings (see Chapter 2).

The County's Role in Energy Usage

Sacramento County influences energy use by:

- Collaborating with local utilities (such as SMUD and PG&E) to encourage energy use reduction through rate structures and energy efficiency rebate programs
- Requiring alternative energy and energy reduction for new developments that go through the County's planning and building permit process
- Requiring energy efficient construction for buildings within its jurisdiction

- Efficiently managing energy consumption of County government operations

Sacramento County does not currently have the ability to influence energy use in existing buildings (non County-owned or rented), which account for a large portion of the building stock in the unincorporated County, and presumably emissions produced.

Goals

The County is committed to achieving three goals to mitigate GHG emissions in compliance with state climate change regulations:

- Improve energy efficiency of all existing and new buildings in the unincorporated County
- Improve energy efficiency of County infrastructure operation (roads, water, waste, buildings, etc)
- Decrease use of fossil fuels by transitioning to renewable energy sources

Co-Benefits

Sacramento County's efforts toward meeting the above goals result in a number of benefits besides those related to reducing GHG emissions:

- Improved outdoor air quality (and associated public health benefits)
- Future energy reliability
- Stabilized energy prices
- Lowered costs for operating County infrastructure and buildings

Health Co-Benefits

The reduced chemical and biological contaminants and improved air quality in green buildings result in less employee illness, and workers in green buildings are generally more productive.

In addition, there are a host of benefits for the community associated with green buildings:

- Lower energy costs over the life of the building
- Conservation of building materials
- Water use efficiency (indoors and outdoors)

- Reduction of solid waste
- Improved indoor air quality
- Less incidence of employee respiratory disease, allergies, asthma, headaches, nausea, and fatigue
- Natural day-lighting reduces depression and insomnia through improved regulation of circadian rhythms, the body's natural cycles that control appetite, sleep and mood
- Direct improvements in worker productivity (Kats 2003; EPA 2008)

Actions to Address Climate Change

Existing and potential actions that reduce GHG emissions are described below, each of which relates to one of the three goals for reducing energy-related GHG emissions and are coded to indicate whether the action applies to Sacramento County government operations (G) or to the entire community (C).

Existing Actions that Improve Energy Efficiency in New and Existing Buildings

The actions described below to improve energy efficiency include those that reduce energy consumption by modifying building practices and utilizing new sustainable green building practices to conserve energy.

Employee Green Building Training and Certifications (G)

Sacramento County encourages employees to obtain accreditation and reimburses costs. The County's 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.

Sacramento Sustainable Business (SSB) Program (C)

The Business Environmental Resource Center (BERC) was established in 1993 as a one-stop, non-regulatory permit assistance center to help Sacramento County businesses understand and comply with Federal, State, and local environmental regulations. Sacramento County is one of the funding partners that help support BERC's efforts. The SSB Program certifies businesses and public agencies that incorporate sustainability practices into their operations. Sacramento Sustainable Business placards will be issued so that businesses and public agencies can display their affiliation and a SSB logo can be used for advertising so that consumers can identify environmentally responsible businesses.

The SSB Program facilitates participation by: 1) Helping businesses develop a positive, proactive relationship with environmental staff members who provide regulatory, pollution prevention, and resource conservation expertise; 2) Coordinating outreach so that businesses receive consistent information and program materials that cover all applicable environmental issues; 3) Recognizing businesses at an annual public awards ceremony; and 4) Promoting the program to encourage the public to choose Certified Sustainable businesses.

Community Outreach and Education (C)

Sacramento County provides information on its Climate Change web site related to steps that residents and businesses can take to conserve energy and purchase renewable energy. This includes links to programs and web sites sponsored by SMUD, PG&E (Flex Your Power) and the SMAQMD.

Existing Actions that Improve Energy Efficiency of County Infrastructure Operation

County Energy Program Manager (G)

In 1992, the County hired its first Energy Program Manager to help reduce the County's consumption of electricity and natural gas.

County Building Energy Conservation Policy (G)

In 1973, the County created its first Energy Conservation Policy with the most recent update occurring 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. The County Energy Manager oversees compliance with the policy.

County Green Information Technology (IT) Program (G)

Sacramento County's Green IT Program applies the highest efficiencies to information technology equipment and encourages sustainable practices through each phase of the equipment's life cycle, from production to use to phasing out and recycling. Sacramento County has been boosting its Green IT performance in recent months, virtualizing servers, establishing power management programs for personal computers, and developing an internal reuse program for equipment that was once discarded.

County Building Energy Efficiency Upgrades (G)

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 CO2e per year. These improvements included more efficient HVAC equipment, controls, lighting and a 100 kilowatt solar array. Buildings with high energy usage relative to similar County buildings were prioritized for upgrades.

Energy Efficient Street Signals (G)

Sacramento County began the conversion of street signals from incandescent light bulbs to light emitting diode (LED) technology in 1997. Currently, approximately 84% 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. The County has saved approximately $481,000 each year in energy costs and expects to have 100% LED replacement by 2010.

Energy Efficient Streetlights (G)

In October 2008, Sacramento County embarked on an induction street light pilot test to determine the cost effectiveness of retrofitting the existing high pressure sodium (hps) lights with induction lights. The test took place on both residential streets and major roadways (13 total). Although the induction lights used less energy, provided a truer color, and had longer lamp life than the hps lights, they also suffered in lighting uniformity. More importantly, they were not cost effective in a retrofit situation. However, in new construction it is cost-beneficial to install induction lights instead of older technology hps lights. The County will recommend that developers (who are responsible for installing street lights) provide induction street lights in lieu of HPS street lights.

LEED Certification for New County Buildings (G)

Several County buildings under construction in 2009 are anticipated to attain LEED certification through the US Green Building Council:

- Sacramento International Landside Terminal B – Silver rating
- SASD/SRCSD Building and Corporation Yard – Silver rating
- County Animal Care Facility – Silver rating
- Vineyard Surface Water Treatment Plant – Silver rating

Sacramento Regional Wastewater Treatment Plant (SRWTP) Cogeneration Facility (C)
At the SRWTP, methane is captured and sent to a SMUD cogeneration facility to produce electricity. Currently, methane produced at the SRWTP is being used solely for the production of electricity. This initiative will be described in more detail in the SRCSD Climate Action Plan.

Existing Actions that Decrease the Use of Fossil Fuels

Building Fee Incentives for Solar Installations (C)
In February 2007, the County adopted an ordinance that exempts building permit and plan review fees for SMUD-approved residential photovoltaic solar system projects on existing residential buildings. The approval of this fee waiver encourages the proliferation of these SMUD solar projects and is consistent with a number of initiatives at the local, State and Federal level.

Aircraft Preconditioned Air and Electric Power (G)
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.

Landfill Gas-to-Energy (C)
Waste methane has been extracted from the County's Kiefer Landfill since 1997. In 1999, a landfill gas-to-energy facility became operational and was expanded in 2006. The landfill gas-to-energy plant produces 14 megawatts of electricity, enough to power 8,900 homes. This conversion of methane to clean energy has reduced GHG emissions by over 4-million metrics tons of CO_2e. Refer to Section 3.5 (Waste Reduction and Recycling) for more details.

Collaboration Related to Renewable Energy Funding (C)
Sacramento County is collaborating with SMUD, PG&E, and other regional partners to actively pursue funding for future renewable energy projects.

Potential Actions to Improve Energy Efficiency in New and Existing Buildings in the Unincorporated County

Support Employee Green Building Training and Certifications (G)
Require employees in the Planning and Community Development and Building Departments (including the Planning Director and Building Official) to become LEED Accredited Professionals

and/or Certified Green Builder Professionals within two years of adoption of this plan or new hire. At a minimum, this will apply to all employees responsible for reviewing and approving plans and permits, as well as building inspection supervisors.

Establish Green Building Task Force (C)

Establish a regional green building task force to provide recommendations which can be considered by the County, cities, and other counties in the region in adopting new green building policies and ordinances. These ordinances and other requirements will apply to new and remodeled buildings, as well as potentially for point-of-sale transactions for residential and commercial development.

Adopt Green Building Policy and Ordinance for Private Projects (C)

Within six months of the Green Building Task Force recommendations, adopt a Green Building Ordinance/Program requiring the mandatory implementation of green building techniques for new construction and existing building remodels/redevelopment for commercial and residential projects. The new policy and ordinance will apply to private projects subject to Sacramento County's land use authority. In addition to achieving energy efficiency, green buildings are expected to achieve "whole system" environmental benefits, such as conservation of building materials, water use efficiency (indoors and landscaping), reduction of solid waste, and improved indoor air quality.

Develop and Implement Energy Efficiency and Solar Retrofit (AB 811) Program (C)

Assembly Bill 811 provides local governments the authority to provide low interest loans to residential and commercial property owners to install solar and energy efficiency projects on existing properties with little to no upfront costs. Costs are to be paid back through tax assessments on participating properties over a designated payback period. Sacramento County is participating in discussions with SMUD and other local jurisdictions to explore the development of a program on a regional scale.

Provide Community Outreach and Education (C)

Sacramento County will continue to provide information on its Climate Change web site related to steps that residents and businesses can take to conserve energy and purchase renewable energy. This will include links to programs and web sites sponsored by SMUD, PG&E (Flex Your Power) and the SMAQMD.

In addition to sharing information with the public through web site postings, the County could develop and implement a public outreach program that may include public workshops with various County commissions, advisory councils, or other associations.

Potential Actions to Improve Energy Efficiency of County Infrastructure Operation

Develop and Adopt a County Green IT Policy For Establishing Energy Efficiency Standards (G)
Augment the existing Green IT Program to increase virtualization of servers and increase the energy efficiency of the County's data centers.

Implement Interim Green Building Standards for New County-Owned Buildings (G)
In 2009-2010, three County buildings with LEED certification (anticipated silver) will be completed. Until the new green building policy/ordinance is available, continue to require all new County building designs to achieve LEED silver or appropriate alternative standard.

Adopt Green Building Policy for New County-Owned Buildings (G)
Within six months of the Green Building Task Force recommendations, adopt and begin 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.

Develop Green Building Policy for Leased County Buildings (G)
Within one year of the Green Building Task Force recommendations, adopt a "Leased Green Building" Policy that sets 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.

Conduct Green Building Audits for County-Owned Buildings (G)
Within six months of adoption of the new County policy, 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.

Implement County Building Green Building Upgrades (G)
As of 2008, ten of the County's buildings (representing 11% of the County's total building square footage) were upgraded to improve their energy efficiency. Based on the results of the sustainability audits (see above), continue to prioritize and complete upgrades until all County buildings have been recommissioned to improve their energy efficiency and reduce the County's GHG emissions.

Adopt County Energy Policy(ies) for County-Owned Infrastructure (G)
Adopt one or more Infrastructure Energy Policy(ies) specific to the needs of the various departments responsible for constructing, operating and maintaining infrastructure (e.g., SACDOT-roads/bridges, County DWR-water supply/drainage systems). Address water use efficiency (e.g., use of water during field operations) which correlates to energy efficiency. At a minimum, require use of Energy Star programs as applicable for efficient energy management of the infrastructure (e.g., pumps). Energy efficient operation of street signals has previously been addressed by the SACDOT and streetlights are covered in the next action. Construction and operation of wastewater and airport infrastructure will be addressed by separate climate action plans prepared by SRCSD and SCAS, respectively.

Enhancing County Green Information Technology (IT) Program (G)
Augment existing Green IT Program to increase virtualizations of servers and increase the energy efficiency of the County's data centers

Conduct Audits of County Infrastructure Operations (G)
Six months following the adoption of County infrastructure energy policy(ies), develop and begin implementing a plan for conducting audits of existing infrastructure for compliance with the policy. Facilities and issues should be benchmarked against similar utilities and agencies to investigate opportunities for improvement. Based on the audit findings, recommend, schedule and implement energy saving measures as appropriate.

Potential Actions to Decrease the Use of Fossil Fuels

Develop and Adopt County Renewable Energy Policy (G,C)
Adopt a renewable energy policy and develop an associated green power purchasing program to ensure that by 2020, 33% of the County's electricity purchases come from renewable sources. This is consistent with CARB's 2008 Scoping Plan for achieving AB 32 compliance. (CARB. 2008)

Support Biogas-To-Electricity Partnership (C)
Continue to support partnerships between local and regional agencies (e.g. SRCSD-SMUD partnership) to explore the feasibility of increasing the production of biogas (methane gas) to generate renewable electricity by effectively handling and treating select waste streams, such as fats, oils, grease, food processing waste, and food waste. This activity will be described in more detail in the SRCSD Climate Action Plan.

Develop Guidelines for Siting of Large-Scale Renewable Energy Production Facilities (G,C)

Establish siting criteria and identify areas and/or zones where renewable energy production is a desired land use. Amend the General Plan, Zoning Code, County Ordinance, etc. as necessary to formalize these criteria. Providing guidelines for renewable energy production sites will: 1) protect valuable habitat resources where renewable energy infrastructure may alter the balance of sensitive ecosystems; and 2) streamline renewable energy projects by removing potential barriers to siting of renewable energy facilities and by providing general land use requirements at the front end of the process.

Table 3.3-1:
Summary of Existing and Potential Actions in Energy

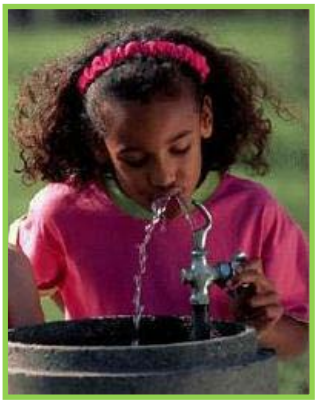
Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Existing Actions that Improve Energy Efficiency in New and Existing Buildings										
Employee Green Building Training and Certifications	Existing	County Government	♦	♦	♦	♦			♦	
Sacramento Sustainable Business Program	Existing	Community	♦	♦						
Community Outreach and Education	Existing	Community	♦	♦	♦	♦	♦	♦	♦	♦
Existing Actions that Improve Energy Efficiency of County Infrastructure Operation										
County Energy Program Manager	Existing	County Government	♦	♦		♦			♦	
County Building Energy Conservation Policy	Existing	County Government	♦	♦		♦			♦	
County Green Information Technology Program	Existing	County Government	♦	♦		♦				
County Building Energy Efficiency Upgrades	Existing	County Government	♦	♦		♦				
Energy Efficient Street Signals	Existing	County Government	♦	♦		♦				
Energy Efficient Streetlights	Existing	County Government	♦	♦		♦				
LEED Certification for New County Buildings	Existing	County Government	♦	♦	♦	♦			♦	
Sacramento Regional Wastewater Treatment Plan Cogeneration Facility	Existing	Community	♦	♦		♦				
Existing Actions that Decrease the Use of Fossil Fuels										
Building Fee Incentives for Solar Installations	Existing	Community	♦	♦		♦				
Aircraft Preconditioned Air and Electric Power	Existing	County Government	♦			♦			♦	

Table 3.3-1 (continued):
Summary of Existing and Potential Actions in Energy

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Existing Actions that Decrease the Use of Fossil Fuels (continued)										
Landfill Gas-to-Energy	Existing	Community	♦			♦			♦	
Collaboration Related to Renewable Energy Funding	Existing	Community	♦	♦		♦				
Potential Actions to Improve Energy Efficiency in New and Existing Buildings in the Unincorporated County										
Support Employee Green Building Training and Certifications	Potential	County Government	♦	♦						
Establish Green Building Task Force	Potential	Community	♦	♦						
Adopt Green Building Policy and Ordinance for Private Projects	Potential	Community	♦	♦	♦	♦	♦		♦	♦
Developand Implement Energy Efficiency and Solar Retrofit (AB 811) Program	Potential	Community	♦	♦		♦				
Provide Community Outreach and Education	Potential	Community	♦	♦	♦	♦		♦	♦	♦
Potential Actions to Improve Energy Efficiency of County Infrastructure Operation										
Develop and Adopt a County Green IT Policy For Establishing Energy Efficiency Standards	Potential	County Government	♦	♦						
Implement Interim Green Building Standards for New County-Owned Buildings	Potential	County Government	♦	♦	♦	♦	♦	♦	♦	♦
Adopt Ultimate Green Building Policy for New County-Owned Buildings	Potential	County Government	♦	♦	♦	♦	♦	♦	♦	♦
Develop Green Building Policy for Leased County Buildings	Potential	County Government	♦	♦	♦	♦	♦		♦	♦

Table 3.3-1 (continued):
Summary of Existing and Potential Actions in Energy

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Potential Actions to Improve Energy Efficiency of County Infrastructure Operation (continued)										
Implement County Building Green Building Upgrades	Potential	County Government	♦	♦	♦	♦			♦	♦
Conduct Green Building Audits for County-Owned Buildings	Potential	County Government		♦	♦	♦			♦	♦
Adopt County Energy Policy(ies) for County-Owned Infrastructure	Potential	County Government	♦	♦	♦	♦	♦	♦	♦	♦
Enhancing County Green Information Technology Program	Potential	County Government	♦	♦		♦				♦
Conduct Audits of County Infrastructure Operations	Potential	County Government	♦	♦	♦	♦		♦	♦	♦
Potential Actions to Decrease the Use of Fossil Fuels										
Develop Guidelines for Siting of Large-Scale Renewable Energy Production Facilities	Potential	Community and County Government	♦	♦		♦	♦			
Develop and Adopt County Renewable Energy Policy	Potential	Community and County Government	♦	♦	♦	♦	♦	♦	♦	♦
Support Biogas-to-Electricity Partnership	Potential	Community	♦	♦	♦	♦	♦	♦	♦	♦



3.4 WATER

Introduction

Energy and water are interconnected; energy is used to pump, treat, and deliver water supplies and treat wastewater and water is used to produce energy (both directly through hydroelectric plants and indirectly for cooling at thermoelectric power plants). Therefore, improving water efficiency will reduce energy demand and improving energy efficiency will reduce water demand. Despite this interrelationship, these two sectors have been managed historically independent of one another. Therefore, it is critical to recognize the balance and tradeoffs involved in meeting both future energy and water demands as these resources become increasingly constrained. Failure to do so, will introduce system vulnerabilities whereby limitations of one resource will result in limitations of the other.

The California Energy Commission (CEC) estimates that approximately 19% of all electricity and 30% of natural gas (e.g., natural gas not used to generate electricity) used in the state is for water management. In general, when a unit of water is saved, so too is the energy required to pump, treat, deliver, use and dispose of that water. (Cal EPA 2008) Most of the GHG emissions attributed to the water sector are emitted from power plants that generate the electricity needed to convey and treat the water, and from the vehicles and equipment required to construct, operate, and maintain the conveyance, treatment, and production systems.

Climate change is expected to strain many of Northern California's water resources, including surface and groundwater-based systems, increasing competition for water in the region. Various conditions are predicted: (DWR 2007; DWR 2008; EPA 2009)

- A warmer climate is expected to affect the seasonal availability of water by increasing evaporation and reducing the Sierra snowpack

- Variability in reservoir, river and stream flows and temperatures will likely impact water supply, water quality, fisheries, recreation, and hydroelectric power availability

- Higher winter flows could lead to flooding problems

- Possible decreases in groundwater recharge will reduce water for urban and agricultural uses

- Higher temperatures, reduced summer soil moisture, and variable water supplies will adversely affect agriculture

- Higher temperatures and changing precipitation will likely lead to more droughts and increase the risk of wildfires

- Rising sea levels will increase the probability for salinity intrusion in the Sacramento-San Joaquin Delta that could require greater quantities of upstream freshwater sources, affecting this region's water supply

As a result of anticipated climate change impacts, Sacramento County exhibits vulnerabilities related to water resources. These include: reduced water supply availability, potential water quality problems, increasing flood risks, impacts to agricultural production and viability, and increased water demands associated with fighting wildfires and increased temperatures.

There are three key challenges for the water sector in addressing climate change:

- Actions necessary to comply with water quality standards (e.g., treating water and wastewater) could increase GHG emissions. A balance is needed between climate change considerations and water quality/health protection; net zero GHG emissions will not be possible.

- Enhancement of water conservation and recycling in a watershed may reduce water supply for downstream urban, agricultural and environmental uses because less water will re-enter the streams and rivers.

- In the event of diminished water supplies, water rights disputes may arise due to reduced water availability.

The County's Role in Water Management

Over 25 water purveyors, including the Sacramento County Water Agency (SCWA), provide drinking water for Sacramento County residents. The SCWA owns and operates the potable water delivery system for 55,000 connections (about 180,000 residents) within its 138 square-mile service area. The SCWA uses surface and groundwater resources to provide water to its customers, and a project is underway to increase the surface water component of the water portfolio, thereby allowing local groundwater aquifers to recharge. SCWA contracts with the County's Department of Water Resources (County DWR) to operate and maintain the water supply infrastructure.

The County DWR plans, owns, and operates the stormwater drainage system in unincorporated Sacramento County. In this area, the County DWR is also responsible for flood protection and compliance with stormwater quality regulations intended to reduce pollution in local creeks and rivers. Additionally, the County DWR is contracted to operate and maintain the stormwater drainage systems and conduct some stormwater quality protection activities within the cities of Citrus Heights and Rancho Cordova.

This section of the Phase 1 CAP describes only those activities within the control of SCWA and County DWR. The following actions are not addressed:

- Actions to mitigate impacts from wastewater collection, conveyance, and treatment – these activities are conducted by the Sacramento Area Sewer District (SASD) and Sacramento Regional County Sanitation District (SRCSD). Both agencies are independent of the County and their actions will be described in a separate document prepared by those entities in conjunction with their master planning efforts. GHG emissions from domestic wastewater treatment required for unincorporated Sacramento County in 2005 amounted to 54,391 metric tons of CO_2e, which represents 0.8% of overall emissions for the unincorporated County (See Chapter 2)

- Water conservation programs (and associated energy efficiencies) and other mitigation actions implemented by over 25 other water purveyors in Sacramento County.

- Water quality and watershed protection initiatives undertaken by cities, community service and parks districts, environmental organizations, federal and state regulatory agencies, and other entities.

- Flood control policies and projects implemented by federal, state, regional and local agencies.

In April 2000, the SCWA along with almost 40 other agencies in the region, signed the Water Forum Agreement, a landmark agreement intended to allow the region to meet its drinking water needs in a balanced way while protecting fish habitat in the lower American River. One of the Water Forum's two coequal objectives is to: "*Provide a reliable and safe water supply for the region's economic health and planned development through the year 2030.*" There are seven major elements of the Water Forum Agreement, three of which (increased surface water diversions, groundwater management and water conservation) relate to goals and actions described in this section. (Water Forum 2000)

Goals

Sacramento County is committed to achieving the following goals to mitigate GHG emissions associated with operation and maintenance of the water supply and drainage systems within its jurisdiction, and to prepare for the potential water-related impacts due to climate change:

- Achieve 20% reduction in per capita water use levels by 2020, consistent with the Governor's water conservation target (SWRCB 2008)[1]

- Emphasize water use efficiency as a way to reduce energy consumption

- Increase energy efficiency related to water system management

[1] On February 28, 2008, Governor Schwarzenegger wrote to leadership of the California State Senate, outlining key elements of a comprehensive solution to problems in the Sacramento-San Joaquin Delta. The first element on the Governor's list was "a plan to achieve a 20 percent reduction in per capita water use statewide by 2020." In March 2008 the 20x2020 Agency Team was convened to develop a plan to achieve a 20 percent reduction in per capita urban water use statewide by 2020.

- Strive to reduce uncertainties in water reliability and quality by increasing the flexibility of the water allocation and distribution system to respond to drought conditions and encouraging redundancy in water storage, supply, and treatment systems (consistent with Water Forum Agreement)

- Elevate the importance of floodplain and open space protection as a means of protecting water quality and habitat, sequestering carbon, and providing groundwater recharge opportunities, if suitable soil conditions permit

Co-Benefits

Sacramento County's efforts toward meeting the above goals result in a number of benefits besides those related to reducing GHG emissions:

Health Co-Benefits

Conserving water (or water conservation) protects drinking water sources and minimizes water pollution and health risks. It also maintains the health of aquatic environments.

- Efforts to conserve water help ensure a reliable drinking water source

- Low impact development practices allow more water to soak into the ground (rather than be carried off as runoff) and typically yield many benefits including reduced flooding risks, increased groundwater recharge and improved water quality

- The River Friendly Landscaping Program (described later) results in many benefits besides efficient water use, including but not limited to, less green waste delivered to landfills and improved runoff quality due to less use of toxic pesticides and fertilizers

- Efforts that preserve floodplains and open space to recharge groundwater typically yield many co-benefits such as wildlife habitat, improved water quality, aesthetics, and provide opportunities for increased physical activity and improved health of community residents

- Conserving water saves money. Customers save on utility bills, and the SCWA can save costs associated with developing or expanding water supply sources

Actions to Address Climate Change

Existing and potential actions that reduce water-related GHG emissions are described below. In addition some actions identified will also help Sacramento County prepare for and adapt to impacts from a changing climate.

All existing and potential actions are coded to indicate whether the action applies to Sacramento County government operations (G) or to the entire community (C).

Existing Actions to Reduce per Capita Water Use Levels by 2020

Voluntary Water Conservation Targets (C)
The SCWA establishes voluntary water conservation targets for its customers when needed to respond to the region's water supply situation (e.g., a current 10% voluntary rate was announced August 2008).

Statewide Collaboration on Water Conservation Practices (C)
SCWA is a member of the California Urban Water Conservation Council and has signed the Council's memorandum of understanding, thereby agreeing to implement 14 best management practices (BMPs) intended to conserve water in urban areas. The BMP list is updated periodically and biennial reporting is required to track BMP activities.

Water Conservation Rate Structure (C)
As an incentive, SCWA has established a three-tiered water conservation rate structure which allows for a discounted rate for customers who conserve water.

Existing Actions to Emphasize Water Use Efficiency

Energy Efficiency of Water Supply System (G)
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 oil-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.

Metered Billing (C)
Metered billing is a water efficiency tool to improve knowledge of personal water use, identify water leaks and establish a more equitable fee structure than flat rate billing. About 80% of the SCWA connections (over 140,000 residents) are already being charged a metered rate. This includes all new homes constructed since January 1, 2000. In addition, in 2010 SCWA will begin increasing its efforts retrofitting the older houses within its service area with water meters and transitioning those customers to metered billing by 2014.

Water Wise Audits (C)
SCWA offers free water wise house and business calls to its customers; the current goal is to reach 15 percent of the customers. During an audit, field staff conducts inspections of the customer's irrigation system, inspect for interior and exterior water leaks and offer a custom irrigation schedule and water-saving tips specific to the property.

Water Waste Prohibition Program (C)
This SCWA program is designed to increase customer awareness and minimize water waste from overwatering. County staff investigates public complaints and look for cases of water waste; customers wasting water receive a notice offering water efficiency tips.

Existing Actions to Increase Energy Efficiency

Fixed Base Meter Reading (C)
SCWA is implementing a program to install devices on existing and future water meters to allow for remote real time reading, thereby reducing staff time, vehicle miles traveled and associated GHG emissions. That program also enables SCWA to focus on high water users and identify opportunities to lower water usage and to more accurately track and repair water system leaks.

County Water Conservation Coordinator (C)
The SCWA employs a full-time water conservation coordinator to educate the public about ways to increase water efficiency. The coordinator oversees the County's various water conservation programs described below and manages the water conservation web site.

Existing Actions to Reduce Uncertainties in Water Reliability and Quality

River Friendly Landscaping Program (C)
Sacramento County DWR launched the River Friendly Landscaping Program in 2007. Through written guidelines and demonstration workshops, the program promotes the use of seven principles. Those have numerous co-benefits, including: reduced water use and site runoff, less green waste delivered to landfills, reduced GHG emissions through less use of gas powered equipment and reduced trips to the landfill, and improved runoff quality due to less use of toxic pesticides and fertilizers. The program targets both landscape professionals and homeowners.

Watershed Protection and Restoration (C)
Sacramento County DWR continues to support (with funding and in kind services) the work of local watershed organizations to assess, protect and restore watershed resources, including water quality and habitat. The Laguna Creek Watershed Council is one such group, and the organization is seeking funding for demonstration water use efficiency projects (e.g., demonstration gardens in the watershed).

Low Impact Development (C)
Through its development standards and the *Stormwater Quality Design Manual for Sacramento and South Placer Regions* (May 2007), Sacramento County DWR encourages new and redevelopment projects to integrate features of low impact development (LID) to reduce runoff and promote infiltration and groundwater recharge. Through the use of such features, the post-development hydrologic conditions more closely mimic natural ones. Examples of LID techniques include maximizing pervious areas, disconnecting roof runoff drains from the stormwater drainage system and directing runoff to landscaped areas and to pervious pavements. Future updates to the *Design Manual* are expected to make the use of LID mandatory, where feasible.

Green Infrastructure (C)
The County is promoting the use of green infrastructure techniques which capture and treat stormwater runoff and promote infiltration and helps replenish groundwater. An example is the proposed Freedom Park Drive Green Streets project in North Sacramento County being designed by SACDOT. For more information about EPA's green infrastructure initiative, see: http://cfpub.epa.gov/npdes/home.cfm?program_id=298.

Conjunctive Use – Freeport Regional Water Project and Vineyard Surface Water Treatment Plant (C)

The Freeport Regional Water Project (FRWP) is a cooperative effort of SCWA and the East Bay Municipal Utility District (EBMUD) of Oakland to supply surface water from the Sacramento River to its customers. SCWA is allocated 85 million gallons of water per day (mgd) from the FRWP to serve customers in the central county. By increasing the availability of surface water supplies, the County can reduce its groundwater use and allow aquifers in the central county to recharge. EBMUD will use 100 mgd of water from the FRWP as a supplemental water source in dry years only.

SCWA's water will be treated by the new SCWA Vineyard Surface Water Treatment Plant which began construction in May 2008 and will be online in fall 2011. The facility will initially be able to treat up to 50 mgd of water from the FRWP. The facility is part of a concerted effort to limit groundwater pumping to ensure the long-term sustainability of the region's groundwater basin. During dry years, the SCWA would rely on groundwater to offset reduced surface water supplies.

Water Recycling Program (C)

In the late 1980s, the SRCSD, in partnership with the SCWA, began to explore the feasibility of using recycled water to meet the demands of a growing region, reduce impacts from droughts, and minimize the imposition of more stringent discharge requirements. In 2002, SRCSD and SCWA entered into recycled water Wholesale Agreement; through this agreement, SRCSD is responsible for producing and providing recycled water to SCWA, which in turn is responsible for distributing and retailing recycled water to select customers.

Since April 2003, SRCSD has produced recycled water at the Water Reclamation Facility (WRF), located in the City of Elk Grove at the Sacramento Regional Wastewater Treatment Plant. WRF has a capacity of 5 mgd, and produces Title 22 "unrestricted" recycled water that is used in-lieu of potable water to meet non-potable demands, such as landscape irrigation. SCWA currently delivers the recycled water to select customers in the Laguna West, Lakeside, and Stonelake communities in Elk Grove.

In 2004, the SRCSD Board of Directors approved strategic concepts to evaluate increasing the delivery of recycled water from 5 mgd to 30-40 mgd over the next 20 years. In 2007, the SRCSD completed a Water Recycling Opportunities Study which engaged stakeholders and assessed the feasibility of potential water recycling projects. SRCSD and SCWA are currently evaluating increasing the WRF's current recycled water capacity from 5 to 9-10 mgd.

Participation in Delta Vision Process (C)
In October 2008, the County adopted resolutions approving the Sacramento County and Sacramento County Water Agency policies regarding Bay-Delta Activities including the Delta Vision and the Bay-Delta Conservation Plan. The County policies are intended to promote cooperation between stakeholders and safeguard future water supply and reliability for county residents, as decisions are made about diversions and other activities.

Participation in the Sacramento Area Water Forum (C)
Sacramento County participates in the Sacramento Area Water Forum (Water Forum), a consensus-based, stakeholder process involving over forty representatives of water purveyors, businesses, and environmental and public interest groups in the region.

The two co-equal objectives of the Sacramento Area Water Forum are:

- To provide a reliable and safe water supply for the region's economic health and planned development through the year 2030; and
- To preserve the fishery, wildlife, recreational, and aesthetic values of the lower American River.

Sacramento County has signed the Water Forum Agreement, which includes detailed understandings among stakeholder organizations on how the region will deal with key issues such as groundwater management, water diversions, dry year water supplies and water conservation. To date, the Sacramento Area Water Forum effort has developed integrated projects and programs that meet the water supply, water quality, environmental, recreational, and flood control requirements of the region.

Existing Actions to Elevate the Importance of Floodplain and Open Space Protection

Participation in Integrated Regional Water Management Plan (IRWMP) Process (C)
Sacramento County is implementing two projects identified in the American River Basin IRWMP: the Freeport Regional Water Project, designed to increase water supply (as previously described) and a joint management project with the Nature Conservancy designed to protect water quality and critical habitat and species of the Cosumnes River.

Potential Actions to Reduce per Capita Water Use Levels by 2020

Develop Water Use Efficiency Policy for County Facilities and Operations (G)
Sacramento County could adopt a water conservation policy to apply to all County facilities, operations and employees and that include targets consistent with the Governor's water conservation target.

Study Feasibility of Sub-metering for County-owned Facilities (G)
The County could assess whether installing sub-meters (which provide information about water use) at County facilities would be an effective way to promote water conservation. Any study recommendations that demonstrate cost-efficiency with a short payback period could then be implemented.

Enhance and Expand Demand Side Management Programs (C)
Existing County programs designed to reduce per capita water consumption for residential and business customers could be expanded. In particular, consider conservation-oriented pricing for metered customers; additional outreach and education; and expansion of the current rebate program to add fixtures and appliances such as waterless urinals, dual flush toilets, faucet retrofits, irrigation controllers, drip irrigation, and water brooms. It may be more economical to reduce water use through such demand side management tools than to pursue new water supply sources.

Potential Actions to Emphasize Water Use Efficiency

Conduct Energy and Water Efficiency Audits of Water and Drainage Infrastructure (G)
The County DWR and SCWA could audit the efficiency of existing water distribution and stormwater conveyance facilities and then recommend, schedule and implement water and energy saving measures as appropriate. Possible energy saving measures include load management and reduction to increase wire to water efficiency, using more energy-efficient lighting, and replacing HVAC systems, if warranted. SCWA and County DWR facilities and operations could be benchmarked against similar utilities to investigate opportunities for improvement.

Study the Water Use Efficiency of County Facilities (G)
SCWA's water conservation staff could advise the County's Department of General Services on how to assess indoor and outdoor water use at all County-owned facilities,

including buildings, parks and golf courses, and identify ways to reduce water use, where feasible. Ideally water use would be evaluated along with energy efficiency, waste management and indoor air quality in a "whole system" facility assessment. The County could take advantage of any applicable utility/commercial rebates when replacing or upgrading water infrastructure and equipment (e.g., changing water-cooled equipment to air-cooled, replacing standard toilets with dual flush or ultra-low flow toilets, or modifying irrigation systems to use drip irrigation or sprinkler controllers) In most cases the costs of upgrading equipment is soon repaid in reduced utility expenses (and potentially rebates) and also results in long-term environmental benefits.

Audit the Water Efficiency of SCWA and DWR Operations (G)
The County DWR could:

- Conduct an audit of water use at all SCWA and DWR field operations, including dust control, vegetation management, pavement cleaning, water system testing/flushing, etc.
- Use the results to create a template for other departments to assess their water use efficiency during field operations.

Audit the Water Efficiency of all County Field Operations (G)
If the SCWA and the County DWR conduct water-use audits of their field operations (see prior action), they could provide guidance and support to other departments to assess and improve the water use efficiency of their field operations.

Incorporate Water Use Efficiency in Green Building Efforts (C)
The County should ensure that the green building efforts described previously (see the Energy section of this chapter) address indoor and outdoor water use efficiency in new and existing buildings.

Advertise/Promote Energy Star Rebate Program (C)
Sacramento County could use its website to promote the Energy Star Rebate Program for clothes washers and dishwashers (as well as the County's own incentive programs); providing the message that Energy Star appliances save water, not just energy.

Potential Actions to Increase Energy Efficiency

Develop an Energy Policy for Water and Drainage Infrastructure (G)
Sacramento County could develop an energy policy specific to the needs of both the County DWR and SCWA.

Conduct Energy and Water Efficiency Audits for Buildings (G)
Sacramento County could assess its buildings and facilities (including those owned/operated by SCWA and DWR) for energy and water use efficiency (indoors and outdoors) and schedule/implement improvements as feasible. (See the Energy section of this chapter regarding the energy assessment.) The assessments should address landscape management with respect to the principles outlined in the River Friendly Landscaping program.

Create River Friendly Landscaping Demonstration Garden(s) (C)
Sacramento County could collaborate with watershed organizations, school districts and others to seek funding to construct River Friendly community demonstration gardens throughout the SCWA service area. The SCWA already has one water efficient demonstration garden located in its service area.

Create a Graywater Re-Use Policy and Program (C)
SCWA and the County's Environmental Management Department and Building Inspection groups could work together to create policies and guidelines for graywater reuse in residential and commercial areas. The County could seek grant funding to implement pilot scale tests to assess feasibility and refine criteria. It could investigate use of rainwater harvesting and/or graywater systems as a source of irrigation water through demonstration projects.

Potential Actions to Reduce Uncertainties in Water Reliability and Quality

Consider Rural-Urban Compacts (C)
The County could consider developing "subsidiary agreements" or similar "rural-urban compacts" to reallocate agriculture and urban water allocations during periods of extreme drought. (Haddad 2005)

Encourage Dam Re-Operation Study (C)
County DWR could encourage efforts to study and implement dam re-operation projects that provide increased weather and hydrological monitoring. Such monitoring helps dam operators know when to release water to prevent flooding and when to capture it for water supply.

Potential Actions to Elevate the Importance of Floodplain and Open Space Protection

Investigate Regional Opportunities for Groundwater Storage (C)
The County could work with other regional partners to study existing groundwater storage and recommend how to use it fully. The study could also explore the feasibility of groundwater banking and possible aquifer storage and recovery programs. SCWA has already identified groundwater storage in their master plan and have initiated discussions with other water purveyors.

Increase Surface Storage (C)
Working with the State Department of Water Resources and other regulatory/resource agencies, the County could investigate the need to participate in the construction of surface storage to mitigate peak flood flows and provide additional water supplies.

Study Sea Level Rise Impacts to Sacramento County (C)
County DWR could work with the State Department of Water Resources and other regulatory/resource agencies to investigate the local impact of sea level rise on flood protection and groundwater quality as well as the impact to North Delta communities.

Promote Open Space Conservation and Conservation Easements (C)
Conserving open space (including through conservation easement) provides groundwater recharge and protects groundwater (as well as wildlife habitat). Retaining and detaining flood flows higher up in the watershed may prove to be an effective way of recharging groundwater along with providing effective stormwater management.

Improve Floodplain Protection Policies (C)
The existing floodplain management policy can be strengthened to ensure compliance with legislation mandating protection of the 200-year flood plain.

Table 3.4-1:
Summary of Existing and Potential Actions in Water

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Existing Actions to Reduce per Capita Water Use Levels by 2020										
Voluntary Water Conservation Targets	Existing	Community	♦	♦	♦					
Statewide Collaboration on Water conservation Practices	Existing	Community	♦	♦	♦					
Water Conservation Rate Structure	Existing	Community	♦	♦	♦					
Existing Actions to Emphasize Water Use Efficiency										
Energy Efficiency of Water Supply System	Existing	County Government	♦	♦	♦		♦	♦	♦	
Metered Billing	Existing	Community	♦	♦	♦					
Water Wise Audits	Existing	Community	♦	♦	♦					
Water Waste Prohibition Program	Existing	Community	♦	♦	♦					
Existing Actions to Increase Energy Efficiency										
Fixed Base Meter Reading	Existing	Community	♦		♦			♦	♦	
County Water Conservation Coordinator	Existing	Community	♦	♦	♦					
Existing Actions to Reduce Uncertainties in Water Reliability and Quality										
River Friendly Landscaping Program	Existing	Community	♦	♦	♦	♦	♦	♦	♦	♦
Watershed Protection and Restoration	Existing	Community	♦	♦	♦	♦	♦	♦	♦	♦
Low Impact Development	Existing	Community	♦	♦	♦	♦	♦	♦	♦	
Green Infrastructure	Existing	Community	♦	♦	♦	♦	♦	♦	♦	

Table 3.4-1 (continued):
Summary of Existing and Potential Actions in Water (continued)

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Existing Actions to Reduce Uncertainties in Water Reliability and Quality (continued)										
Conjunctive Use – Freeport Regional Water Project and Vineyard Surface Water Treatment Plant	Existing	Community	♦	♦	♦	♦			♦	
Water Recycling Program	Existing	Community	♦	♦	♦	♦	♦	♦		
Participation in Delta Vision Process	Existing	Community	♦		♦		♦	♦	♦	
Participation in the Sacramento Area Water Forum	Existing	Community	♦		♦		♦	♦	♦	
Existing Actions to Elevate the Importance of Floodplain and Open Space Protection										
Participation in Integrated Regional Water Management Plan Process	Existing	Community	♦		♦		♦	♦		
Potential Actions to Reduce per Capita Water Use Levels by 2020										
Develop Water Use Efficiency Policy for County Facilities and Operations	Potential	County Government	♦	♦	♦	♦				
Study Feasibility of Sub Metering for County-Owned Facilities and Operations	Potential	County Government	♦		♦					
Enhance and Expand Demand Side Management Programs	Potential	Community	♦		♦	♦				
Potential Actions to Emphasize Water Use Efficiency										
Conduct Energy and Water Efficiency Audits of Water and Drainage Infrastructure	Potential	County Government	♦	♦	♦	♦				

Table 3.4-1 (continued):
Summary of Existing and Potential Actions in Water (continued)

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Potential Actions to Emphasize Water Use Efficiency (continued)										
Study the Water Use Efficiency of County Facilities	Potential	County Government	♦	♦	♦	♦				
Audit the Water Efficiency of SCWA and DWR Operations	Potential	County Government	♦	♦	♦	♦				
Audit the Water Efficiency of all County Field Operations	Potential	County Government	♦	♦	♦					
Incorporate Water Use Efficiency in Green Building Efforts	Potential	Community	♦	♦	♦	♦				
Advertise/Promote Energy Star Rebate Program	Potential	Community and County Government	♦	♦	♦	♦				
Potential Actions to Increase Energy Efficiency										
Develop an Energy Policy for Water and Drainage Infrastructure	Potential	County Government	♦	♦	♦	♦				
Conduct Energy and Water Efficiency Audits for Buildings	Potential	County Government	♦	♦	♦					
Create River Friendly Landscaping Demonstration Garden(s)	Potential	Community	♦	♦	♦	♦	♦	♦	♦	♦
Create a Graywater Re-Use Policy and Program	Potential	Community	♦	♦	♦	♦	♦	♦	♦	♦
Potential Actions to Reduce Uncertainties in Water Reliability and Quality										
Consider Rural-Urban Compacts	Potential	Community	♦	♦	♦	♦			♦	
Encourage Dam Re-Operation Study	Potential	Community	♦		♦					

Table 3.4-1 (continued):
Summary of Existing and Potential Actions in Water (continued)

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Potential Actions to Elevate the Importance of Floodplain and Open Space Protection										
Investigate Regional Opportunities for Groundwater Storage	Potential	Community	♦	♦	♦	♦			♦	
Increase Surface Storage	Potential	Community	♦	♦	♦	♦				
Study Sea Level Rise Impacts to Sacramento County	Potential	Community	♦		♦		♦			
Promote Open Space Conservation and Conservation Easements	Potential	Community	♦		♦	♦	♦		♦	
Improve Floodplain Protection Policies	Potential	Community	♦		♦				♦	

3.5 WASTE MANAGEMENT AND RECYCLING

Introduction

Sacramento County's waste management operations, described in this section, are responsible for a relatively small portion (about 3%) of total community GHG emissions, as compared to emissions from transportation and building energy use (see Chapter 2). In complying with stringent State air quality regulations since 1990, the County has already made significant progress in lowering GHG emissions. However, the County recognizes the many benefits (including cost savings) that might be achieved by enhancing and expanding efforts described in this section of the Climate Action Plan.

The County's Role in Waste Management

Sacramento County provides comprehensive waste management and recycling systems for residents and businesses in the unincorporated area.

The Sacramento County Department of Waste Management & Recycling (DWMR) provides waste collection services to 150,000 residential customers in the unincorporated area every week. Residential solid wastes are disposed of in the County's Kiefer Landfill, discussed later in this section. The County has no influence over residential waste collection operations by other jurisdictions in the region, including decisions made related to export of wastes outside of the county.

Sacramento County is a member of the Sacramento Regional Solid Waste Authority (SWA) formed in December 1992 to assume the responsibilities for commercial solid waste, recycling and disposal for the City of Sacramento and the County. The SWA is a Joint Powers Authority funded by franchisee fees and governed by a Board of Directors consisting of elected officials from the City and the County. The SWA regulates commercial solid waste collection by franchised haulers through franchise agreements and ordinances. SWA ordinances require that franchised haulers achieve a 30 percent recycling rate and offer recycling services to multi-family dwelling units.

In addition to collection services, Sacramento County offers waste transfer and disposal services. The County competes for and accepts residential and commercial waste from all jurisdictions in the region at the following two locations:

- *Kiefer Landfill*. Kiefer Landfill is the only active municipal solid waste disposal facility in Sacramento County. Over 700,000 tons of waste are accepted each year from the general public, businesses, government operations (including Sacramento County), and private waste haulers. The entire facility is 1,084 acres, and of that, the current landfill makes up only 290 acres of the ultimate 660-acre disposal area. Therefore, this facility will be able to serve regional waste disposal needs for many years to come. As a result of a comprehensive array of programs aimed at source reduction, recycling, composting, and public education and outreach, Sacramento County diverted an estimated 58% of its solid waste from the landfill in 2006.

- *North Area Recovery Station (NARS)*. The North Area Recovery Station is a transfer and recovery facility that accepts various types of wastes (e.g., solid, green, household hazardous, universal and electronic) from the general public, businesses and private waste haulers, and sorts the waste for shipment off-site. Residential wastes are transferred to Kiefer Landfill. Some organic waste is segregated at NARS for composting and biomass processing. Other materials recovered at the facility include metals, appliances, asphalt, concrete, and soil. Source separated recyclables are transferred off-site for processing and marketing.

Sacramento County works to reduce GHG emissions from its waste management activities by promoting reduced consumption in homes and businesses and by properly managing all materials to minimize the generation of waste, increase the diversion from landfills, and to turn the waste into reusable resources. Reduced waste generation also achieves efficiencies in collection and thus associated reduction in GHG emissions. Recycling reduces GHG emissions by avoiding the energy used in manufacturing new products and by reducing the amount of methane released into the atmosphere as waste decomposes in landfills.

The two major waste-related sources of GHG emissions for the unincorporated county are solid waste generation and decomposition of waste at Kiefer Landfill. As discussed in Chapter 2, combined emissions from these sources in 2005 represented a relatively

small portion (about 3%) of total community emissions. This total includes GHG emissions attributed to solid waste from government operations (Kiefer Landfill). Actions taken by DWMR since 1990 have likely contributed to significant reduction in GHG emissions as discussed below. Additionally, DWMR-owned solid waste collection vehicles contribute to GHG emissions under vehicle fleet categories within the government emissions category (see Chapter 2).

Emissions from Waste Generation

In 1990, the per capita solid waste generation rate for the unincorporated county was approximately 8 lbs/person/day resulting in about 940,000 tons of solid waste for the unincorporated county area (Table 3.5-1). As highlighted in Figure 3.5-2, a large portion of the waste disposed in the Kiefer Landfill in 1990 consisted of organic materials, which contribute carbon dioxide and methane to the atmosphere as they decompose. This is no longer the case. Since 1990, the DWMR has been actively engaged in implementing a multitude of waste diversion activities and has achieved 58% waste diversion as of 2006. Waste diverted from the landfill is reused in other ways.

Table 3.5-1: Solid Waste Diversion in Unincorporated Sacramento County (tons):

	1990*	2001**	2006***	2020**** (projected)
Solid Waste Generated	941,500	1,552,450	1,576,960	
Solid Waste Disposed	769,600	681,020	658,260	
Solid Waste Diverted	171,900	871,430	918,700	
Diversion rate	18%	56%	58%	65%

Source: *AB 939 SRR Element, 1991, **AB 939 Base Year study, 2002, ***,**** DWMR study

Assuming that the current diversion programs will continue performing at a similar level and by implementing new programs (both discussed later in this plan), the waste diversion rate for 2020 is projected to be 65% or higher by 2020 (Figure 3.5-1).

Emissions from "Waste-in-Place" at Kiefer Landfill

"Waste-in-Place" emissions are based on the accumulated waste in a landfill over the landfill's lifetime and the efficiency of environmental control systems employed to control landfill gas generated by the decomposing waste. Waste placed in a landfill begins to degrade immediately following placement. The rate of degradation and volume of landfill gas produced are dependent on organic content and environmental variables such as temperature, moisture, etc. Organic materials such as food and yard (green) waste decompose and produce carbon dioxide and methane.

Figure 3.5-1: Composition of Unincorporated County Waste Disposed, 1990

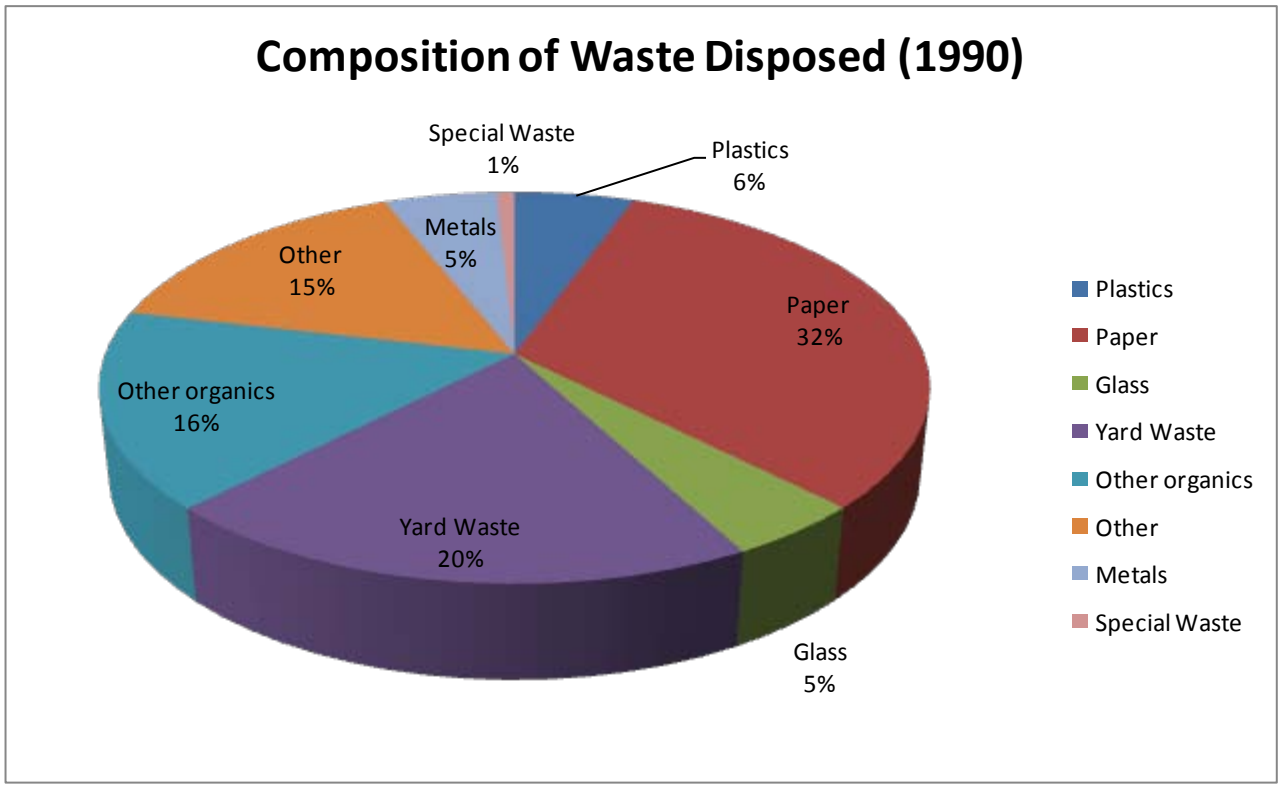
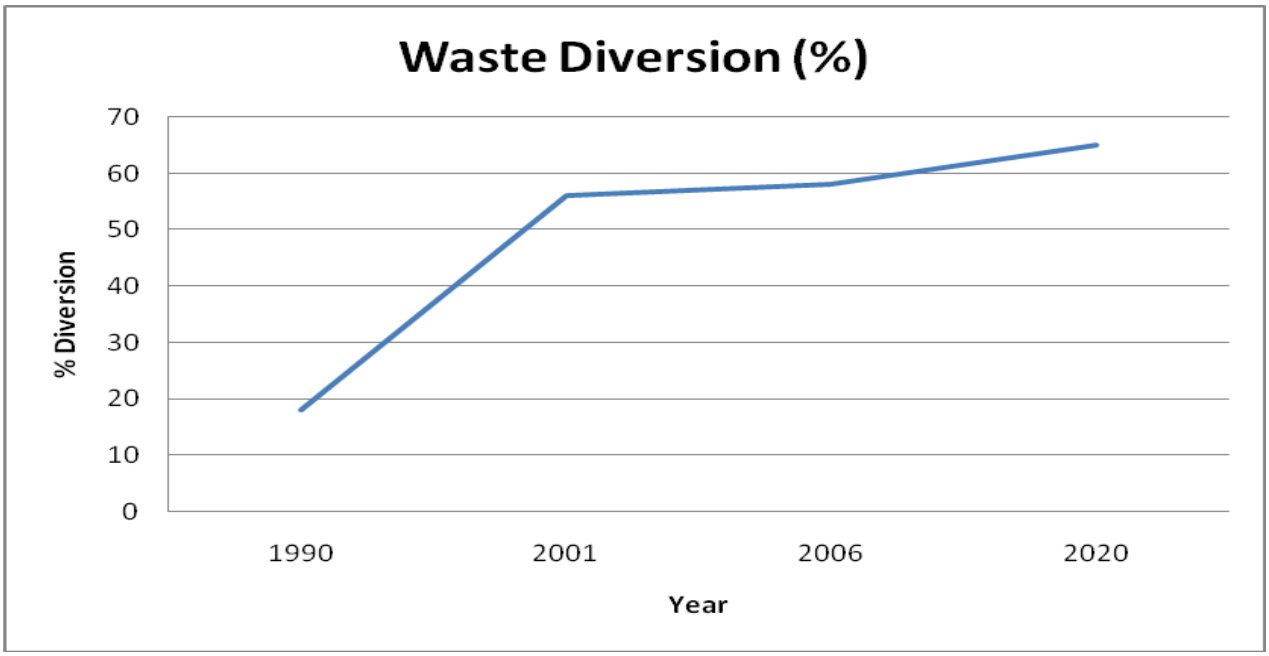


Figure 3.5-2: Solid Waste Diversion in Unincorporated Sacramento County (with 2020 projection)



According to the 2005 emissions inventory (see Chapter 2), total waste-in-place emissions at Kiefer Landfill are estimated to be nearly 50,000 metric tons CO_2e (based on total waste landfilled through 2005.) Actual emissions may be significantly lower than the 2005 inventory estimate due to the control actions described below. The quantity of landfill gas that is emitted is a function of the efficiency of the collection system, the amount of gas that is oxidized in the landfill cover, and the destruction device efficiency. The County collects, controls, and destroys harmful landfill gas at Kiefer Landfill through the implementation of the following environmental control systems:

- All new landfill cells are constructed with liner systems that mitigate migration of gas from the base of the waste
- Horizontal and vertical wells are installed in the waste to facilitate active extraction of landfill gas from the waste
- The cover system atop the waste actively oxidizes methane and reduces emissions

- Gas is collected from the landfill liner's leachate collection system
- Collected gas is destroyed using either internal combustion engines or a flare
- The landfill surface and perimeter are regularly monitored for fugitive methane emissions or migration

Goals

The County is committed to achieving the following goals to mitigate GHG emissions associated with waste management activities in the unincorporated Sacramento County and County government operations:

- Promote reduction in consumption
- Maximize waste diversion, composting, and recycling through expanding residential and commercial programs
- Reduce methane emissions at Kiefer landfill

This section of the Climate Action Plan describes actions already being conducted and identifies potential options that can lead to realization of these goals.

Co-Benefits

The County's efforts to maximize waste diversion from the landfill results in several co-benefits in addition to GHG emission reduction:

- Recovering and composting organic materials in gardens and landscapes reduces the need for water, complimenting the County's water conservation program discussed in Section 3.4 and helping the County adapt for projected reduced water supplies in the future

Health Co-Benefits

Promotion of River Friendly Landscaping principles, which encourage on-site recycling of lawn and garden wastes, eliminates the need for fertilizers and ensures cleaner urban runoff carried to local creeks and rivers. *www.riverfriendly.org*

- Reuse of leaves and other green waste as compost also reduces or eliminates the need for fertilizers, which can impair local creeks and rivers when carried from landscapes into storm drains via runoff

- As more community residents practice these techniques, presumably collection trips can be reduced, thereby improving air quality

- Convenient transfer and recycling options mean less solid, hazardous and universal wastes disposed of illegally in storm drains and creeks

In addition, the preserved bufferlands surrounding the Kiefer Landfill (described later in this section) provides a multitude of environmental benefits, including habitat protection, water quality improvement, groundwater replenishment and aesthetic amenities.

Actions to Address Climate Change

A large number of mitigation measures discussed in this section have been implemented for many years. It is the County's intent to continue enhancing and expanding these programs, for example, to achieve a 65% or higher waste diversion goal by 2020. It is assumed that higher waste diversion combined with continued landfill gas recovery, waste collection routing efficiencies, and alternative fuel fleet will have a positive impact on the overall GHG emissions reduction for the County.

In this section, actions are grouped according to four functional program areas in the County's DWMR organization:

- Solid waste reduction & recycling
- Solid waste collection
- Waste disposal and processing
- Education & outreach

Also, all actions are coded to indicate whether the action applies to Sacramento County government operations (G) or to the entire community (C).

Existing Actions Related to Solid Waste Reduction and Recycling

Recycling Programs at County-Owned Facilities (G)

In 2006, the County established recycling programs at certain high-volume generating County-owned facilities. These programs are managed by the Department of General Services 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.

Construction & Demolition (C&D) Waste Recycling Program (C)

In March 2009, the SWA adopted an ordinance establishing a certification program for construction and demolition (C&D) debris sorting facilities. This program will work in combination with C&D ordinances adopted by the City of Sacramento and the County. Builders will be required to implement jobsite recycling programs and will direct mixed C&D debris to certified facilities who extract recyclable materials.

The C&D ordinance is modest in its initial scope and is designed to begin with a relatively high threshold for covering projects, $250,000 in construction value. Even so, 12,000 tons of debris could be successfully diverted in the initial program. As best management practices are established and the education component matures, the threshold can be lowered, diverting more C&D materials from landfills.

SWA Recycling Programs (C)

SWA ordinances require that franchised haulers achieve a 30% recycling rate and offer recycling services to multi-family housing units. As an incentive, the SWA does not assess franchise fees on revenue derived from commercial recyclable collection. In April 2007, SWA adopted a new Business Recycling Ordinance that requires keeping designated recyclables including cardboard, office paper and beverage containers separate from the garbage. All businesses and all non-residential properties that subscribe to garbage service of four (4) cubic yards or greater per week are required to have a recycling program.

Residential Recycling Programs (C)

The County DWMR provides residential solid waste and recycling services to approximately 150,000 residential units in unincorporated county service areas. The services include separate curbside collection of comingled recyclables (fiber products, used beverage containers, plastics, etc.), yard waste and used oil and filters. An

estimated 45,000 tons of recyclables are collected each year and therefore diverted from the landfill for reuse.

Yard Waste Diversion Programs (C)

As discussed previously, a large portion of the waste stream consists of organic waste – one of the most significant sources of methane generated at the landfills. Recognizing the need for diverting organic waste in general and yard waste in particular, the DWMR provides yard waste recycling services to unincorporated county residents. An estimated 75,000 tons of green waste is collected each year. Currently, it is diverted to compost or biomass facilities or used for landfill cover. In addition to this, the SWA is in the process of developing a new regional composting facility to process yard waste locally, as described later in this section.

Other Recycling Programs (C)

In addition to the NARS and Kiefer drop-off locations for collecting and processing household hazardous waste and universal waste described previously, the DWMR offers periodic collection, recycling and disposal services for bulky, household hazardous and universal wastes under its Appointment-Based Neighborhood Clean-Up (ABNCU) program. This program also provides response to illegal dumping incidents in coordination with County Code Enforcement. This convenient centralized collection system reduces GHG emissions associated with vehicle miles traveled.

Existing Actions Related to Solid Waste Collection

Alternative Fuel Waste Collection Fleet (G)

As discussed in Section 3.2, the DWMR owns and operates a fleet of approximately 120 waste collection vehicles of which 35 are dedicated liquefied natural gas (LNG) and 60 are dual-fuel vehicles running on 80% LNG and 20% diesel. The LNG fleet was acquired by the County during 2001-2005 and DWMR intends to convert the entire collection fleet to alternative fuel by 2010 as required by the CARB.

Fleet Routing To Reduce Vehicle Miles Traveled (G)

In addition to converting over 80% of its fleet to alternative fuel, DWMR has implemented periodic re-routing to increase collection efficiencies, reducing VMT and associated GHG emissions. For example, the most recent re-routing (January 2009) successfully reduced five collection routes.

Existing Actions Related to Waste Disposal and Processing

Landfill Gas-to-Energy Plant at Kiefer Landfill (G, C)

The County DWMR began operating an extensive landfill gas (LFG) extraction and control system at Kiefer Landfill in 1997, whereby approximately 85 percent of landfill gas generated in the landfill is collected and destroyed. Subsequently, the County began operating a LFG-to-energy facility in 1999 and expanded the facility in 2006. Further expansion of the collection system is scheduled to be complete by the end of 2009.

The energy plant is used as the primary LFG destruction device for the system. The plant consumes up to 5,500 CFM (cubic feet per minute) of LFG. A flare is used to destroy excess LFG that is collected. If the energy plant is not operational, the flare serves as the primary destruction device. DWMR is in the process of adding a second flare to add destruction capacity.

The landfill gas-to-energy plant produces 14.0 megawatts of electricity, enough to power almost 9,000 homes. The gas-to-energy plant delivers significant electricity to SMUD's green energy program and displaces electricity generated using fossil fuels.

Carbon Sequestration at Kiefer Landfill and Kiefer Bufferlands (C)

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. Landfills are another 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. One part of this is the 243 acres Kiefer Wetland Preserve. 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.

Existing Actions Related to Education and Outreach

Education and outreach programs are essential to bring success to any waste diversion activities. Since the enactment of AB 939, the DWMR has implemented various educational programs targeting residential and commercial customers to promote waste reduction and recycling.

Education for Residential Customers (C)
These programs range from educating residents about the various recycling opportunities to providing hands-on training for backyard composting. Announcements and links are provided on the DWMR web site about Green Gardener and River Friendly Landscaping training and demonstration workshops.

Education for Commercial Businesses (C)
For the commercial sector, the DWMR and SWA have implemented outreach programs to assist businesses with their recycling needs. Additionally, the DWMR has a strategic alliance with the Business Environmental Resource Center to provide assistance to local businesses in the area of environmental sustainability.

Potential Actions Related to Waste Disposal and Processing

Establish New Regional Composting Facility (GreenCycle) (C)
Due to inadequate regional capacity to process organic waste, the SWA has undertaken a project to establish a local composting facility ("GreenCycle") with approximately 100,000 tons per year processing capacity. As of April 2009, the SWA had developed a list of potential sites and is pursuing environmental review of these sites for final selection. The SWA intends to complete the environmental review by the end of 2009 and pursue site acquisition and permitting activities during 2010. The GreenCycle facility will provide increased capacity to compost yard waste in local area.

The potential GHG impacts of the GreenCycle project will be analyzed as part of the selection process for the preferred site and preferred technology alternatives.

Table 3.5-2:
Summary of Existing and Potential Actions in Waste

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Existing Actions Related to Sold Waste Reduction and Recycling										
Recycling Programs at County-Owned Facilities	Existing	County Government	♦	♦		♦	♦			♦
Construction and Demolition Waste Recycling Program	Existing	Community	♦	♦		♦	♦			♦
SWA Recycling Programs	Existing	Community	♦	♦		♦	♦			♦
Residential Recycling Programs	Existing	Community	♦	♦		♦	♦			♦
Yard Waste Diversion Programs	Existing	Community	♦	♦		♦	♦			♦
Other Recycling Programs	Existing	Community	♦	♦		♦	♦	♦		♦
Existing Actions Related to Solid Waste Collection										
Alternative Fuel Waste Collection Fleet	Existing	County Government	♦	♦		♦	♦		♦	
Fleet Routing to Reduce Vehicle Miles Traveled	Existing	County Government	♦	♦		♦	♦		♦	
Existing Actions Related to Waste Disposal and Processing										
Landfill Gas-to-Energy Plant at Kiefer Landfill	Existing	Community and County Government	♦	♦		♦			♦	
Carbon Sequestration at Kiefer Landfill and Kiefer Bufferlands	Existing	Community	♦	♦		♦			♦	
Existing Actions Related to Education and Outreach										
Education for Residential Customers	Existing	Community	♦	♦	♦	♦	♦			♦
Education for Commercial Businesses	Existing	Community	♦	♦	♦	♦	♦			♦

Table 3.5-2 (continued):
Summary of Existing and Potential Actions in Waste (continued)

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Potential Actions Related to Waste Disposal and Processing										
Establish New Regional Composting Facility	Potential	Community	♦	♦		♦	♦			♦

3.6 AGRICULTURE AND OPEN SPACE

Introduction

The relationship between the agricultural industry and climate change is multi-faceted. Agriculture contributes GHG emissions, but can also help reduce greenhouse gases produced by other sectors, as explained below. In addition, agriculture can be used to create fuels with fewer GHG emissions than fossil fuels. Finally, projected climate changes will stress this extremely important industry. Trees and open space, which are also discussed in this section, reduce greenhouse gases in the atmosphere by absorbing carbon dioxide through a process called carbon sequestration.

As explained in Chapter 2, agriculture accounts for about 3% of the total GHG emissions for unincorporated Sacramento County. Agricultural GHG emissions originate from various sources including livestock (which produce methane in their digestive systems), manure management, agricultural equipment operation, fertilizer application and soil tillage (which release nitrous oxide), burning of crop residue, refrigeration, processing, and distribution. Distribution-related emissions are reduced when people buy locally grown products. The County's estimate of agricultural GHG emissions only considers emissions produced by livestock digestion, manure management, and fertilizer use.

Agriculture contributes greenhouse gases, but also has the potential to reduce emissions from other sectors. The agricultural industry can grow crops used to create biofuels, which generate fewer greenhouse gas emissions than do fossil fuels. In addition, agriculture can take carbon dioxide out of the atmosphere and store it as carbon in plants and soils. Recent studies have found that soils may be either sources or sinks for greenhouse gases. (Paustian et al 2006)

As explained in Chapter 1, it is important to reduce greenhouse gas emissions, but some climate impacts are now seen as inevitable. A changing climate is expected to impact the agricultural industry in a number of ways:

- Increased temperatures will reduce the quantity and quality of agricultural products statewide.

- California farmers will face greater water demand for crops and a less reliable water supply as temperatures rise. By the end of the century, if temperatures rise and

precipitation decreases, late spring stream flow could decline by up to 30 percent and California farmers could lose as much as 25 percent of the water supply needed. (Leurs et al 2006).

- Crop growth and development will change, as will the intensity and frequency of pest and disease outbreaks.

- Rising temperatures will likely aggravate ozone pollution, which makes plants more susceptible to disease and pests and interferes with plant growth. (Leurs et al 2006)

These impacts to the California agriculture industry are particularly significant considering that the state is home to a $38 billion dollar agriculture industry that employs more than one million workers. It is the largest and most diverse agriculture industry in the nation (fifth largest in the world), producing more than 300 commodities including half of the country's fruits and vegetables. (Leurs et al 2006)

In Sacramento County, most of the land outside the urban area is used for agricultural purposes (crop and livestock) and agricultural production in the county is a significant contributor to the local economy. In 2007, the combined total of certain crops (wine grapes, pears, corn, hay, alfalfa and tomatoes), livestock products (milk), livestock (poultry, cattle, and calves) and wholesale nursery stock accounted for almost 80% of the nearly $365 million dollars in annual production value. (Sacramento County 2008) There are hundreds of jobs directly tied to that production and thousands more that are impacted indirectly in the production, processing, transportation, and marketing of those commodities.

There is a need to promote sustainable farming and ranching practices which can holistically address all of the challenges associated with a changing climate (see the discussion regarding conventional versus sustainable agriculture).

Like some agricultural practices, open space and trees can be an effective tool for sequestering carbon dioxide. In 1998, a researcher with University of California at Davis estimated that Sacramento County's urban forest of 6 million trees (mainly in residential and suburban areas) removed approximately 304,000 tons of CO_2 each year, with an implied value of $3.3 million ($0.55/tree). (McPherson 1998) A study conducted in 2001, which included Sacramento area tree data, found that urban tree planting can account for a 25% reduction in net cooling and heating energy usage in urban landscapes. (Akbari 2001)

Conventional Versus Sustainable Agriculture

Conventional farming systems vary from farm to farm but typically share many characteristics including (but not limited to) being large scale; growing single crops/row crops continuously over many seasons; and extensively using pesticides, fertilizers and external energy inputs. Conventional farms are productive but have resulted in negative effects such as:

- Reduced soil productivity
- Water pollution (Agriculture is the largest single non-point source of water pollutants, and the pollutants include sediments, salts, fertilizers--nitrates and phosphorus, pesticides, and manures [USDA 2007])
- Stresses on pollinators and other beneficial species through pesticide use
- Reduced biodiversity (a key element of food security) due to monocultures and reliance on genetic uniformity in most crops and livestock breeds
- Increased dependence on imported oil

Sustainable agriculture practices follow the principles of nature and result in abundant food without depleting the earth's resources or polluting its environment. Sustainable approaches foster biodiversity, recycle plant nutrients to reduce or eliminate fertilizer use, reduce or eliminate the need for pesticides, protect soil from erosion, conserve water, use energy efficiently, and use minimum tillage. Virtually all of these practices reduce greenhouse gas emissions. Improved management practices can also increase the uptake and storage of carbon in plants and soil. Every ton of carbon added to, and stored in, plants or soils removes 3.6 tons of CO_2 from the atmosphere. (Paustian et al 2006)

Sustainable practices lend themselves to smaller, family-scale farms that tend to find their best niches in local markets, often selling directly to consumers. (Eates 2005)

The County's Role in Agriculture and Open Space

The County's Draft 2030 General Plan sets a strong policy for continued protection of agriculture, open space and other natural resources in Sacramento County. The 2030 General Plan employs smart growth strategies and directs development to take place within the existing urban core to maintain outer agricultural and open space lands. Within its General Plan, the County is implementing the Sacramento Area Council of Governments' *BluePrint* which guides projected regional growth, promoting compact, mixed-use development with more transit choices, as alternatives to low density development. The Land Use Element of the General Plan contains a number of key strategies, including rigorous standards that must be met to convert agricultural or open space uses to urban uses. For instance, Sacramento County has adopted an urban growth boundary (the Urban Services Boundary) that directs urban growth towards the

regional core in an effort to reduce conversion of agricultural lands, rangelands, and open space to other uses. The Agricultural, Open Space, Conservation, and Economic Development Elements of the General Plan contain a myriad of policies that not only provide for the protection of natural resources, but also promote sustainable and viable agricultural pursuits. A prime example is a series of policies in the Agricultural and Economic Development Elements that call for an Agricultural Tourism Program to allow farmers flexibility to market their products at the local level (e.g. produce stands, etc) to encourage local consumption of food grown in Sacramento County (which reduces VMT), as well as to give farmers an additional revenue stream. Finally, the Open Space Element includes an "Open Space Vision Diagram" that shows where key natural resources are located throughout the county and will be used to guide future preservation efforts.

In light of its diverse natural resources, Sacramento County is undertaking a multi-jurisdictional habitat conservation plan, which facilitates the establishment of large-scale habitat and species preserves through a comprehensive mitigation plan. The South Sacramento Habitat Conservation Plan (SSHCP) uses the Urban Services Boundary to define the urban growth areas within the unincorporated County. The SSHCP is discussed further under the "Existing Actions That Protect Farmlands and Open Space" section of this chapter.

The County's zoning code is a tool used to implement the policies in the General Plan. Land outside the Urban Services Boundary is generally zoned either Agriculture (20-160 acre minimum parcel sizes) or Agricultural-Residential (1-10 acre minimum parcel sizes). These zoning categories preclude urban development and encourage continued agriculture, rangeland, and related uses.

In addition, Sacramento County's Department of Regional Parks plans and manages a county-wide system of parks, recreation sites, trails, waterways, and open space encompassing 15,000 acres, including the American River Parkway.

Goals

The County is committed to achieving the following goals to reduce GHG emissions and adapt to the impacts of climate change on local agriculture and open space resources:

- Protect important farmlands and open space from conversion and encroachment and maintain connectivity of protected areas

- Educate the local agricultural community about the impacts of climate change and support efforts to promote sustainable practices

- Promote water conservation to ensure reliable and sufficient water supplies for crop irrigation and livestock needs

- Implement policies and programs which increase demand for locally grown and processed agricultural commodities

- Achieve a net gain in the size, health, and diversity of open space and the local urban forest, encouraging native species wherever practical

- Ensure community understanding of and appreciation for open space, parks, and trees both as a vital part of Sacramento's character and as a greenhouse gas-reduction strategy

- Pursue carbon-offset strategies which involve carbon sequestration to complement but not substitute for local emissions reduction strategies

Co-Benefits

Many agricultural practices that reduce greenhouse gas emissions—such as practices that reduce the need for pesticides and fertilizers—provide other environmental benefits such as improved water quality. Many are simply good management practices that can lead to more efficient operations and cost savings for farmers and ranchers.

Health Co-Benefits

Use of sustainable agricultural practices to develop local sources of foods can lead to reduced obesity and other diseases related to preserved, processed foods shipped over long distances

Agriculture, public health and climate change are connected in numerous ways. The long distance transportation of food creates significant GHG emissions, and food that travels over long distances declines in nutritional value. Industrial food systems that rely on petroleum-based fertilizers, pesticides and herbicides threaten both consumer health and farmworker health while also contributing large amounts of GHG emissions. While beef production creates significant methane emissions, the overconsumption of meat contributes to

the development of obesity and cardiovascular disease. Climate change may also result in the spread of agricultural pests and diseases, which can threaten food supplies and food security. The health benefits of using sustainable agricultural practices to develop local sources of foods include:

- Improved food security
- Reduced obesity and other chronic diseases that are related to consumption of preserved, processed foods shipped over long distances
- Reduced asthma, other respiratory conditions, strokes, heart disease and other conditions triggered by air pollution generated by the long-distance transportation of food

In addition to taking carbon dioxide out of the atmosphere, trees and open space have important benefits for habitat conservation, increased biodiversity, urban temperature control and building energy conservation (due to shade provided by trees), enhanced air and water quality, and stormwater management/runoff reduction (through interception and adsorption).

Actions to Address Climate Change

Existing and potential actions that reduce GHG emissions are described below with respect to the goals of this sector. The sector's contribution to achieving GHG reduction goals will depend on economics as well as available technology and the biological and physical capacity of local soils to sequester carbon. Policies are needed to provide incentives that make it profitable for farmers to adopt GHG-mitigation practices and to support needed research.
All existing and potential actions are coded to indicate whether the action applies to Sacramento County government operations (G) or to the entire community (C).

Existing Actions That Protect Farmlands and Open Space

Open Space and Habitat Conservation Planning (C)
Sacramento County and the cities of Elk Grove, Rancho Cordova, and Galt are working with State and Federal regulatory agencies to develop a South Sacramento Habitat Conservation Plan. South Sacramento County gradually slopes eastward from the rich flat agricultural lands of the untamed Cosumnes River floodplain towards stretching vernal pool landscapes and rolling blue oak woodlands. The interplay between fertile agricultural lands, open rangelands scattered with thousands of vernal pools, and the annual cycle of inundated lands in winter

makes the area a key stop for millions of migratory birds and crucial home to an array of threatened and endangered species. The SSHCP area encompasses 341,270 acres with 40 species of plants and animals, including 10 that are state or federally listed as threatened or endangered.

The area's features combined with its proximity to Sacramento, the Bay Area, and Lake Tahoe have also made this area an attractive home for thousands of new residents, and more growth is projected. The SSHCP is intended to accommodate continued growth while maintaining lasting environmental stewardship. The proposed SSHCP seeks to address wetland and endangered species interests in a coordinated manner rather than on a project by project basis as is currently done. (Project by project review can be costly and confusing and result in and scattered and less than desirable habitat preserves.) The plan provides for ecologically viable conservation and minimizes regulatory hurdles for development by streamlining the permitting process to the benefit of all stakeholders. The SSHCP is currently undergoing the environmental review process.

Existing Actions That Promote Collaboration, Sustainable Practices, and Water Conservation

Collaborative Partnerships (C)

Sacramento County has developed collaborative partnerships with the Farm Bureau, Resource Conservation Districts, and some grass roots efforts like *Grow Local Buy Local* to support sustainability, agricultural marketing and resource conservation.

Water Conservation (C)

Sacramento County has 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. This ordinance is applied to all commercial, industrial and multi-family residential projects, parks, and County road medians and landscape corridors.

Conservation programs for urban areas can benefit rural and agricultural users by preserving or replenishing the groundwater supply. The Sacramento County Water Agency and other water purveyors implement such water conservation programs to target residents and businesses in their respective service areas.

Integrated Pest Management Program (C)

Sacramento County actively promotes the use of Integrated Pest Management (IPM), which is intended to provide effective, sustainable pest control, and to reduce risks to humans and the environment associated with pesticide use. The County's IPM Program includes outreach programs to educate and encourage residents and businesses to adopt IPM practices. In addition, the County has a policy to follow IPM when its staff or vendors manage pests on County property and facilities.

Existing Actions That Promote Open Space, Parks and Trees

Tree Preservation (C)

Sacramento County was one of the first agencies in the State to recognize the value of tree canopy and specifically the heritage native oak trees unique to the region. To that end, Sacramento County adopted Title 19 of the County Code for "Tree Preservation and Protection". The purpose of this ordinance is to promote public health, safety, and general welfare, to preserve and protect significant historical heritage values, to enhance the beauty of the County of Sacramento and to complement and strengthen zoning subdivision and land use standards, while at the same time recognizing individuals rights to develop private property, establishing basic standards, regulations and measures for the preservation of trees. It is the policy of Sacramento County to preserve all trees possible through the development review process. This ordinance has served as a model ordinance for the cities of Rancho Cordova, Elk Grove, and Citrus Heights.

Tree Planting (C)

Since 1982, Sacramento County has worked collaboratively with the non-profit Sacramento Tree Foundation to expand urban forests and optimize the benefits of tree canopies. Sacramento County also supports the Sacramento Tree Foundation's *Greenprint* initiative, a multi-decade regional framework with the goal of doubling the region's tree canopy within the next 40 years; this goal supports the County's sustainability and livability goals. In addition, the County municipal/zoning code requires trees to be planted as part of new landscaping associated with new development projects.

County Regional Parks System (C)

The County's Department of Regional Parks works to increase its protected open space by securing funds to acquire key parcels. Parcels are selected based on the uniqueness of their features, potential connectivity with other existing open spaces, and consistency with the County's General Plan and open space vision.

Potential Actions That Increase Demand for Locally Grown Agricultural Commodities

Promote Sustainable Agricultural Practices (C)

To promote sustainable agriculture practice, the County could:

- Provide support for growers who implement sustainable agricultural practices, with a special emphasis on the largest production sectors in the county (e.g., vintners, dairies).
- Develop regional partnerships with other agricultural communities (e.g., Yolo, Amador and San Joaquin Counties) to share resources, disseminate information to the public, and promote consistency in sustainable agricultural practices. Showcase sustainable practices each year at the County Fair and through the County's participation in the annual State Fair.
- Work collaboratively to seek and secure funding for demonstration projects in the county/region.

Promote Sustainable Food Production and Consumption (C)

The County could:

- Create policies that reduce food miles and create a more sustainable, organic and locally-available food production system for County residents.
- Promote (e.g., co-sponsor) local farmers' markets and other means to make it more convenient for residents to purchase local products.
- Educate and inform the public through the annual County Fair exhibits, web site, and other media.
- Reduce and/or eliminate barriers (such as zoning code restrictions) that inhibit direct sales of agricultural products (e.g. from farmer to consumer).
- Work with local grocers to encourage procurement of locally-grown agricultural products.

Potential Actions That Promote Open Space, Parks and Trees

Adopt Open Space and Urban Forest Policies (C)

The County could adopt policies to achieve a net gain in the size, health, and diversity of open space and the local urban forest, encouraging native species wherever practical.

Conduct an Urban Forest Inventory (C)

Support the Sacramento Tree Foundation's regional tree inventory project to determine the current health, quantify its benefits (including CO_2 reduction) and identify needs and priorities for future urban forest management for trees within the unincorporated County.

Adopt Regional Tree Preservation and Protection Ordinance (C)

The Sacramento Tree Foundation is working with Sacramento County to develop a revised and improved model tree ordinance for possible adoption by the counties and cities in the region. The intent of the revised model tree ordinance is to regionalize the Sacramento Valley tree preservation and protection efforts in order to increase overall effectiveness and promote consistency across jurisdictional boundaries. The goal is to see the forest as a larger mass of infrastructure that crosses agency lines and allows for the sharing of CO_2 sequestration and other environmental benefits such as improved air quality.

Collaborate with Others to Promote Community Tree Planting (C)

In addition to existing partnerships to promote tree planting, the County could:

- Partner with the Sacramento Tree Foundation to develop new programs to increase tree canopy, including in redeveloping areas
- Forge partnerships with community cooperatives to organize tree-planting and maintenance events

Enhance Tree Planting and Maintenance in County Rights-of-Way (G)

There are several ways the County could improve tree performance in its right-of-ways: promoting/planting trees that will perform well for a long period of time, designing infrastructure in a manner that will allow trees to grow to their full potential, maintaining trees carefully, and eradicating invasive vegetation.

Increase Landscaping of County Rights-of-Way (G)

The County could secure increased funding for tree planting and other landscaping in the public right-of-way through partnerships and from businesses, residents, and organizations that would benefit.

Potential Actions That Pursue Carbon Offset Strategies

Explore Carbon Offsets for Government (G)

To help meet its overall greenhouse gas reduction goal, the County could explore investing in carbon offsets and retiring the associated credits.

Promote Carbon Offsets for the Community (C)

The County could encourage residents, businesses, governments, schools, and institutions to invest in greenhouse gas-reducing projects to offset their personal or corporate greenhouse gas emissions. In addition, the County could explore ways to create offset programs which provide local revenues for local climate change projects.

Table 3.6-1:
Summary of Existing and Potential Actions in Agriculture and Open Space

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Existing Actions that Protect Farmlands and Open Space										
Open Space and Habitat Conservation Planning	Existing	Community	♦		♦	♦	♦	♦	♦	
Existing Actions that Promote Collaboration, Sustainable Practices, and Water Conservation										
Collaborative Partnerships	Existing	Community	♦	♦	♦	♦	♦	♦	♦	
Water Conservation	Existing	Community	♦	♦	♦	♦	♦	♦	♦	
Integrated Pest Management Program	Existing	Community	♦	♦		♦	♦	♦	♦	
Existing Actions that Promote Open space, Parks, and Trees										
Tree Preservation	Existing	Community	♦	♦		♦	♦		♦	
Tree Planting	Existing	Community	♦	♦		♦	♦		♦	
County Regional Parks System	Existing	Community	♦			♦	♦		♦	
Potential Actions that Increase Demand for Locally Grown Agricultural Commodities										
Promote Sustainable Agricultural Practices	Potential	Community	♦	♦	♦	♦	♦	♦	♦	♦
Promote Sustainable Food Production and Consumption	Potential	Community	♦	♦	♦	♦	♦	♦	♦	♦
Potential Actions that Promote Open Space, Parks, and Trees										
Adopt Open Space and Urban Forest Policies	Potential	Community	♦	♦	♦	♦	♦	♦	♦	
Conduct an Urban Forest Inventory	Potential	Community	♦			♦	♦		♦	
Adopt Regional Tree Preservation and Protection Ordinance	Potential	Community	♦	♦	♦	♦	♦		♦	

Table 3.6-1 (continued):
Summary of Existing and Potential Actions in Agriculture and Open Space (continued)

Action	Status	Application	Benefits							
			Reduces GHG	Conserves Energy	Conserves Water	Improves Air Quality	Protects Habitat	Improves Water Quality	Improves Public Health	Reduces Waste to Landfill
Potential Actions that Promote Open space, Parks, and Trees (continued)										
Collaborate with Others to Promote Community Tree Planting	Potential	Community	♦	♦		♦	♦		♦	
Enhance Tree Planting and maintenance in County Rights-of-Way	Potential	County Government	♦			♦	♦		♦	
Increase Landscaping of County Rights-of-Way	Potential	County Government	♦			♦	♦		♦	
Potential Actions that Pursue Carbon-Offset Strategies										
Explore Carbon Offsets for Government	Potential	County Government	♦	♦		♦	♦		♦	
Promote Carbon Offsets for the Community	Potential	Community	♦	♦		♦	♦		♦	

Appendix A: Acronyms and Abbreviations

ABNCU	Appointment-Based Neighborhood Clean-Up
ADA	Americans with Disabilities Act
BERC	Business Environmental Resource Center
BMP	Best Management Practice
BRT	Bus Rapid Transit
C&D	Construction and Demolition
CACP	Clean Air and Climate Protection
CAFE	Corporate Average Fuel Efficiency
Cal EPA	California Environmental Protection Agency
CalTrans	California Department of Transportation
CAP	Climate Action Plan
CARB	California Air Resources Board
CAT	Cal EPA Climate Action Team
CCAR	California Climate Action Registry
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFM	Cubic Feet per Minute
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
DERA	Department of Environmental Review and Assessment
DWMR	Department of Waste Management and Recycling
DWR	Department of Water Resources
EBMUD	East Bay Municipal Utilities District

Appendix A: Acronyms and Abbreviations (continued)

EIR	Environmental Impact Report
FAA	Federal Aviation Administration
FRWP	Freeport Regional Water Project
GHG	Greenhouse Gas
GPS	Global Positioning System
GWP	Global Warming Potential
HPS	High Pressure Sodium
HVAC	Heating, Ventilation and Air Conditioning
Hz	hertz (unit of frequency)
ICLEI	Local Governments for Sustainability
ILEAV	Inherently Low Emission Airport Vehicle
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
IRWMP	Integrated Regional Water Management Plan
IT	Information Technology
ITS	Intelligent Transportation Systems
LED	Light-Emitting Diode
LEED	Leadership in Energy and Environmental Design
LFG	Landfill Gas
LID	Low Impact Development
LNG	Liquefied Natural Gas
LOS	Level of Service
M	Million

Appendix A: Acronyms and Abbreviations (continued)

MGD	Million Gallons per Day
MPG	Miles Per Gallon
NARS	North Area Recovery Station
PG&E	Pacific Gas and Electric
RT	Sacramento Regional Transit District
SACDOT	Sacramento County Department of Transportation
SACOG	Sacramento Area Council of Governments
SAGP	Sacramento Area Green Partnership
SASD	Sacramento Area Sewer District
SCADA	Supervisory Control and Data Acquisition
SCAS	Sacramento County Airport System
SCWA	Sacramento County Water Agency
SEC	Sacramento Environmental Commission
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMUD	Sacramento Municipal Utilities District
SPA	Special Planning Area
SR2S	Safe Routes to School (State)
SRCSD	Sacramento Regional County Sanitation District
SRTS	Safe Routes To School (Federal)
SRWTP	Sacramento Regional Wastewater Treatment Plant
SSB	Sacramento Sustainable Business
SSHCP	South Sacramento Habitat Conservation Plan
SWA	Solid Waste Authority

Appendix A: Acronyms and Abbreviations (continued)

TOD	Transit Oriented Development
US	United States
US EPA	United States Environmental Protection Agency
USDA	United States Department of Agriculture
VMPG	Vehicle Miles Traveled Per Gallon
VMT	Vehicle Miles Traveled
WMO	World Meteorological Organization
WRF	Water Reclamation Facility

Appendix B: References

Chapter 1

Intergovernmental Panel on Climate Change (IPCC) web site. Accessed January 2009. http://www.ipcc.ch/

California Air Resources Board, Climate Change web site. Accessed January-April 2009. http://www.arb.ca.gov/cc/cc.htm

Cal EPA California Climate Change Portal. Accessed January-April 2009. http://www.climatechange.ca.gov/publications.

State of California Department of Justice, Office of the Attorney General. Global Warming web site. Accessed January-April 2009. http://www.ag.ca.gov/globalwarming/

State of California, Office of the Governor. *Fact Sheet: Senate Bill 375: Redesigning Communities to Reduce Greenhouse Gases*. October 1, 2008. http://gov.ca.gov/fact-sheet/10707/

United Nations Department of Economic and Social Affairs, Division for Sustainable Development. Climate Change web site. Accessed January 2009. http://www.un.org/esa/dsd/dsd_aofw_cc/cc_index.shtml

Chapter 2

Sacramento County. 2009. *Greenhouse Gas Emissions Inventory for Sacramento County (Draft.* Prepared by ICF Jones & Stokes for Sacramento County Department of Environmental Review and Assessment. February 2009. http://www.dera.saccounty.net/ *("Special Studies" link)*

Chapter 3, Section 3.2 Transportation and Land Use

CARB. 2008. California Air Resources Board, *Climate Change Proposed Scoping Plan: A Framework for Change.* October 2008. http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm

EPA. 2005. United States Environmental Protection Agency, *Emission Facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel*, February 2005. http://www.epa.gov/oms/climate/420f05001.htm

Appendix B: References

Ewing et al. 2008. Ewing, Reid and Nelson, Arthur, *CO2 Reductions Attributable to Smart Growth in California*. University of Maryland and University of Utah, 2008. http://www.solutionsforglobalwarming.org/docs/California-Ewing-Nelson-Analysis.pdf

Goldberg et. al. 2007. *New Data for a New Era: A Summary of the SMARTRAQ Findings Linking Land Use, Transportation, Air Quality and Health in the Atlanta Region.* 2007. Goldberg, David; Chapman, Jim; Frank, Lawrence; Kavage, Sarah; and McCann, Barbara. http://www.livablecommunitiescoalition.org/uploads/100012_bodycontentfiles/100573.pdf

Litman 2008. Litman, Todd, *Win-Win Emission Reduction Strategies.* Victoria Transport Policy Institute. July 10, 2008. http://www.vtpi.org/wwclimate.pdf

SACOG. 2009. Clint Holtzen, Assistant Planner, Sacramento Area Council of Governments, Personal Correspondence. March 16, 2009.

Sacramento County. 2009. *Greenhouse Gas Emissions Inventory for Sacramento County (Draft.* Prepared by ICF Jones & Stokes for Sacramento County Department of Environmental Review and Assessment. February 2009. http://www.dera.saccounty.net/ *("Special Studies" link)*

Chapter 3, Section 3.3 Energy (including Green Buildings)

References Cited

CARB (2008). California Air Resources Board, *Climate Change Proposed Scoping Plan: A Framework for Change.* October 2008. http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm

CEC (2005). *Development of Energy Balances for the State of California.* Prepared by Scott Murtishaw, Lynn Price, Stephane de la Rue du Can, Eric Masanet, Ernst Worrell and Jayant Sathaye of Lawrence Berkeley National Laboratory for California Energy Commission - Public Interest Energy Research Program, June 2005. http://industrial-energy.lbl.gov/node/78

EIA (2009). Energy Information Administration, Official Energy Statistics from the U.S. Government. Accessed April 23, 2009. http://tonto.eia.doe.gov/energy_in_brief/foreign_oil_dependence.cfm

Kats. 2003. *The Costs and Financial Benefits of Green Buildings. Prepared by Greg Kats for the* California Sustainable Building Task Force, 2003. http://www.cap-e.com/ewebeditpro/items/O59F3259.pdf

EPA. 2008. *Indoor Air Facts No. 4 (Revised) Sick Building Syndrome*, U.S. Environmental Protection Agency, February 20, 2008. http://www.epa.gov/iaq/pdfs/sick_building_factsheet.pdf

Appendix B: References

Other References

Build It Green, Green Point Rater and Certified Professional in Green Building. http://www.builditgreen.org/

U.S. Green Building Council, Leadership in Energy and Environmental Design (LEED) – information on building certification program and training/accreditation program. http://www.usgbc.org/DisplayPage.aspx?CategoryID=19

Chapter 3, Section 3.4 Water

References Cited

Cal EPA 2008. California EPA Climate Action Team, *Water-Energy Sector Summary -AB32 Scoping Plan -GHG Emission Reduction Strategies*, April 28, 2008. http://www.climatechange.ca.gov/climate_action_team/reports/

DWR 2007. *Climate Change in California, June 2007* (fact sheet). State of California Department of Water Resources (DWR). http://www.water.ca.gov/climatechange/docs/062807factsheet.pdf

DWR 2008. *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water.* State of California DWR, October 2008. http://www.water.ca.gov/climatechange/docs/ClimateChangeWhitePaper.pdf

EPA 2009. *Climate Change – Health and Environmental Effects, Possible Water Resource Impacts in North America.* US EPA. Accessed February 2009. http://www.epa.gov/climatechange/effects/water/northamerica.html

Haddad 2005. *California Water Policy: Planning for Climate Change, Growth, and Natural Heritage Preservation.* Haddad, Brent M. University of Santa Cruz. October 2005. http://www.lib.berkeley.edu/WRCA/WRC/pdfs/Haddad.pdf

ICLEI 2007. *Preparing for Climate Change: A Guidebook for Local, Regional, and State Governments.* ICLEI-Local Governments for Sustainability and King County, Washington. 2007. http://www.icleiusa.org/action-center/planning/adaptation-guidebook/view?searchterm=

SWRCB 2008. State Water Resources Control Board 20x2020 Agency Team on Water Conservation. http://www.swrcb.ca.gov/water_issues/hot_topics/20x2020/index.shtml

Water Forum 2007. Water Forum Agreement. January 2000. http://www.waterforum.org/

Appendix B: References

Other References

Saving Water Saves our Nation's Water Supplies. Accessed March 2009. http://www.energystar.gov/index.cfm?c=products.pr_protect_water_supplies

U.S. Environmental Protection Agency and U.S. Department of Energy, Energy Star Program. Accessed March 2009. http://www.energystar.gov/

East Bay Municipal Utility District (EBMUD) Drought Management Program, May 2008. http://www.ebmud.com/conserving_&_recycling/water_smart_tips/default.htm

Graywater (greywater)use. Accessed March 2009. http://www.oasisdesign.net/greywater/index.htm (linked from EBMUD site)

Sacramento Water Agency, Water Conservation Programs. Accessed March 2009. http://www.msa2.saccounty.net/dwr/scwa/Pages/default.aspx

Sacramento County Water Agency, Resolutions Related to Delta Vision and the Bay-Delta Conservation Plan. October 2008. http://www.msa2.saccounty.net/dwr/scwa/Documents/Water%20News/BDC_DV_BoardPackage.pdf

Chapter 3, Section 3.5 Waste Management and Recycling

EPA. 2002. U.S. EPA, *Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks, 2nd Edition*, EPA530-R-02-006. May 2002. http://epa.gov/climatechange/wycd/waste/SWMGHGreport.html

Chapter 3, Section 3.6 Agriculture and Open Space

References Cited

Akbari 2001. *Shade trees reduce building energy use and CO_2 emissions from power plants.* Akbari, H., Lawrence Berkeley National Laboratory. Published by Elsevier Science Ltd. December 17, 2001. http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VB5-44PCGFP15&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=9e8520fad63ed27317d1053cedc08882

Eates 2005. *Sustainable Agriculture: An Introduction*. Eates, Richard as revised by Williams, Paul. ATTRA, the National Sustainable Agriculture Information Service. Arkansas. 2005. http://attra.ncat.org/new_pubs/attra-pub/sustagintro.html?id=California#what

Appendix B: References

Leurs et. al. 2006. *Our Changing Climate: Assessing the Risks to California. A Summary Report of the California Climate Change Center.* Prepared by Amy Lynd Luers (Union of Concerned Scientists), Daniel R. Cayan (Scripps Institution of Oceanography), Guido Franco (California Energy Commission), Michael Hanemann (University of California, Berkeley), and Bart Croes (California Air Resources Board). July 2006. http://meteora.ucsd.edu/cap/pdffiles/CA_climate_Scenarios.pdf

McPherson 1998. *Atmospheric Carbon Dioxide Reduction by Sacramento's Urban Forest.* Journal of Arboriculture 24(4): July 1998. McPherson, Gregory, USDA Forest Service c/o UC Davis Department of Environmental Horticulture. http://www.fs.fed.us/ccrc/topics/urban-forests/docs/1998%20Atmospheric%20carbon%20dioxide%20reduction%20.pdf

Paustian et al 2006. *Agriculture's Role in Greenhouse Gas Mitigation.* Prepared for the Pew Center on Global Climate Change by Keith Paustian, John Antie, John Sheehan and Eldor A. Paul. September 2006. http://www.pewclimate.org/docUploads/Agriculture's%20Role%20in%20GHG%20Mitigation.pdf

Chapter 3, Section 3.6 Agriculture and Open Space *continued*

Sacramento County 2008. *Sacramento County 2007 Crop and Livestock Report.* Sacramento County Agricultural Commissioner, August 22, 2008. http://www.agcomm.saccounty.net/coswcms/groups/public/@wcm/@pub/@agcomm/@inter/documents/webcontent/sac_016425.pdf

USDA 2007. Special Reference Briefs Series no. SRB 99-02: *Sustainable Agriculture: Definitions and Terms.* U.S. Department of Agriculture (USDA), National Agricultural Library. Sept. 1999, slightly updated 2007. http://www.nal.usda.gov/afsic/pubs/terms/srb9902.shtmlhttp://attra.ncat.org/new_pubs/attra-pub/sustagintro.html?id=California#what

Other References

Cal EPA. 2008. California EPA Climate Action Team, *Agriculture Sector Write-Up for Public Distribution - AB 32 Scoping Plan.* December 2008. http://www.climatechange.ca.gov/climate_action_team/reports/

Council for Agricultural Science and Technology (CAST). May 2004. *Interpretative Summary, Climate Change and Greenhouse Gas Mitigation, Challenges and Opportunities for Agriculture* (Task Force report 141). http://www.cast-science.org/cast/src/cast_top.htm

D'Souza, Shereen. *Comments on City of Berkeley Draft Climate Action Plan.* California Food and Justice Coalition. October 2008. http://www.foodsecurity.org/california/CFJC-SubmissionToBerkeleyClimateActionPlan.pdf

Appendix B: References

Grubinger, Vern, 2006. *Climate Change and Agriculture: Challenges and Opportunities for Outreach.* University of Vermont Extension. VT. http://www.climateandfarming.org/pdfs/FactSheets/Outreach.pdf

Smith, Pete (Lead Author); Marco Bertaglia (Topic Editor). 2007. *Greenhouse Gas Mitigation in Agriculture.* In: Encyclopedia of Earth. Eds. Cutler J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [Published in the Encyclopedia of Earth June 26, 2007; Retrieved February 26, 2009]. <http://www.eoearth.org/article/Greenhouse_gas_mitigation_in_agriculture>

U.S. Department of Agriculture (USDA), Economic Research Service web site. Accessed February 2009. http://www.ers.usda.gov/

U.S. Department of Economic Analysis. *U.S. Agricultural Trade Update* – July 2008. http://www.kfb.org/commodities/commoditiesimages/July2008TradeUpdate.pdf