RESOLUTION NO. 2012-030

Adopted by the Sacramento City Council

February 14, 2012

ADOPTING THE CLIMATE ACTION PLAN

BACKGROUND

A. The California Global Warming Solutions Act of 2006 (AB 32) set a statewide goal of reducing greenhouse gas emissions to 1990 levels by the year 2020.

B. The AB 32 Scoping Plan, adopted in 2008 by the California Air Resources Board, recommended that local governments take action to reduce communitywide greenhouse gas emissions to at least 15% below current levels by the year 2020, which is estimated to be equivalent to achieving 1990 levels by 2020 at the local level.

C. The 2030 General Plan was adopted on March 3, 2009, and a Climate Action Plan was identified by City Council as a priority General Plan implementation program and mitigation measure to be completed by July 2011.

D. The City Council adopted Phase 1 of the Climate Action Plan on February 16, 2010, which identified strategies to reduce greenhouse gas emissions from the City's internal municipal operations 15% below 2005 levels by the year 2020.

E. On August 16, 2011, the City Council adopted greenhouse gas emission reduction targets as follows: 15% below 2005 levels by 2020, consistent with CA Air Resources Board guidance to local governments in the AB 32 Scoping Plan; and interim communitywide targets of 38% below 2005 levels by 2030, and 83% below 2005 levels by 2050, consistent with policies established in the Sustainability Master Plan. City Council also approved measurable performance goals and a draft emissions reduction measures framework, and directed staff to prepare a Draft Climate Action Plan for public review.

F. On November 3, 2011, the Draft Climate Action Plan was completed and circulated for public review.

G. At its regular meeting on December 8, 2011, the City Planning Commission received and considered public testimony concerning the Draft Climate Action Plan, and forwarded to the City Council a recommendation to adopt the Climate Action Plan.

H. At its regular meeting on January 31, 2012, the City Council received and considered public testimony concerning the Climate Action Plan.

BASED ON THE FACTS SET FORTH IN THE BACKGROUND, THE CITY COUNCIL RESOLVES AS FOLLOWS:

Section 1. Environmental Determination: The City has approved the environmental review for the Climate Action Plan, and has determined that it is within the scope of the 2030 General Plan Master EIR by Resolution No. 2012-029.

Section 2. The City Council finds that the Climate Action Plan is consistent with the 2030 General Plan, the intent of the Global Warming Solutions Act of 2006 (AB 32), and the Sustainability Master Plan. The City Council further finds that the Climate Action Plan is a plan for the reduction of greenhouse gas emissions within the meaning of CEQA Guidelines section 15183.5, and may be used in the cumulative impacts analysis for later projects as appropriate.

Section 4. The City Council hereby adopts the Climate Action Plan and directs staff to implement the strategies, measures and actions identified in the Plan.

Adopted by the City of Sacramento City Council on February 14, 2012 by the following vote:

Ayes: Councilmembers Ashby, Cohn, D Fong, McCarty, Pannell, Schenirer, and Mayor Johnson.

Noes: None.

Abstain: None.

Absent: Councilmembers R Fong, and Sheedy

Mayor Kevin Johnson

Attest:

Shirley Concolino, City Clerk

Attachment 7

CLIMATE ACTION PLAN

CITY OF SACRAMENTO
creating a sustainable city

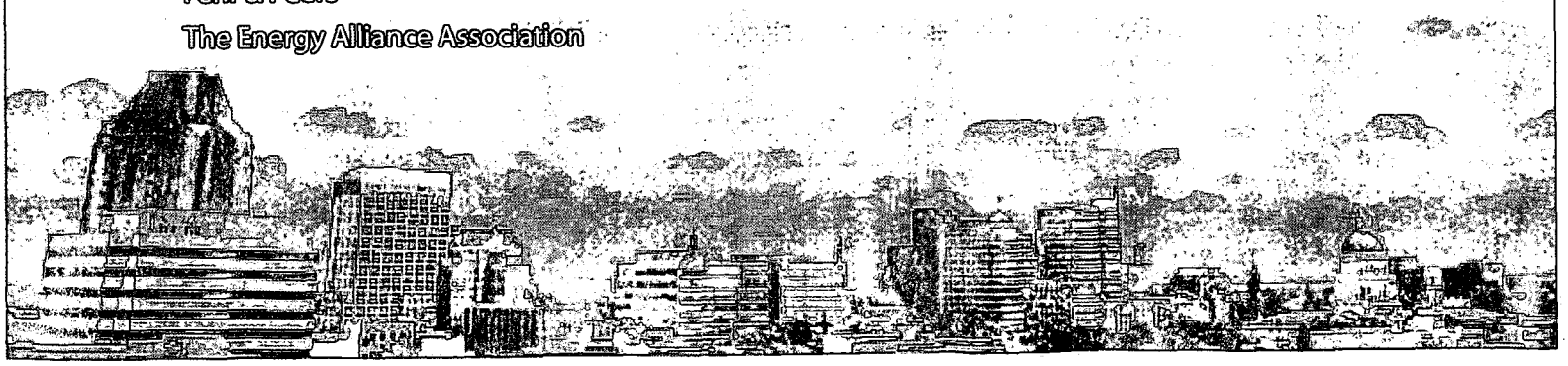
SACRAMENTO CLIMATE ACTION PLAN

Final Draft

JANUARY 13, 2012

Prepared by
The City of Sacramento

In consultation with
Ascent Environmental, Inc.
Mintier Harnish
Fehr & Peers
The Energy Alliance Association



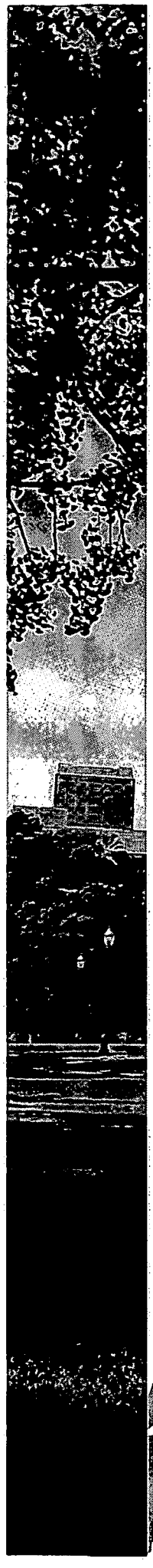
CITY OF SACRAMENTO CLIMATE ACTION PLAN

FINAL DRAFT

January 13, 2012

Prepared by
City of Sacramento

In consultation with
Ascent Environmental, Inc.
Mintier Harnish
Fehr & Peers
The Energy Alliance Association



ACKNOWLEDGMENTS

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Sandy Sheedy, District 2
Steve Cohn, District 3
Robert King Fong, District 4
Jay Schenirer, District 5
Kevin McCarty, District 6
Darrell Fong, District 7
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TABLE OF CONTENTS

EXECUTIVE SUMMARY i

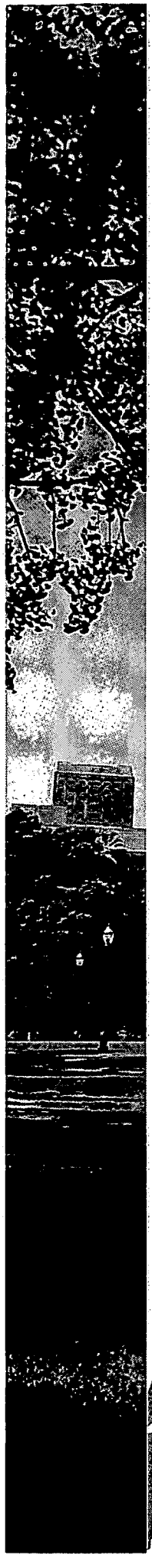
CHAPTER 1: INTRODUCTION
1.1 Climate Action Plan Overview 1-2
1.2 Introduction to Climate Change Science 1-3
1.3 Purpose of the Climate Action Plan 1-6
1.4 Actions Being Taken To Address Climate Change 1-8
1.5 Co-Benefits of Implementation 1-10
1.6 Community Action 1-12
1.7 How the Climate Action Plan was Prepared 1-13
1.8 Relationship To Other City Plans and Documents 1-15

CHAPTER 2: GREENHOUSE GAS EMISSIONS INVENTORIES, FORECASTS, AND TARGETS
2.1 Introduction 2-2
2.2 City of Sacramento GHG Emissions Inventory 2-4
2.3 GHG Emissions Forecasts 2-8
2.4 GHG Emissions Near-term Target and Interim Goals 2-10
2.5 Municipal Operations GHG Emissions, Forecasts, and Near-term Target and Interim Goals 2-13

CHAPTER 3: EXPECTED CLIMATE CHANGE IMPACTS
3.1 Introduction 3-2
3.2 Expected Effects on the Sacramento Region 3-6
3.3 Expected Impacts on the Sacramento Region 3-10

CHAPTER 4: GREENHOUSE GAS REDUCTION AND ADAPTATION POLICIES AND MEASURES
4.1 Introduction 4-2
4.2 Climate Action Plan Strategies 4-3
4.3 GHG Emissions Reduction Summary 4-4
4.4 Climate Change Adaptation Summary 4-6
4.5 Guiding and Implementing the Plan 4-7
4.6 Methods of Implementing Actions 4-9
4.7 Strategy and Measures Readers' Guide 4-11
Strategy 1: Sustainable Land Use 4-15
Strategy 2: Mobility and Connectivity 4-25
Strategy 3: Energy Efficiency and Renewable Energy 4-41
Strategy 4: Waste Reduction and Recycling 4-55
Strategy 5: Water Conservation and Wastewater Reduction 4-63
Strategy 6: Climate Change Adaptation 4-69
Strategy 7: Community Involvement and Empowerment 4-83

APPENDIX
Appendix A: Cost-Benefit Analysis of GHG Reduction Measures
Appendix B: Phase 1: Municipal Climate Action Plan
Appendix C: Connection of Actions to General Plan Policies
Appendix D: GHG Emissions Inventory for Sacramento County
Appendix E: Technical Climate Action Plan Analysis



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EXECUTIVE SUMMARY

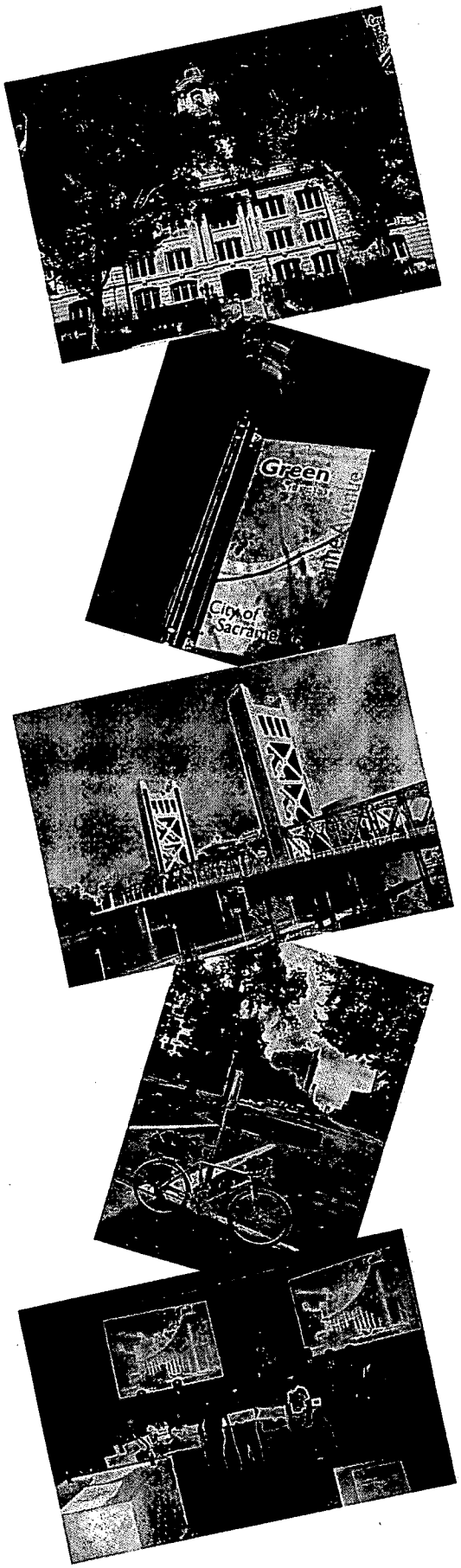
Over the past decade our understanding of global climate change and the role that communities can play in addressing it has grown tremendously. There is large scientific consensus that recent increases in global temperatures are associated with corresponding increases of greenhouse gasses (GHGs). This temperature increase is beginning to affect regional climates and is expected to result in impacts to our region and the world. Climate change has profound implications for the availability of the natural resources on which economic prosperity and human development depend. Closer to home, the changing climate has potentially severe economic, health, social, and environmental consequences.

While climate change poses a threat to our community, our response to this challenge presents opportunities to create a more sustainable Sacramento that is livable, equitable, and economically vibrant. Beyond the benefits of local climate action, the impacts associated with climate change make action at all levels an urgent and absolute necessity.

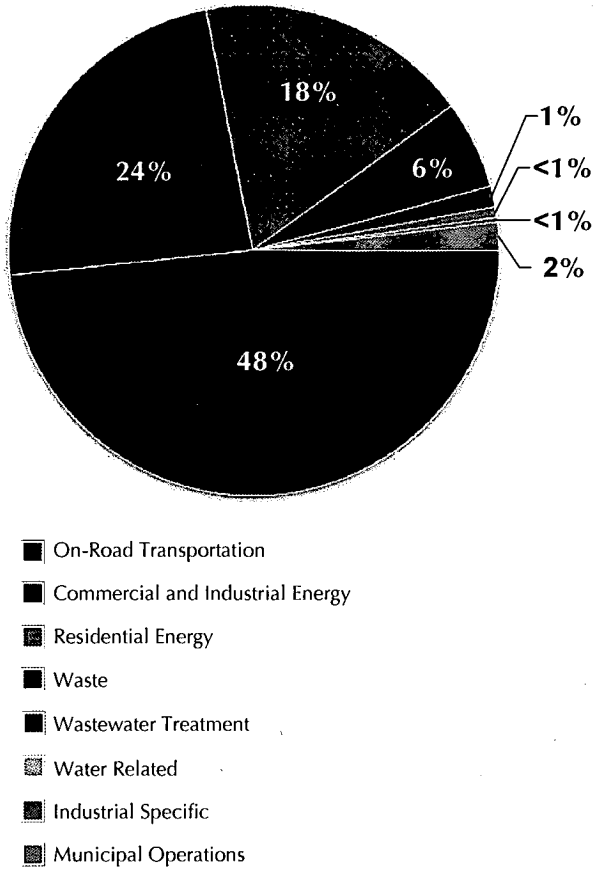
The guiding vision of the 2030 General Plan affirms that *Sacramento will be the most livable city in America.* The Climate Action Plan will implement this vision and help Sacramento become a model of sustainable development and a leader in the conservation of energy, water, and natural resources. The overarching goal of the Climate Action Plan, however, remains the same: to reduce our GHG emissions and prepare for climate change.

The Climate Action Plan represents an important step in identifying locally-based strategies, measures, and actions to reduce GHG emissions and plan for climate change impacts. However, more action is needed on a broader scale if we are going to have a real impact. Through community support for the Plan, the 2030 General Plan, and other sustainability initiatives, Sacramento residents and businesses can inspire other communities throughout California and the nation to take action.

The Climate Action Plan details steps that the City – in coordination with residents, businesses, and partners – will use to address the challenges of a changing climate and to reduce Sacramento's contribution to GHGs. Everyone in Sacramento has a role to play in implementing the Climate Action Plan.



SACRAMENTO'S 2005 GREENHOUSE GAS EMISSIONS INVENTORY



Source: ICF Jones & Stokes. 2009. GHG Emissions Inventory for Incorporated and Unincorporated Sacramento County. June 2009. (ICF J&S 00310.08.) Sacramento, CA. Prepared for: Sacramento County Department of Environmental Review and Assessment.

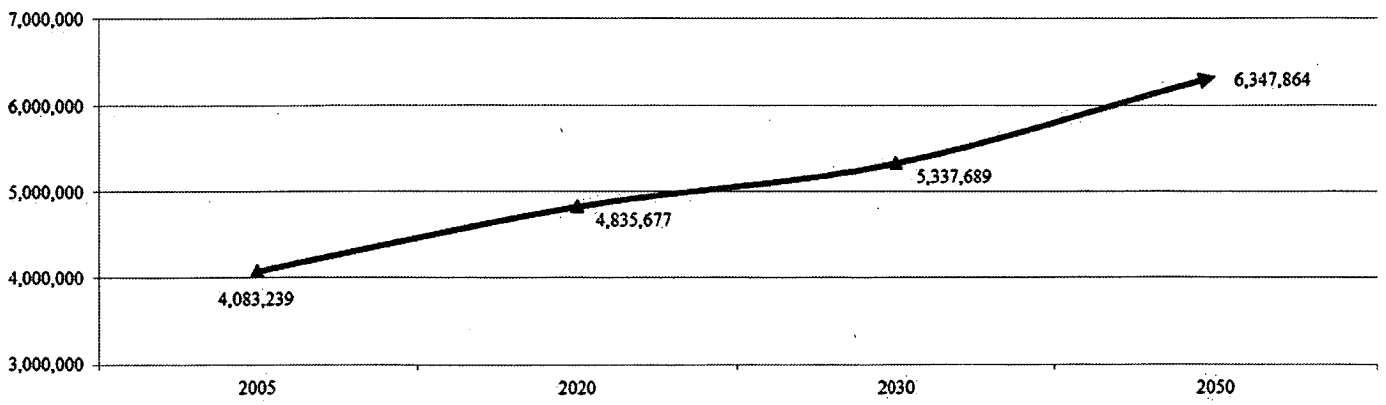
MEASURING AND FORECASTING EMISSIONS

One of the main objectives of the Climate Action Plan is to identify and reduce our contribution to GHG emissions. As part of the process to develop the Plan, the City prepared a 2005 GHG emissions inventory. The GHG emissions inventory can be thought of as a point-in-time estimate of emissions. It provides a baseline to begin the process of figuring out what we need to do to help stabilize and reverse climate change. The inventory also plays a role in ensuring that we stay on course to meet GHG reduction targets and goals.

In 2005 Sacramento emitted over 4.1 million metric tons of CO_2 equivalent ($MMTCO_2e$), which is equal to the emissions produced by driving around the earth almost 412,000 times! Gasoline and diesel consumption by on-road vehicles driven in Sacramento was the single largest source of GHG emissions, accounting for just over 48 percent of the city's total emissions. Electricity and natural gas used to operate, heat, and cool commercial and industrial buildings and residential dwellings accounted for another 42 percent.

If no action is taken to reduce GHG emissions, our contributions to climate change would continue to grow leading to more severe climate change impacts. As part of the GHG inventory, the City prepared a "business as usual" scenario that forecasted GHG emissions to the year 2050. Forecasts provide insight into the scale of reductions needed to change our behaviors and perspective on what it will take to achieve GHG reduction targets and goals. Without action it is estimated that our emissions would rise to over 6.3 MMTCO2e by 2050.

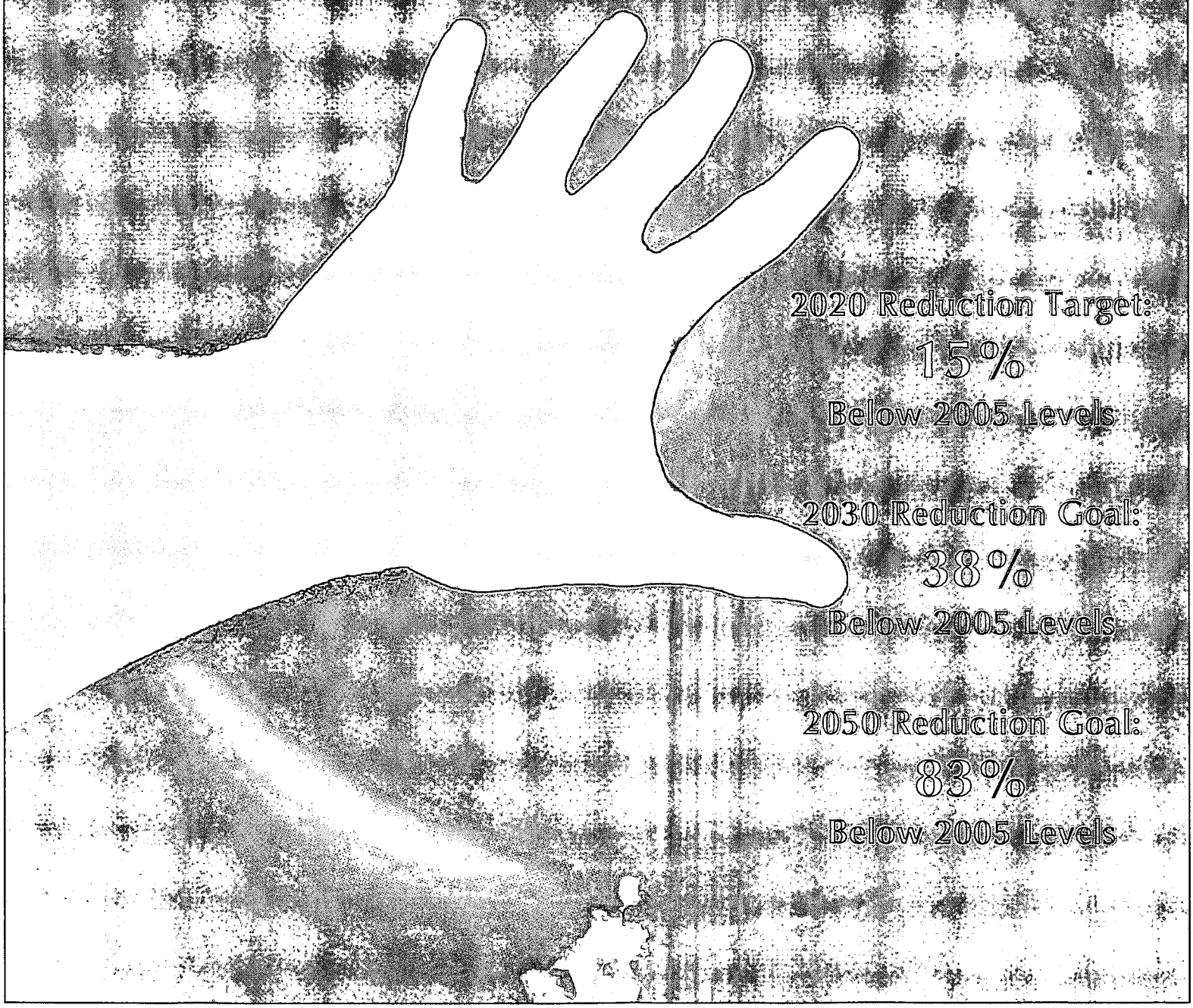
BUSINESS-AS-USUAL GHG EMISSION FORECASTS ($MTCO_2e$/YEAR)

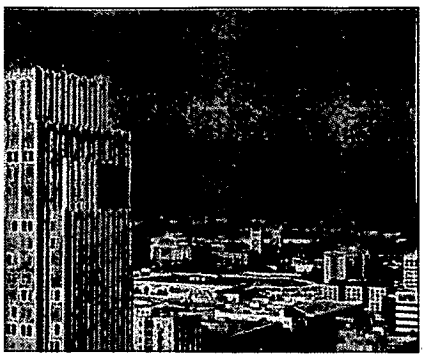


Source: ICF International 2011; Fehr & Peers 2011; data compiled by Ascent in 2011.

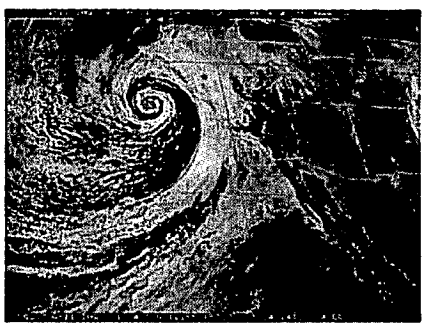
Reducing Our Emissions

Sacramento has adopted a near-term target and long-term goals to reduce GHG emissions relative to 2005 emissions levels. The near-term target is focused on reducing emissions to 1990 levels by 2020 consistent with State mandates (i.e., AB 32). The long-term goals are intended to set Sacramento on a path for additional GHG emissions reductions, consistent with the time frame of the 2030 General Plan and Executive Order S-3-05.



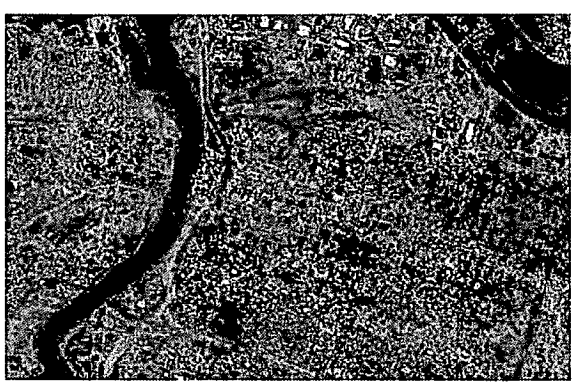


Poor Air Quality



Extreme Storm Events

Habitat Loss



Increased Average Temperatures

CLIMATE CHANGE EFFECTS AND IMPACTS

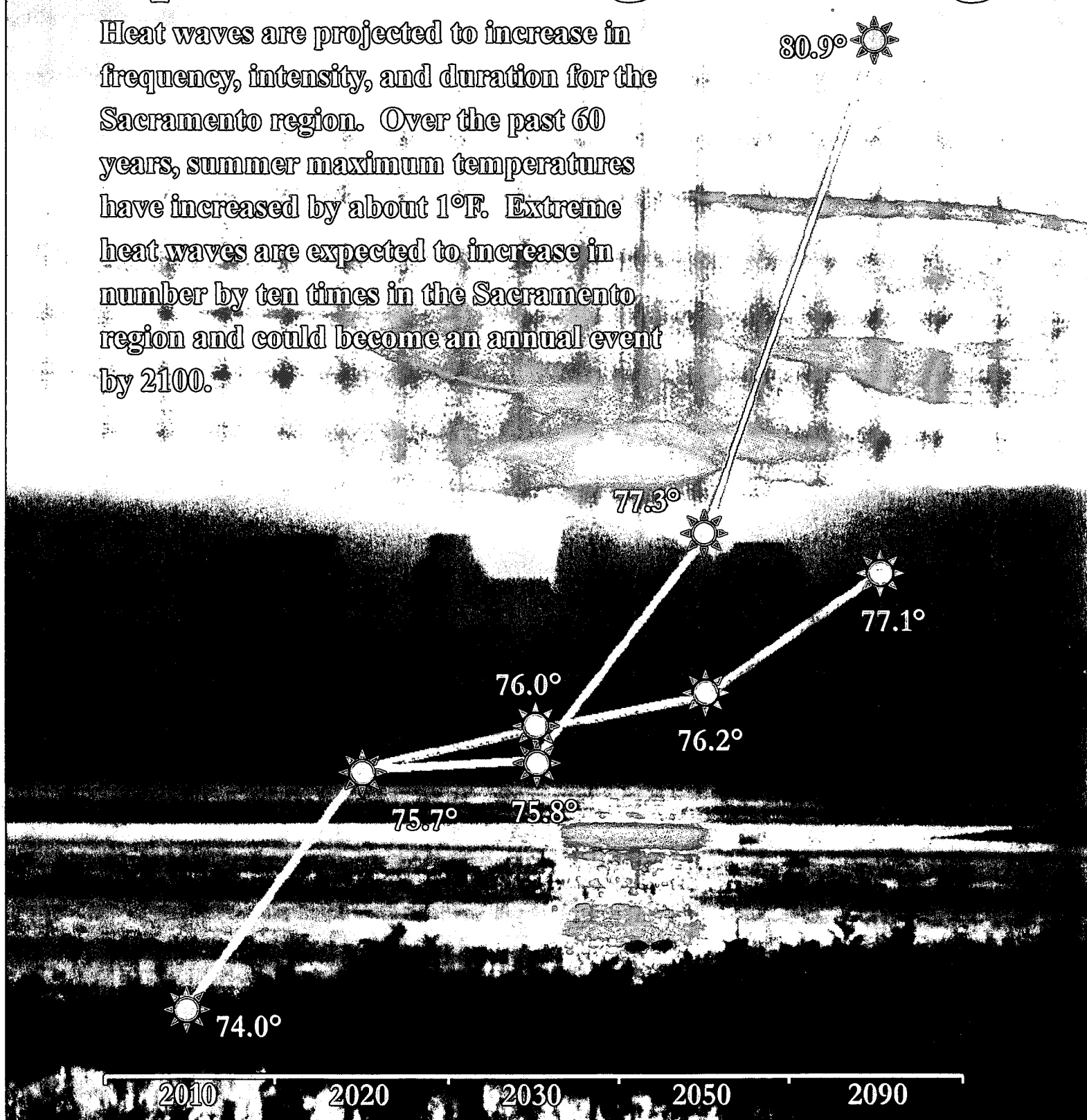
Even with significant GHG reductions, climate change is expected to affect us all, threatening to harm our health and safety, economic stability, and overall quality of life. According to the U.S. Global Change Research Program, climate change is already affecting regions in the United States, and it warns that climate change could have serious consequences for how we live and work; access to and quality of basic goods and services such as water, shelter and food; and how we manage other key priorities for well-being such as education and employment. The potential costs to California, if no action is taken, could exceed tens of billions of dollars annually and place trillions of dollars of real estate at risk.

The Climate Action Plan identifies the following climate change effects and impacts that Sacramento may experience in the coming decades:

- Up to 100 additional days per year with temperatures above 95°F, and by 2090 average July temperature reaching over 104°F.
- Higher temperatures and increased ultraviolet rays that facilitate the formation of more air pollutants and lower air quality.
- More intense, warmer storm events and higher peak river flow patterns that make flood conditions more frequent and severe.
- Up to 80 percent decrease in Sierra Nevada snowpack by 2100.
- Increased pressure on and competition for water resources, further exacerbating already stretched water supplies.
- Increases in residential electricity demand by up to 55 percent by 2100 due to higher average temperatures and longer, more intense heat waves.
- Increases in costs for energy, food, services, and insurance.
- Damage to infrastructure caused by more intense storms, floods, heat waves, and sea-level rise.
- Increases in resident risks for respiratory illness, heat-related illness, and vector-borne diseases.
- Changes to habitats that currently support local wildlife, forcing plants and animals to adapt to the new environment, move to more hospitable areas, or risk extinction.

Experiencing Change

Heat waves are projected to increase in frequency, intensity, and duration for the Sacramento region. Over the past 60 years, summer maximum temperatures have increased by about 1°F. Extreme heat waves are expected to increase in number by ten times in the Sacramento region and could become an annual event by 2100.

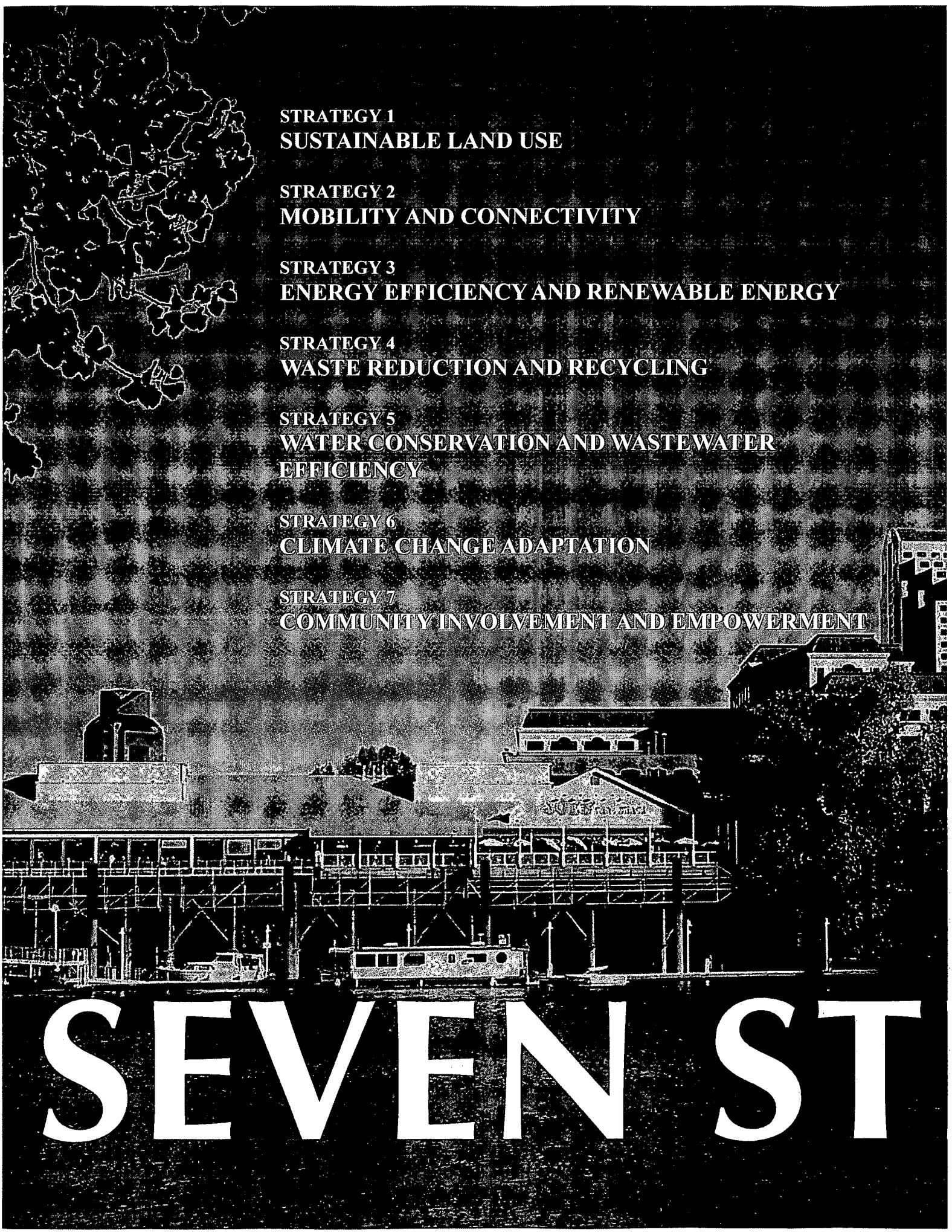


Projected Annual Average High Temperatures in the Sacramento Region

High Emissions Scenario

Low Emissions Scenario

Source: Cal-Adapt, http://cal-adapt.org/tools/factsheet, June 2011.


STRATEGY 1
SUSTAINABLE LAND USE
STRATEGY 2
MOBILITY AND CONNECTIVITY
STRATEGY 3
ENERGY EFFICIENCY AND RENEWABLE ENERGY
STRATEGY 4
WASTE REDUCTION AND RECYCLING
STRATEGY 5
WATER CONSERVATION AND WASTEWATER EFFICIENCY
STRATEGY 6
CLIMATE CHANGE ADAPTATION
STRATEGY 7
COMMUNITY INVOLVEMENT AND EMPOWERMENT
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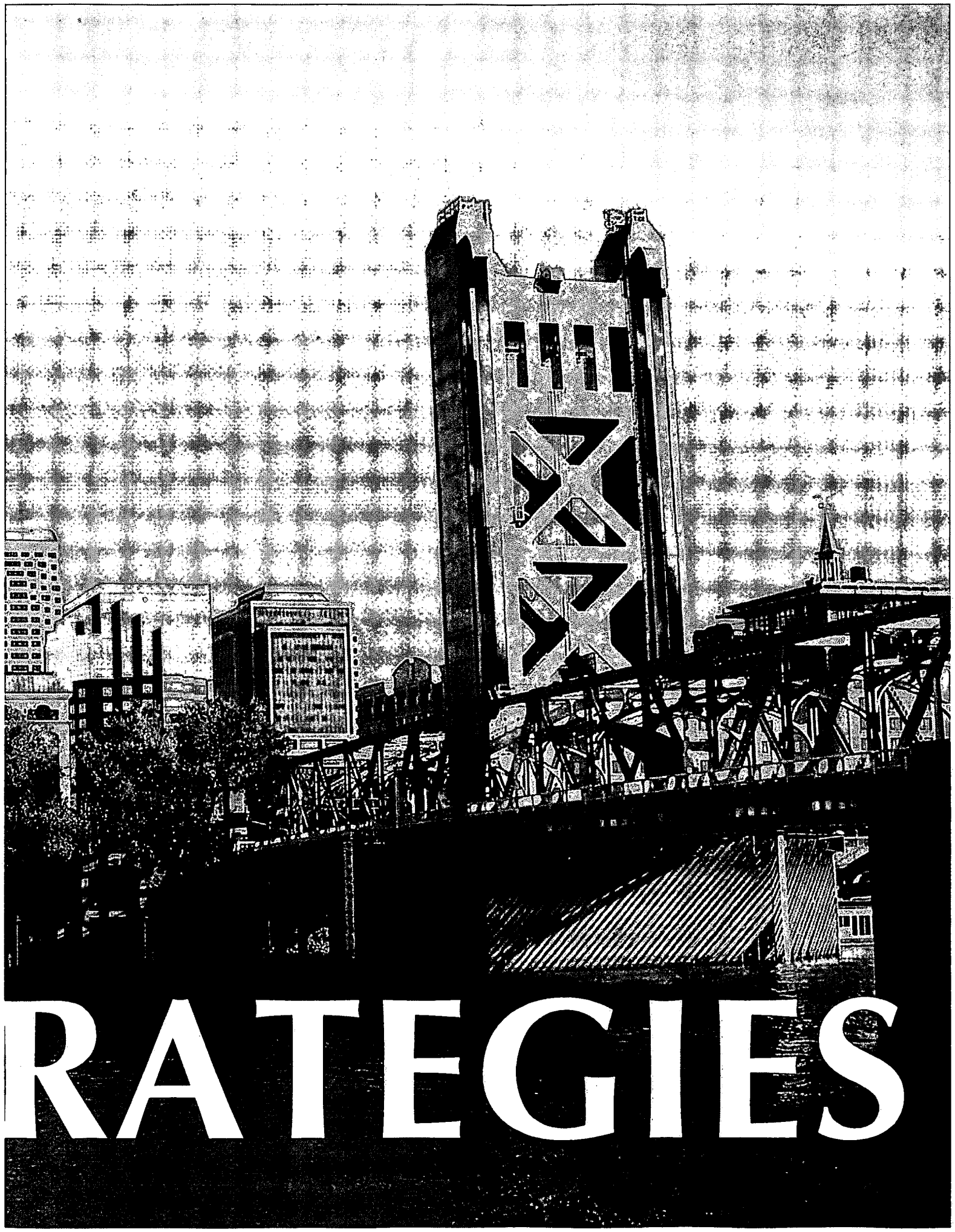

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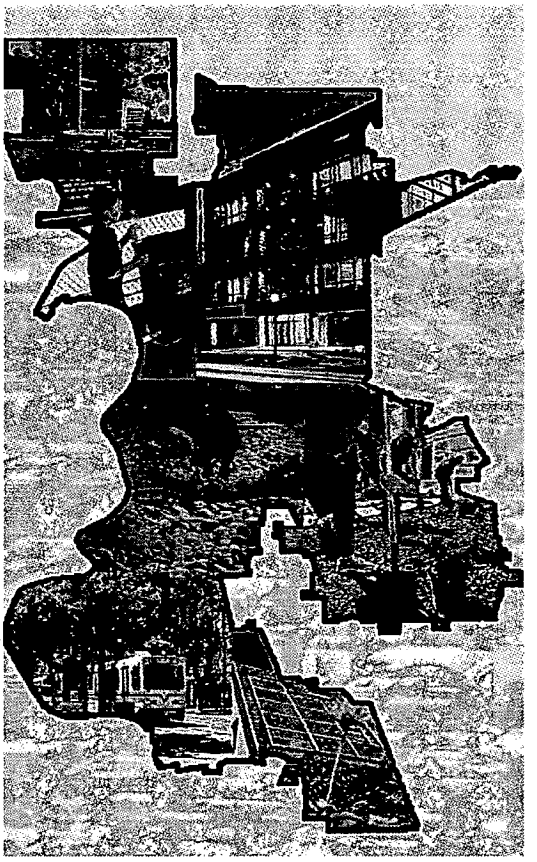
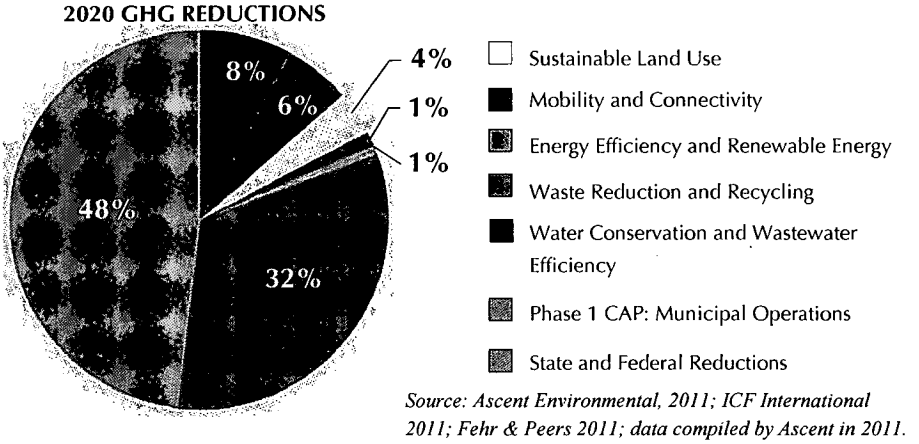


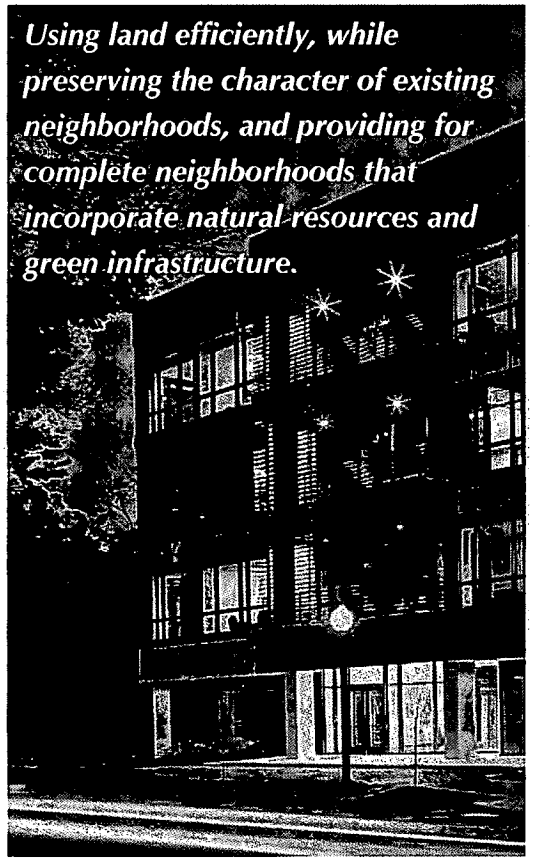
TAKING ACTION

The Climate Action Plan is organized by seven overarching strategies that represent the primary ways we will reduce GHG emissions and adapt to expected climate change impacts. Within each strategy are a series of measures that define the programs, policies, and regulations that the City will implement to achieve its climate action objectives. These are grounded in actions directly influenced by the City, but are reliant on partnerships with the business community and participation by community members. Through partnerships among the City, residents, businesses, and other organizations, these strategies will provide net benefits for everyone, such as cost savings, a strengthened economy, and greater quality of life, while also making a difference in the world.

2020 GHG REDUCTIONS

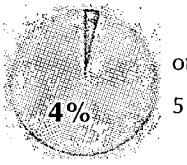


Source: Ascent Environmental, 2011; ICF International 2011; Fehr & Peers 2011; data compiled by Ascent in 2011.



STRATEGY 1

SUSTAINABLE LAND USE



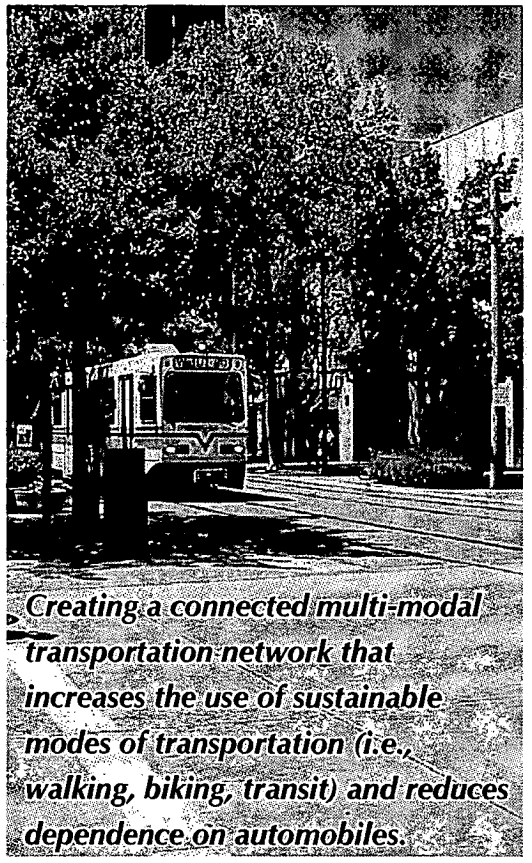
of total 2020 GHG reduction

51,507 $MMTCO_2e$

MEASURES

1. Promote Sustainable Growth Patterns and Infill Development
2. Create More Complete Neighborhoods
3. Encourage Mixed-use Development Projects
4. Require Sustainable Development Practices
5. Ensure Quality Development and Design

The Sacramento 2030 General Plan provides the foundation for Sacramento's overall approach to achieve sustainable land use. The places we live, the methods used to construct our homes, and where we work dictate how far and by what means we travel and how much energy we use. This strategy builds upon and supports the goals and policies of the 2030 General Plan to design more compact development patterns, infill and reuse underutilized properties, intensify development near transit and mixed-use activity centers, and locate jobs closer to housing. Similarly, "green" buildings and development projects, as part of a broader sustainability plan, will consume less energy, produce fewer emissions, protect occupant health, minimize waste, and create jobs.



STRATEGY 2

MOBILITY AND CONNECTIVITY

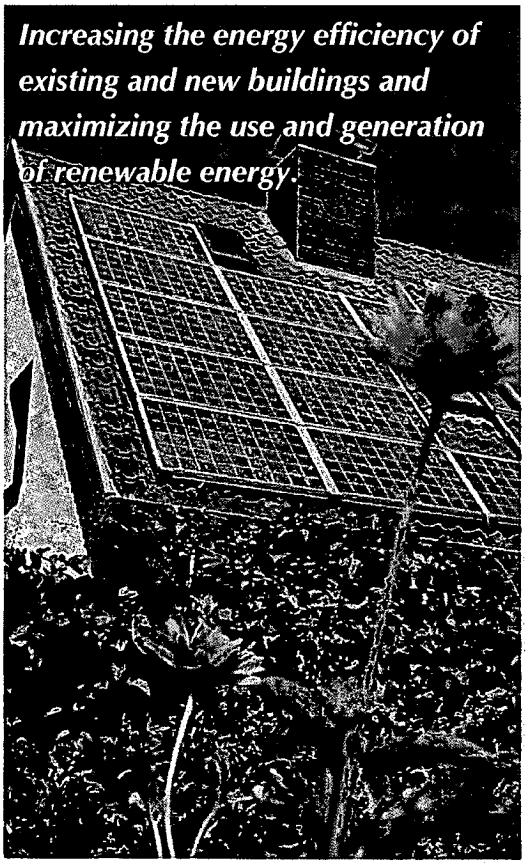
of total 2020 GHG reduction

107,894 $MMTCO_2e$

MEASURES

1. Multi-modal Travel Options
2. Improved Pedestrian Environment
3. Increased Bicycle Mode Share
4. Increased Transit Mode Share
5. Low Emission Vehicles/Efficient Goods Movement
6. Connected Transportation System
7. Transportation Demand Management

The City of Sacramento is committed to establishing an efficient multi-modal transportation network that minimizes impacts to natural resources and improves the quality of life for city residents. Reducing vehicle miles traveled (VMT) by increasing the availability, efficiency, and appeal of sustainable forms of transportation, such as walking, bicycling, and riding public transit, will not only reduce GHG emissions, but will improve public health and quality of life and lead to cleaner air, more recreation space, and opportunities for exercise. Land use and transportation are inextricably linked. Sacramento's transportation network will include well connected neighborhoods, centers, and corridors with complete streets that provide infrastructure and facilities for pedestrians, bicycles, transit, and vehicles.



STRATEGY 3

ENERGY EFFICIENCY AND RENEWABLE ENERGY

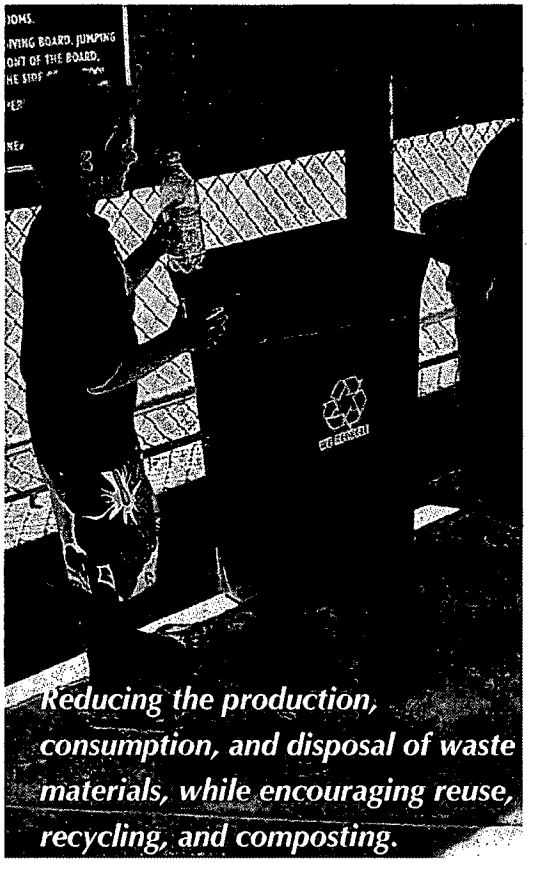
of total 2020 GHG reduction

445,590 $MTCO_2e$

MEASURES

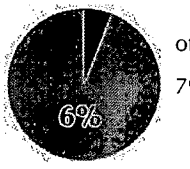
1. Energy Demand Management and Conservation
2. Increase Existing Building Energy Efficiency
3. Increase Energy Efficiency in New Buildings
4. Increase Renewable Energy Generation and Use

The City of Sacramento recognizes that energy is an essential part of our everyday lives, from the lights that illuminate our homes to the machines and computers that operate our businesses. Increasing energy efficiency in existing and new homes and buildings, generating renewable energy, and motivating individuals to make choices that conserve energy will significantly reduce energy demand. The City will support SMUD efforts to increase the generation and use of renewable sources of electricity, such as hydro, wind, geothermal, and solar power. Finally, emissions reductions will be achieved by using less natural gas and electricity in our daily lifestyle choices and business practices, and by improving the energy efficiency of our household appliances and industrial processes.



STRATEGY 4

WASTE REDUCTION AND RECYCLING



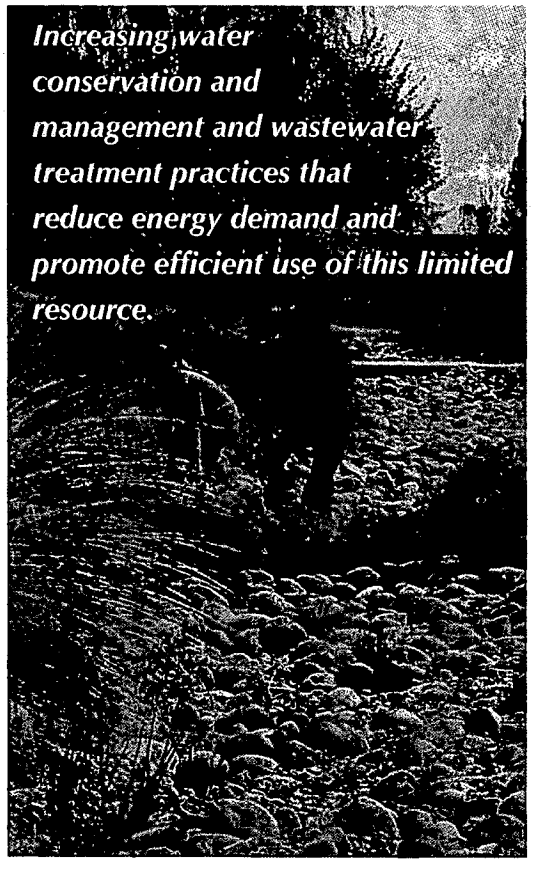
of total 2020 GHG reduction

79,404 $MMTCO_2e$

MEASURES

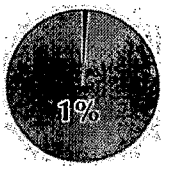
1. Sustainable Production and Consumption
2. Source Reduction, Diversion, Recycling, and Reuse
3. Greenwaste and Composting

The City of Sacramento is committed to helping its residents and businesses reduce waste and increase recycling of materials that would otherwise end up in a landfill. Our decisions about the goods we consume and how we dispose of them can greatly impact emissions. Reusing and recycling materials will save energy required for production and disposal of materials and products and reduce the amount of solid waste that emits GHG gasses in landfills. The City will support commercial and industrial sectors in their efforts to reduce the amount of emissions related to manufacturing new products. Residents will also be encouraged to consume less and reduce the number of products consumed.



STRATEGY 5

WATER CONSERVATION AND WATER EFFICIENCY



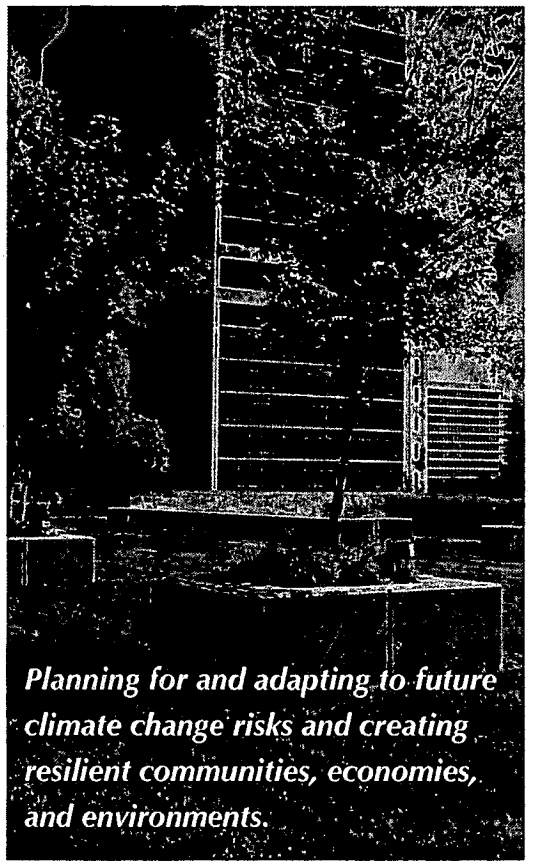
of total 2020 GHG reduction

17,267 $MTCO_2e$

MEASURES

1. Water Conservation
2. Wastewater Treatment

The City of Sacramento recognizes the importance of water conservation and efficient management and treatment of wastewater. Increasing the efficiency of water distribution and reducing consumption will help reduce the energy needed to treat and transport water. It will also help to conserve this important resource. Conservation measures will encourage the use of water-efficient appliances, landscaping, and practice that improve water quality in the American and Sacramento Rivers and the Delta and improve the long-term reliability of the region's water supply. Finally, they will lower the cost of water service and associated energy costs to water and wastewater customers.



STRATEGY 6

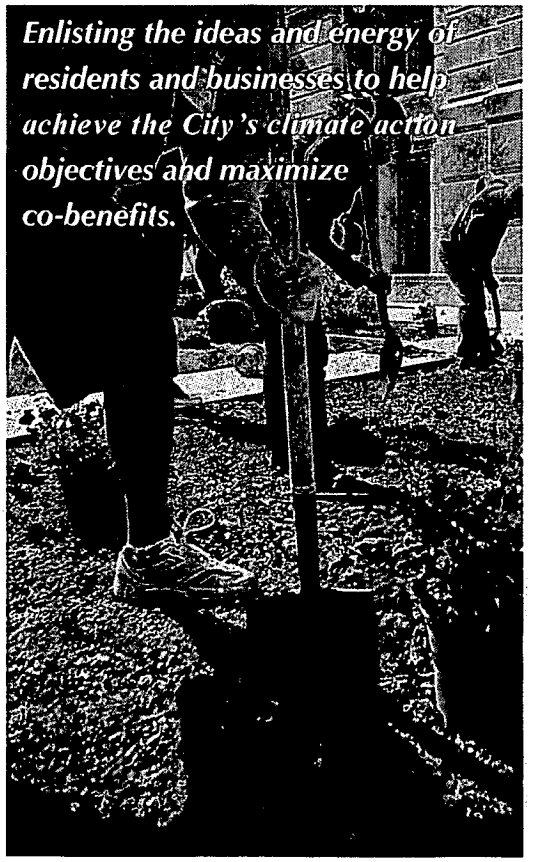
CLIMATE CHANGE ADAPTATION

GHG reductions for the measures and actions in this strategy could not be measured at this time, but are still expected to help reduce emissions.

MEASURES

1. Prepare for Increases in Average Temperatures
2. Preserve Water Sources and Respond to Variable Supplies
3. Respond to Energy Demands and Variable Supplies
4. Protect Public from Health Risks and Safety Hazards
5. Promote a Climate-Resilient Economy
6. Respond to Potential Impacts on Public Infrastructure
7. Protect Natural Ecosystems and Migration Routes

While other strategies focus on reducing GHG emissions to prevent further climate change, the City of Sacramento also recognizes the importance of preparing Sacramento to deal with the expected impacts of climate change and creating a more climate-resilient community. By monitoring climate change impacts, staying up to date on climate change science, and incorporating climate change thinking into normal activities, the City and its residents and businesses will be better prepared to deal with likely future climate change effects and impacts.



STRATEGY 7

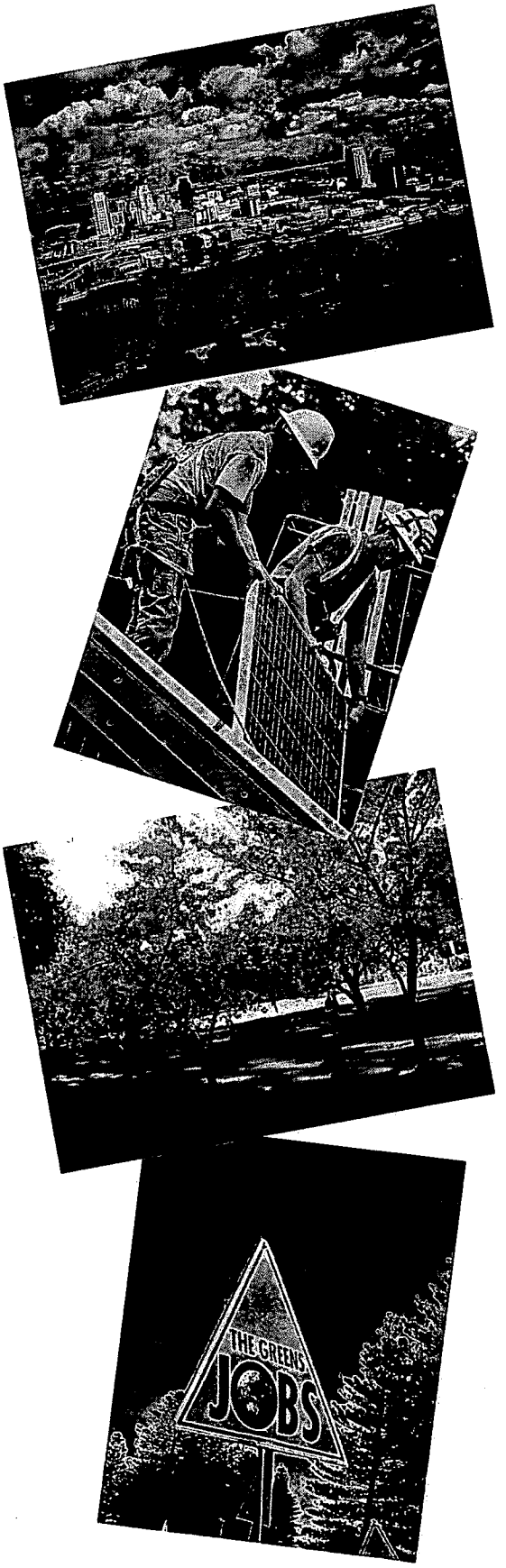
COMMUNITY INVOLVEMENT AND EMPOWERMENT

Most of the GHG reductions for the measures and actions in this strategy could not be measured at this time, but are still expected to help reduce emissions.

MEASURES

1. Education and Community Involvement
2. Recognize Community Accomplishments
3. Build Businesses and Community Organization Partnerships

The City of Sacramento is committed to engaging the public and encouraging residents to actively participate in planning a more sustainable future. Everyone in the community has a role to play in addressing climate change and participation by residents and businesses in climate action programs will increase the likelihood of success. Residents will have the opportunity to work with the City as a partner in facilitating a climate action movement, while the City will lead by example, giving residents and businesses the means to take action. Outreach programs will involve residents and businesses in various GHG-reducing activities and acknowledge the accomplishments of individuals, businesses, and neighborhoods to reduce GHG emissions.



CO-BENEFITS OF ACTION

While the measures and actions included in the Climate Action Plan are generally oriented towards reducing GHG emissions and adapting to expected climate change impacts, many will also achieve important "co-benefits."

For example, the Plan emphasizes sustainable development, complete neighborhoods, and green building practices to help reduce emissions. These types of actions will have co-benefits of increasing equity in and resale value of homes and buildings and allow people to live closer to jobs, schools, and services. Driving less and using sustainable modes of transportation will reduce emissions. It will also reduce traffic congestion, lower commute times, and improve air quality. Finally, more compact forms of development and infill development will prevent the conversion of open space and natural habitats, which will preserve farmland, increase access to recreation areas, and ensure habitat is available for plants and animals. These types of actions will allow us to drive less, save money, spend more time with family and friends, and enjoy a better quality of life.

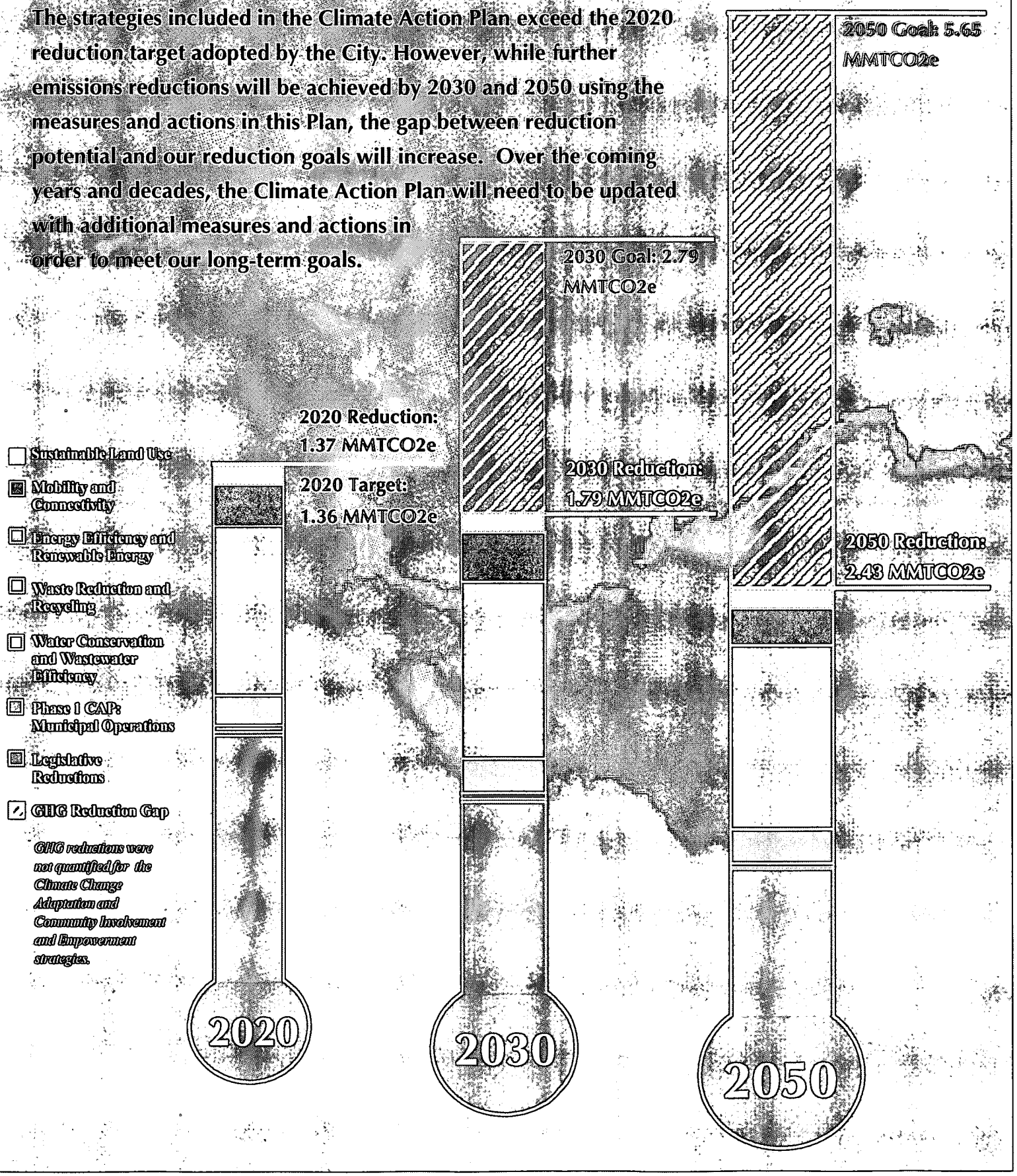
Two other key Climate Action Plan strategies will increase energy and water efficiency in existing and new buildings and generate renewable energy within Sacramento. Generating renewable energy and using energy more efficiently will lower energy demand and increase our energy independence. Conserving water will also help ensure that this limited resource is available in the future. Energy efficiency, renewable energy, and water conservation will save residents and businesses money, and lower our housing and business operating costs.

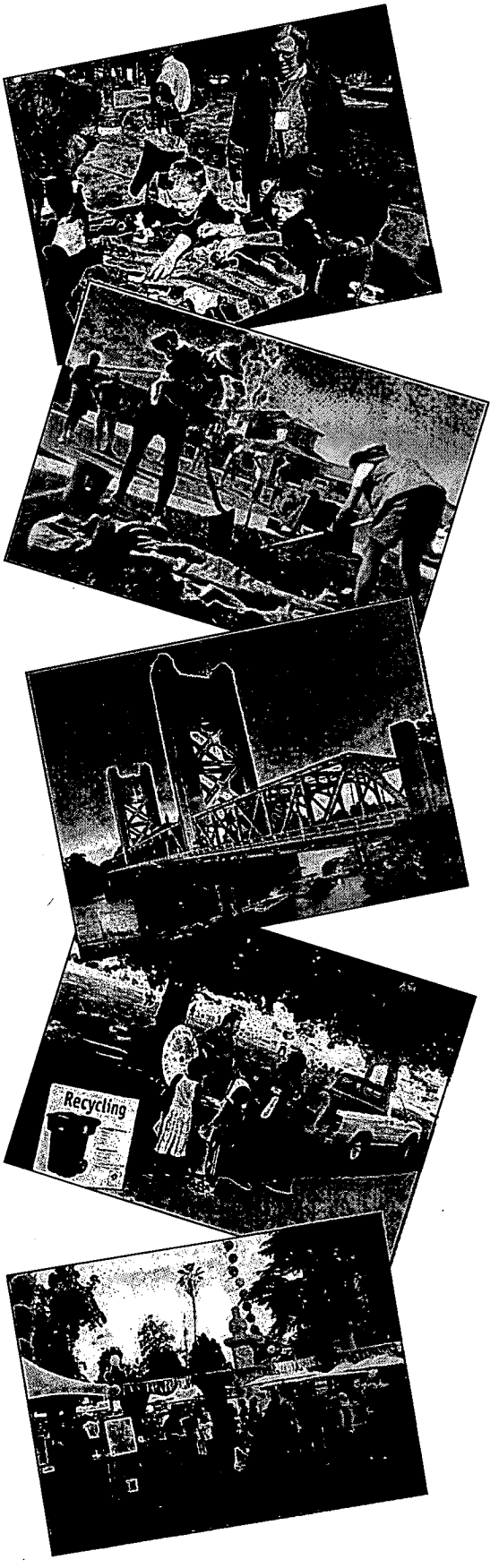
Many actions that reduce GHG emissions also provide climate change adaptation co-benefits that will help create a climate-resilient community. Creating a multi-modal transportation network will reduce our dependence on oil and prepare Sacramento for possible future gasoline shortages. Conserving water will also prepare us for potential droughts and lower water supplies in the summer. Finally, rooftop gardens and a robust urban forest will help reduce energy demand and the urban heat-island effect and prepare Sacramento for hotter summers and longer heat waves.

Beyond helping to solve a global problem and protect our community, residents, and businesses can benefit from the efforts outlined in the Climate Action Plan.

Reaching Our Goals

The strategies included in the Climate Action Plan exceed the 2020 reduction target adopted by the City. However, while further emissions reductions will be achieved by 2030 and 2050 using the measures and actions in this Plan, the gap between reduction potential and our reduction goals will increase. Over the coming years and decades, the Climate Action Plan will need to be updated with additional measures and actions in order to meet our long-term goals.





COMMUNITY ACTION

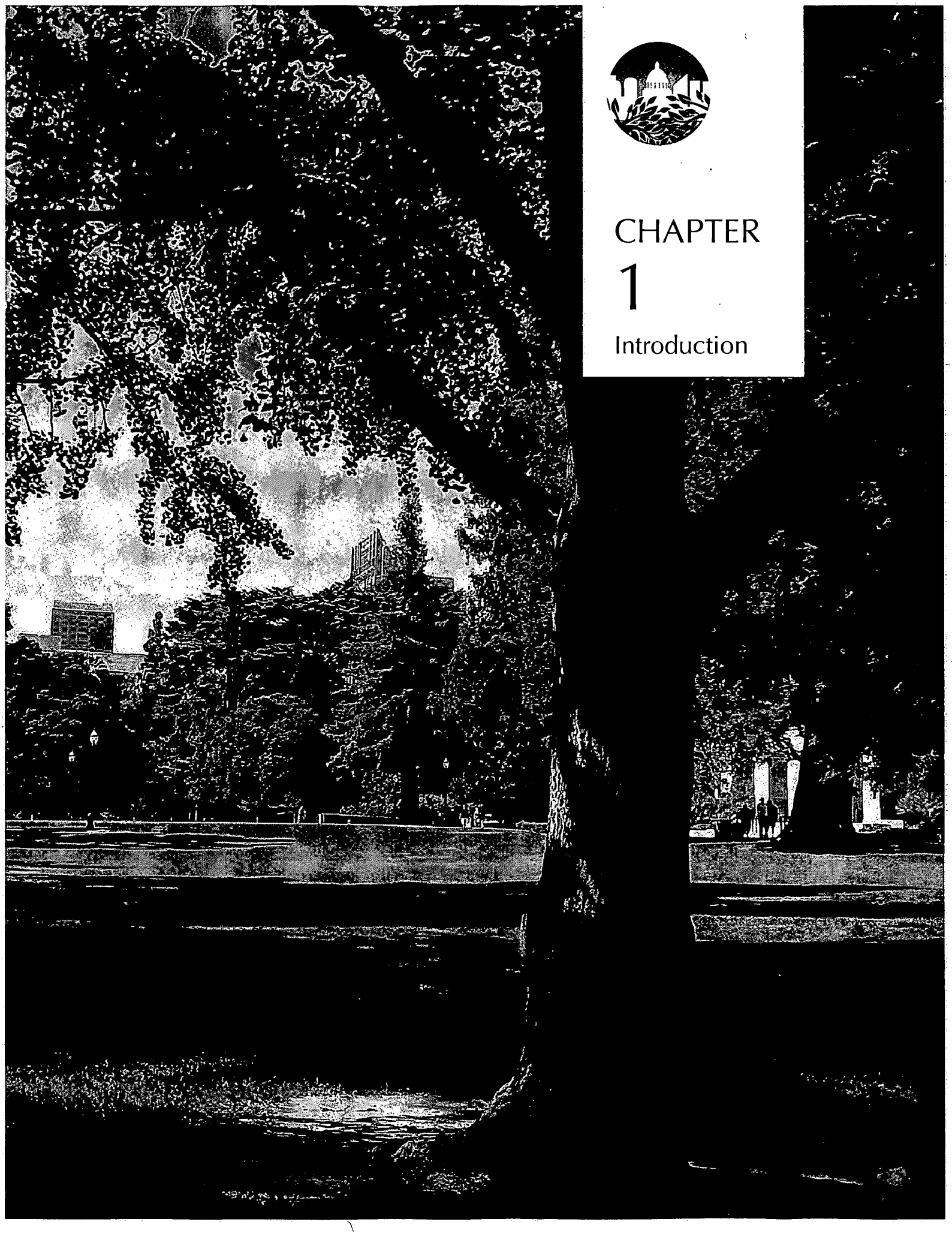
Climate change planning encompasses more than just reducing GHG emissions and adaptation planning – it is also about sustainability and quality of life. The City of Sacramento will take the lead in turning policy into action; however, everyone will need to be involved in the activities outlined in the Climate Action Plan in order to be successful. To do this, the City, residents, and businesses must work together and actively participate in planning the future of Sacramento.

Climate change is an avenue that offers a unique opportunity to partner for collective action, while fostering individual empowerment. Enlisting the ideas and energy of residents, businesses, and other partners in the ongoing implementation of the Climate Action Plan will not only give the community the opportunity to work with the City to facilitate a climate action movement, it will also create climate action and sustainability leaders. Outreach and education programs will increase social interaction, increase public awareness of climate change, and improve participation in City governance.

The City of Sacramento encourages the community to get involved in policy development, program planning, implementation, and assessment. The Climate Action Plan acts as a tool for creating dialog and calling people to action. The Plan includes education and outreach actions that involve the public in climate change strategies. Residents have the opportunity to work with the City as an equal partner in facilitating this movement. The City's role will be to inspire others in leading by example and to give residents, businesses, and other partners the means to take action and influence their peers.

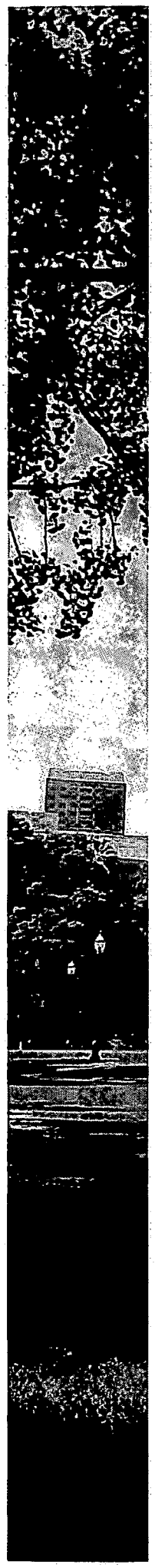
Although it may seem that an individual cannot have much impact on global processes, individual actions can collectively make a big difference. Everyone in the community has a role to play in addressing climate change. Effective climate action will require new behaviors and ways of thinking. Individuals and businesses can consume less energy and produce less waste by recycling, composting, conserving water, using public transit, and making homes and businesses more energy efficient. Small steps can make a difference for the future of our city and our planet. Everyone stands to benefit from the results of effective climate action.

The Climate Action Plan serves as a resource that supports the efforts of government, individuals, and businesses. Together we can create a safer, more sustainable Sacramento, while increasing the number of jobs and business opportunities and achieving energy independence.



CHAPTER 1

Introduction



CHAPTER 1

INTRODUCTION

1.1 CLIMATE ACTION PLAN OVERVIEW

Over the past decade our understanding of global climate change and the role that communities can play in addressing it has grown tremendously. There has been a rise in temperatures associated with global climate change that has profound implications for the availability of the natural resources on which economic prosperity and human development depend. The changing climate also has potentially severe economic, health, social, and environmental consequences for us close to home.

This Climate Action Plan (Plan) presents information demonstrating that climate change poses real risks to Sacramento's economy and to the health and safety of its residents. While climate change is a threat to our community, our response to this challenge presents opportunities to create a more sustainable Sacramento that is livable, equitable, and economically vibrant. Beyond the benefits of local climate action, the impacts associated with climate change make action at all levels an urgent and absolute necessity.

This Plan details steps that the City – in coordination with its residents, businesses, and partners – will use to address the challenges of a changing climate and to reduce Sacramento's contribution. Everyone in Sacramento and beyond has a role to play in implementing the Plan.

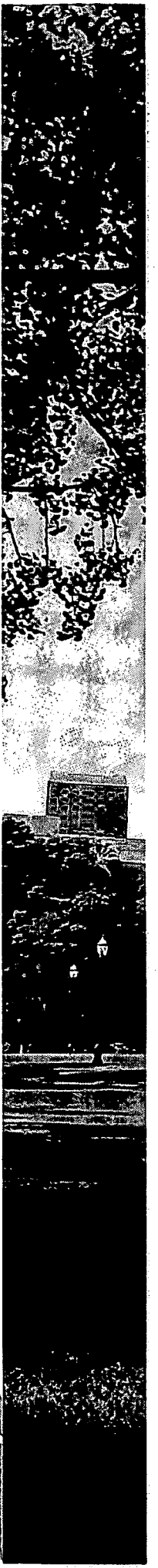
While based on extensive research and analysis, this Plan is a snap-shot in time. It uses the best information available today. As new technologies, markets, and options emerge, roles may change. A strategy identified today may become obsolete in light of the development of new technologies that are not currently available, or State and Federal laws may be enacted that were not conceivable at this time. The overarching goal of this Plan, however, remains the same: to reduce our greenhouse gas (GHG) emissions and prepare for climate change.

I strongly believe Sacramento can be the national leader in the green movement.
- Mayor Kevin Johnson

1.2 INTRODUCTION TO CLIMATE CHANGE SCIENCE

Scientists, business leaders, and heads of government around the world agree that climate change is one of the most serious issues facing the Earth today. There is strong consensus that most of the changes in the world's climate during the last 50 years are a result of man-made GHG emissions. According to the Intergovernmental Panel on Climate Change, "most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in human GHG concentrations." Climate change has resulted in increasing air and ocean temperatures, melting polar ice, shrinking mountain snow packs, and rising sea levels. These trends represent serious threats to the health of people, economies, and environments across the globe.

Scientists, business leaders, and heads of government around the world agree that climate change is one of the most serious issues facing the Earth today.



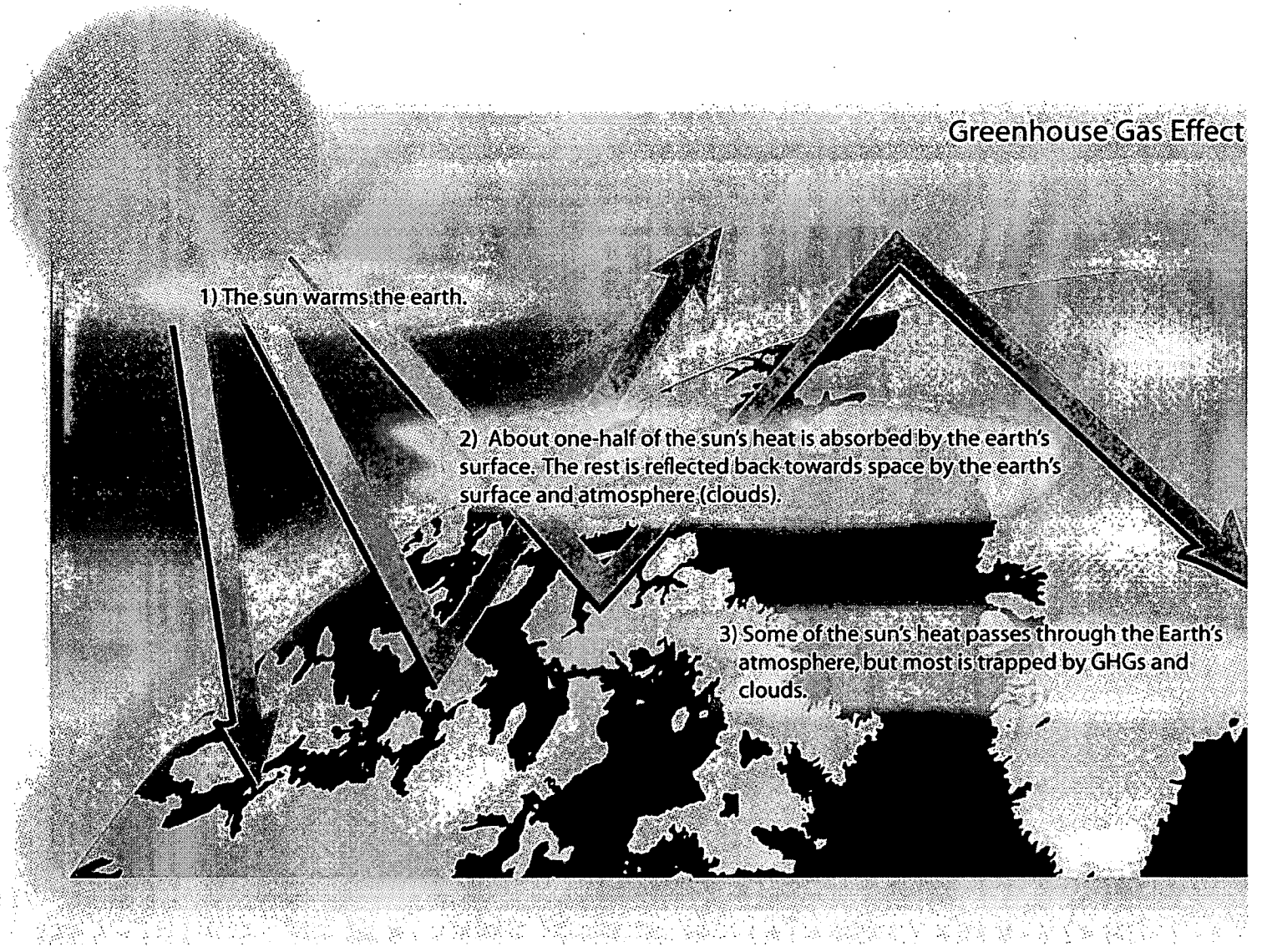
The Greenhouse Effect and Global Warming

The greenhouse effect is a natural phenomenon that helps regulate the Earth's temperature. Naturally occurring levels of GHG emissions keep temperatures on Earth stable. As the Sun warms the earth, about half its solar radiation is absorbed by the Earth's surface, warming it. The rest is reflected back toward space by the Earth's surface and atmosphere (e.g., clouds). Some of this reflected radiation passes through the Earth's atmosphere back into space, but most is trapped by GHGs and clouds. Naturally, the solar radiation absorbed by the Earth and the atmosphere warms the planet. In fact, this absorbed radiation, or heat, keeps the earth's average temperature almost 60 degrees (F) warmer than it would be otherwise.

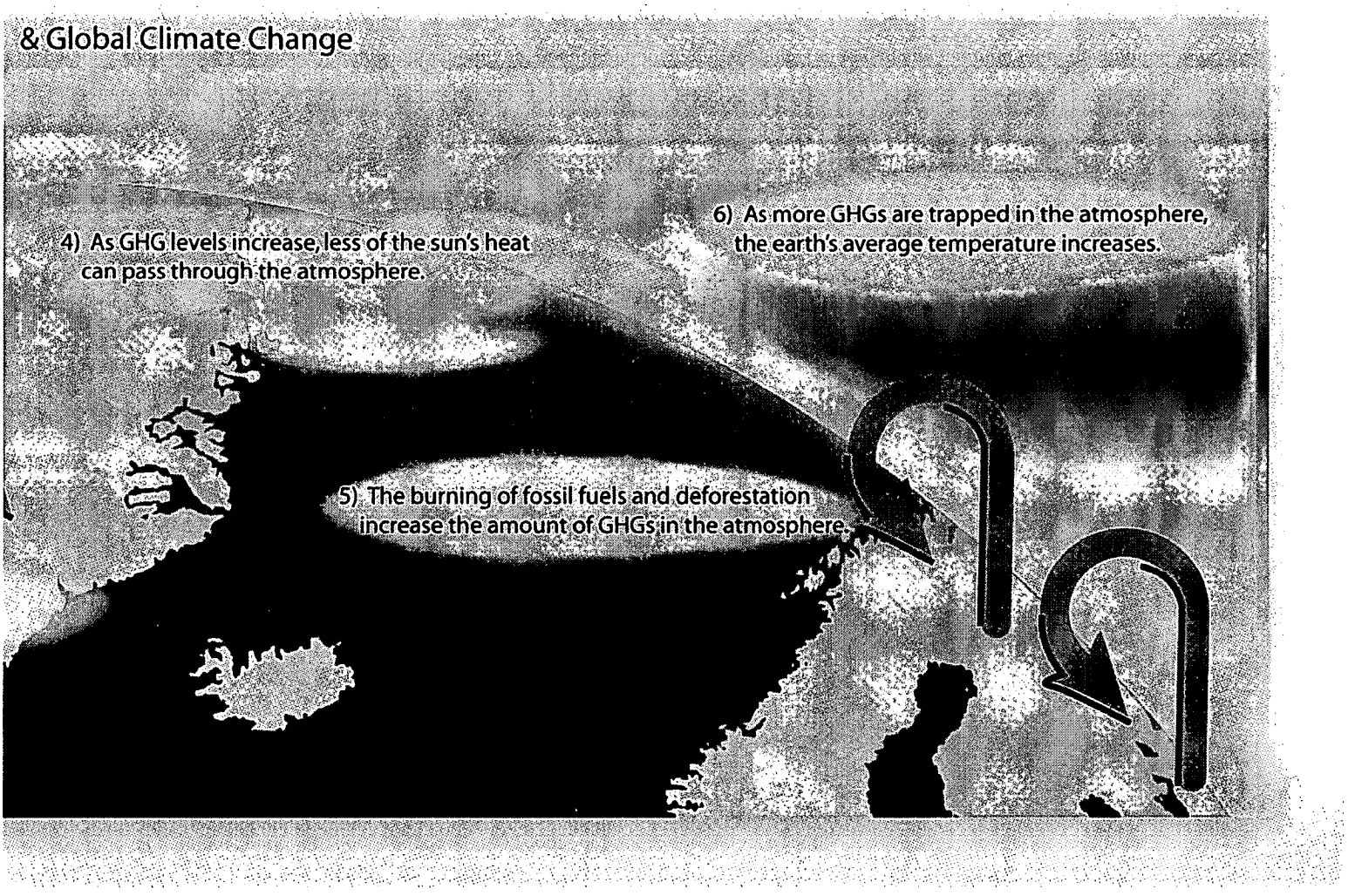
However, the unnatural increase of GHGs intensifies the greenhouse effect. The burning of fossil fuels for transportation and energy and increasing rates of deforestation and development increase the amounts of carbon dioxide (CO_2), methane (CH_4), and other heat-trapping gases in our atmosphere. As the amount of GHGs in the atmosphere increase, less heating radiation from the sun and Earth can pass through the atmosphere back into space. As more GHGs are trapped in the atmosphere, the Earth's average temperature increases above what it would normally be. Compounding this trend is the rapid rate at which human-generated GHG increases have occurred. The resulting effect is global warming that creates major climatic changes. Chapter 2 of this Plan summarizes Sacramento's GHG emissions that are contributing to global warming in California and the city of Sacramento.

Global Climate Change

Left unchecked, global warming can lead to significant fluctuations in regional climates, which can lead to detrimental impacts on the Earth's systems. The magnitude of these changes, however, is uncertain. Virtually all published estimates of how the climate could change in the future are produced by computer models of the Earth's climate system. However, we are already seeing some effects of global warming.

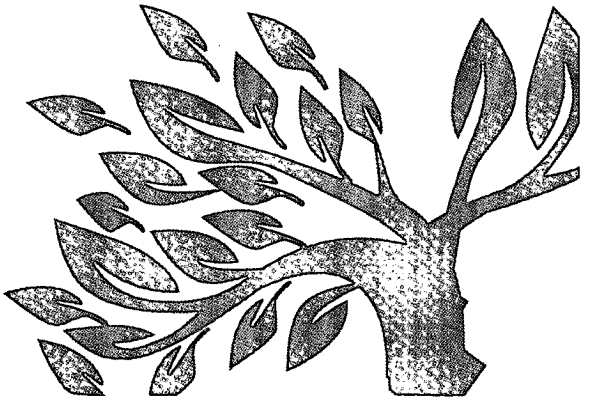


For example, the Arctic ice cap is melting at a rate faster than scientists predicted, a process that is expected to raise sea levels enough to have devastating impacts on coastal communities. Globally, millions of people and thousands of species of plants and animals are expected to be affected. Closer to home, scientists expect that over this century climate change trends will continue and intensify, threatening California's valuable land, water, and other natural resources. Shorter, warmer winters, for example, are likely to decrease the Sierra snowpack, a major source of annual water supply on which many Californians depend for drinking water and other purposes. Longer, hotter summers in the semi-arid southern part of California could upend agricultural production and create ideal conditions for wildfires. Chapter 3 of this Plan summarizes the regional and local impacts that are expected to occur due to climate change.



Addressing the Climate Change Challenge

This Plan represents an important step in changing the trends that are warming the Earth's atmosphere. Chapter 4 of this Plan includes strategies, measures, and actions to reduce GHG emissions and plan for climate change impacts. However, more action is needed, and must be on a broader scale if we are going to have a real impact. Through community support for the Plan, the 2030 General Plan, and other sustainability initiatives, Sacramento residents and businesses can inspire other communities throughout California and the nation to take action.



THERE IS NO TIME TO LOSE! The technical analysis conducted as part of this Plan makes one thing clear: there is no time to lose. If Sacramento continues producing GHG emissions as it has in the past, emissions could increase 19 percent by the year 2020 and 57.1 percent by the year 2050. If the world continues on its present path, Sacramento residents can expect to experience more extreme heat in the summer, more heavy rain storms, less snowpack in the winter, heightened flood risks, public health impacts, and threats to the economy.

1.3 PURPOSE OF THE CLIMATE ACTION PLAN

In 2006 the State of California passed the Global Warming Solutions Act (Assembly Bill [AB] 32), which established a goal of reducing statewide GHG emissions to 1990 levels by the year 2020. AB 32 set a mid-term GHG emissions reduction target, which seeks to move California toward achieving an even more aggressive, long-term reduction goal: Executive Order S-3-05, signed by Governor Arnold Schwarzenegger in 2005, directed California to reduce GHG emissions to 80 percent below 1990 levels by 2050. As part of its implementation of AB 32 and Executive Order S-3-05, the California Air Resources Board (ARB) identified local governments as a key partner in achieving statewide GHG emissions reduction targets and goals. Since 2006 communities throughout California have been preparing climate action plans to do their part to help meet State GHG emissions reduction targets.

However, GHG emissions are not the only concern that climate change poses to our communities. Scientists agree that, regardless of the reasons, our global climate is changing. Seasons are shifting, temperatures are fluctuating, and sea levels are rising. Without efforts to reduce emissions by communities throughout the U.S. and other countries throughout the world, we can expect climate change impacts in and around Sacramento and the globe to continue to escalate. Even if GHG emissions were significantly reduced today, the emissions that have already been put into the atmosphere are expected to continue global warming trends through the end of this century. To help guide efforts to adapt to expected statewide climate change impacts, the State prepared the California Climate Adaptation Strategy (2010). Regionally, however, climate change impacts pose specific risks and threats to Sacramento's economy, residents, and ecosystems. Local and regional actions are needed to plan for these risks and mitigate potential impacts that are expected to occur.

Recognizing its role in this effort, the City of Sacramento 2030 General Plan (2009) included goals and policies directing the City to be proactive in addressing climate change. General Plan policies and programs direct the City to develop, adopt, and maintain a climate action plan for municipal operations and the community. In February 2010 the City prepared Phase 1 of its Climate Action Plan to address GHG emissions from its internal municipal operations. The second phase of the City's Plan focuses on communitywide climate change issues for areas within the City limits. It is a dual-purpose plan that addresses two major climate change challenges: reducing global warming-causing GHG emissions resulting from human activities; and planning for the expected impacts from climate change resulting from global warming.

This Plan sets a course of action for Sacramento to achieve a 15 percent reduction below its 2005 GHG emissions level by the year 2020. This is consistent with State expectations for Sacramento; ARB recommends a minimum 15 percent reduction target to maintain consistency with AB 32. Specifically, according to the *Climate Change Scoping Plan* (December 2008):

> *"ARB encourages local governments to adopt a reduction goal for municipal operations emissions and move toward establishing similar goals for community emissions that parallel the State commitment to reduce greenhouse gas emissions by approximately 15 percent from current levels by 2020."*

The 2020 target is far enough in the future to allow time for development and behavioral changes, but close enough to ensure we are on the right course to achieve longer-term GHG reduction goals to avoid the worst impacts from climate change. Beyond the mid-term target, this Plan sets us on a path to continue reducing GHG emissions consistent with longer-term goals for 2030 and 2050. The Plan also identifies strategies and actions that we can take to prepare for and mitigate the expected impacts from climate change. These efforts are timely because we are only now beginning to experience the effects of a warming climate and still have time to prepare. These adaptation efforts will position Sacramento to be more resilient to climatic changes and protect the health and safety of residents and businesses.

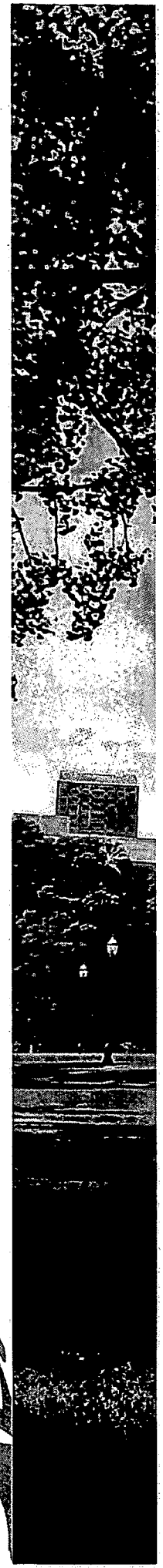
To achieve these objectives, this Plan identifies the following:

- Main sources of GHG emissions and the expected regional impacts from climate change.
- Baseline GHG emissions and the potential growth of these emissions over time.
- GHG emission targets and goals to reduce the community's contribution to global warming.
- Strategies, measures, and actions to comply with statewide GHG reduction targets and goals and to adapt to climate change impacts.
- Areas in which to strategically direct funding and investment opportunities, while positioning the City to compete for grant funding.

This Plan addresses two major climate change challenges: reducing global warming-causing GHG emissions and planning for the expected impacts from climate change.

EVALUATING THE CLIMATE ACTION PLAN

As part of Climate Action Plan evaluation, each strategy, measure, and action must be continually assessed and monitored. Annual reporting on the status of implementation of the actions, periodic updates to the GHG emissions inventory, and other monitoring activities will help to ensure that the CAP is making progress. See Sections 4.5 and 4.6 for more information on administering, implementing, and monitoring the Plan.



Major Sustainability and

1993	1999	2000	2001	2002	2003	2004	2005	2006
Sacramento becomes a member of the ICLEI-Local Governments for Sustainability to promote climate protection, sustainable development, and GHG emissions reductions.			City adopts 14 "Principles for Smart Growth" as part of the 1988 General Plan to promote more sustainable development patterns.	City joins, as a charter member, the California Climate Action Registry, an organization promoting early actions to reduce GHG emissions.			City adopts the Vision and Guiding Principles that provide a framework for the 2030 General Plan Update process and sets the city on a path to be a model of sustainable development.	City Council authorizes Mayor Heather Fargo to sign the United Nations Charter Urban Environmental Accords to achieve urban sustainability, promote healthy economies, advance social equity, and protect the world's ecosystems.
							Executive Order S-3-05 establishes goals to reduce statewide GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.	The California Global Warming Solutions Act of 2006 (AB 32) requires that statewide GHG emissions be reduced to 1990 levels by 2020 and directs CARB to prepare a plan to achieve the target.

When I sign AB 32 we will begin a bold new era of environmental protection here in the State of California that can change the course of history.
- Governor Arnold Schwarzenegger

1.4 ACTIONS BEING TAKEN TO ADDRESS CLIMATE CHANGE

The City has already demonstrated its commitment to addressing climate change and reducing GHG emissions. Over the past decade the City has proactively participated in a series of partnerships and formal agreements with other jurisdictions in California and the rest of the nation. With the passage of the Global Warming Solutions Act (AB 32) in 2006 and prior and subsequent legislation and implementing guidelines, new focus was placed on local governments addressing GHG emissions reductions and climate change through focused programs and efforts, including climate action plans.

Many other Federal, State, and regional laws and regulations are relevant to Sacramento's climate change planning. They support the intent and purpose of the City actions and climate change legislation discussed above and indirectly influence implementation of the Plan. However, they will result in furthering efforts to reduce GHG emissions and mitigate climate change impacts. A complete list of California Legislation and Governor's Executive Orders on climate change can be found online on the California Climate Change Portal (http://www.climatechange.ca.gov/publications/legislation.html).

Climate Change Initiatives

City signs the United States Conference of Mayors Climate Protection Agreement to reduce carbon emissions consistent with the Kyoto Protocol international agreement.

City adopts the Sustainability Master Plan to guide future operational and policy decisions to create a more sustainable city. Every year since adopting the Plan, the City has prepared and adopted Sustainability Implementation Plans.

City adopts the Parks and Recreation Sustainability Plan to manage and operate parks and recreation facilities and programs in a more sustainable manner

City adopts the 2030 General Plan, which includes goals and policies that guide the City's approach to comprehensively address sustainability and climate change.

City adopts Phase 1 of the City of Sacramento Climate Action Plan to reduce GHG emissions from the City's internal government operations.

Mayor Kevin Johnson launches the Greenwise Sacramento initiative that results in a Regional Action Plan that includes goals to create a self sustaining section, become the greenest region in the country, and brand the Sacramento region as the "Emerald Valley."

City initiates Phase 2 of the Sacramento Climate Action Plan to reduce GHG emissions from communitywide actions.

2007

SB 97 directed the Governor's Office of Planning and Research (OPR) to update the California Environmental Quality Act (CEQA) Guidelines to include guidance on addressing GHG emissions in environmental review documents.

2008

SB 375 requires MPOs to prepare Sustainable Communities Strategies that plan regional transportation systems to reduce vehicle miles traveled and GHG emissions for cars and light trucks.

Executive Order S-13-08 requires development of a Climate Adaptation Strategy that directs statewide management of climate impacts from sea level rise, increased temperatures, shifting precipitation, and extreme weather events.

2009

The Air Resource Board adopts the Climate Change Scoping Plan outlining the State's plan to achieve GHG reductions required by AB 32 and provides direction for local governments.

The Natural Resources Agency adopts the California Climate Change Adaptation Strategy.

2010

The Natural Resources Agency adopts updated CEQA guidelines that provide direction on addressing GHG emissions in environmental review documents.

2011

Our vision is to transform Sacramento into the Emerald Valley. We want to make this the greenest region in the country.
- Mayor Kevin Johnson

Beyond helping to solve a global problem and protect our community, residents and businesses can benefit from the efforts outlined in the Plan.

1.5 CO-BENEFITS OF IMPLEMENTATION

Beyond helping to solve a global problem and protect our community, residents and businesses can benefit from the efforts outlined in the Plan. While the actions included in the Plan are generally oriented towards reduction of GHG emissions, many of them will achieve important "co-benefits." For example, a major co-benefit of implementing the Plan will be fewer toxic emissions, leading to better air quality and improved health for everyone. Two other key strategies identified in the Plan are to raise the energy and water-use efficiency of buildings and reduce the amount of time we spend traveling in cars. Energy and water efficiency will save residents and businesses money, and lower our housing and operation costs. Additional money available to residents and businesses will boost our local and regional economy and help to create jobs, especially for local businesses. Finally, the plan emphasizes opportunities for people to live closer to our jobs, schools, and services, which will allow us to drive less, save money, spend more time with family and friends, and enjoy a better quality of life. Each Strategy included in Chapter 4 of this Plan contains a list of co-benefits that can be achieved as we implement each measure and action. Appendix A includes for several actions the economic cost and benefits of implementation.

Streamlined Process for Sustainable Development

While the current development review process provides an approach for determining the significance of cumulative project impacts on climate change, it lacks clear, quantifiable solutions for development projects to reduce GHG emissions and mitigate for climate change impacts. The Plan will provide the basis for a streamlined approach to demonstrate project compliance with CEQA.

The City will also develop a Green Development Code that will serve as a key implementation vehicle for the 2030 General Plan, Sustainability Master Plan, and Climate Action Plan. The Green Development Code will benefit the development community by clarifying and simplifying regulations and improving the transparency and consistency of decision-making, while promoting and streamlining infill development that is consistent with the 2030 General Plan.

The Climate Action Plan will be used as part of the development review process to ensure that developers who follow City guidelines to produce more sustainable, compact, mixed-use, and efficient development have the benefit of a more streamlined development review process. It will provide strategies, measures, and actions that the development community can use to reduce their projects GHG emissions. Developers who use the Plan are likely to spend less time in review by the City and require fewer revisions and modifications.

ECONOMIC CO-BENEFITS

Implementation of the Climate Action Plan will provide many economic co-benefits to residents and businesses within the city. The following examples highlight some of the cost savings and job creation potential that can be achieved by implementing the actions in the Plan:

- The Residential Energy Conservation Ordinance (Action 3.2.2) will provide an annual energy savings of $330 to $420 for every household that participates and create 2-4 public jobs.
- The Commercial Energy Conservation Ordinance (Action 3.2.4) will provide an annual average utility savings of $0.33 per square foot. It is anticipated that participating buildings could recover their upfront renovation costs in about five years.
- The Commercial Property Assessed Clean Energy Financing program (Action 3.2.1) will create up to 126 public jobs and 106 private jobs during the first five years of its implementation. Furthermore, building owners who participate in the PACE program are not required to front the initial capital costs.
- The Rental Housing Water and Energy Efficiency Program (Action 3.2.3) will create up to 13 public jobs and 207 private jobs during the first five years of its implementation.
- Action 3.4.1, which requires new residential developments of 10 units or more to install photovoltaic systems, will provide an annual average energy savings of about $630 per household per year and create over 2,000 jobs.
- Action 3.4.2, which requires solar to be installed in new commercial developments over 25,000 square feet and industrial developments over 100,000 square feet, will provide an annual average energy savings of about $10,800 per participating building and create about 69 private jobs.
- The SMUD Smart Grid program (Action 3.1.2) will result in a annual savings of $11.5 million dollars for residential SMUD customers and $25 million for non-residential SMUD customers. The infrastructure costs associated with the program will be recovered in about five years and create up to nine jobs for every $1 million dollars invested.
- Implementation of the California Green Building Code Tier 1 provisions (Action 3.3.2) will result in energy savings for residential dwellings ranging from $0.77 to $2.01 per square foot. For office buildings savings are expected to range from $0.59 to $3.13 per square foot.

E I CO S O M C C O B E N E F IT

1.5 COMMUNITY ACTION

Although it may seem that an individual cannot have much of an impact on global processes, individual actions can collectively make a big difference. The key to effectively addressing climate change includes active, ongoing partnerships between residents, businesses, and City government.

Everyone in the community has a role to play in addressing climate change. Individuals and businesses can consume less energy and produce less waste by recycling, composting, conserving water, using public transit, and making homes and businesses more energy efficient. Small steps can make a difference for the future of Sacramento and our planet.

Everyone stands to benefit from the results of an effective climate action. Effective climate action will require new behaviors and ways of thinking, which can only be sustained in the long term by communitywide efforts to reduce waste and use resources more sustainably. The Plan serves as a resource that supports the efforts of government, individuals, and businesses. Together we can create a safer, more sustainable Sacramento, while increasing the number of jobs and business opportunities and energy independence.

1.6 HOW THE CLIMATE ACTION PLAN WAS PREPARED

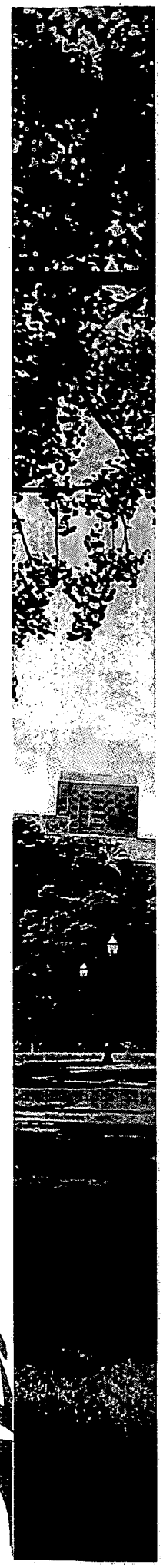
The City's Plan was developed in two phases. Phase 1, adopted in February 2010, addresses the City's internal government operations and identifies strategies to reduce GHG emissions in a cost effective manner in the City's municipal buildings, vehicle fleet, streetlights and signals, parks maintenance, water and drainage pumping, and other facilities and operations that are under the City's direct control. Chapter 4 of this Plan includes a summary of the results of Phase 1 Plan results and a complete copy of the Phase 1 report is included in Appendix B.

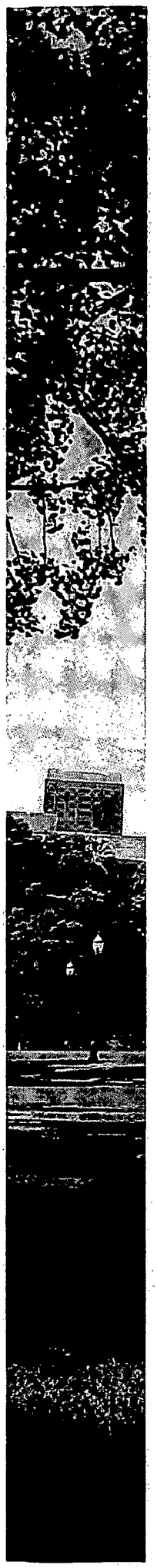
This Plan is Phase 2 of the City's climate action planning efforts. It focuses on reducing communitywide GHG emissions from activities within the City limits, as well as strategies to adapt to the effects of climate change. In partnership with the County of Sacramento, Sacramento Municipal Utility District (SMUD), and other incorporated cities within Sacramento County, the City of Sacramento commissioned a joint study to develop a countywide GHG inventory, which was used as the baseline GHG emissions for this Plan.

The process used by the City for setting communitywide climate protection goals included the following steps, based on the 5-Step model framework for climate action planning developed by the International Council for Local Environmental Initiatives (ICLEI):

1. Confirm existing GHG emissions inventories for municipal operations and communitywide emissions for the baseline year of 2005.
2. Forecast future "business-as-usual" GHG emissions levels that would occur in the absence of the climate action plan for 2020, 2030, and 2050.
3. Calculate a GHG reduction target for 2020 and goals for 2030 and 2050, consistent with State laws, goals, and guidelines.
4. Identify expected regional impacts due to climate change.
5. Identify and quantify draft GHG emissions reduction and climate change adaptation strategies, measures, and actions.
6. Conduct a "gap-analysis" to determine if the draft strategies, measures, and actions achieve the preliminary GHG emissions reduction target. Adjust the target or the draft strategies, measures, and actions based on community input and direction from City Council.
7. Draft a Climate Action Plan that includes GHG emissions reduction and climate change adaptation strategies, measures, and actions and programs for ongoing monitoring and adjustment over time.
8. Conduct outreach and participation efforts at key milestones in the process to engage community and interested stakeholders.
9. Present the draft Climate Action Plan to City commissions and to the City Council for adoption.

The process used by the City was based on the 5-Step model framework for climate action planning developed by the International Council for Local Environmental Initiatives (ICLEI).





The Climate Action Plan Work Program kicked off in 2009. Phase 1 was completed and approved by the City Council in February 2010. Phase 2 of the CAP process initiated in April 2010 with an initial public workshop. By the following year, staff and consultants had finalized the GHG inventory and identified draft emission reduction targets and reduction measures. Stakeholder outreach meetings were conducted in Summer 2011, along with hearings at the Planning Commission and City Council. A Draft Climate Action Plan was released for public review on November 3, 2011. Staff held a public meeting on the Draft Plan on November 16, 2011, and a number of written comments were received from the public through the close of the comment period on December 9, 2011. The Planning Commission held a public hearing on the Draft Plan on December 8, 2011 and voted forward a recommendation of approval to the City Council. The final Climate Action Plan was adopted January 31, 2012.

Environmental Review of the Climate Action Plan

Climate Action Plans are considered a "project" subject to compliance with the California Environmental Quality Act (CEQA) because they are activities undertaken by a public agency that are subject to discretionary approval and may cause a direct or indirect effects on the environment. Senate Bill (SB) 97 clarified that GHG emissions are within the scope of environmental review. Climate action plans include measures that can change the physical environment and influence land use and development patterns that affect GHG emissions.

The environmental review process requires local governments to identify and evaluate GHG emissions, assess the significance of the impacts of GHG emissions on the environment as compared to the existing conditions, and identify feasible alternatives and mitigation measures to reduce significant impacts. Local governments should also identify measures to monitor program progress and adopt the approved plan in a public process following completion of environmental review.

The Climate Action Plan implements policies in the Sacramento 2030 General Plan, approved in March 2009. The General Plan includes goals, policies, and actions addressing GHG emissions, sustainability, and climate change. This Climate Action Plan builds on the policies outlined in the General Plan; its preparation was called for in Environmental Resources Implementation Program #12. The Master EIR (MEIR) prepared for the 2030 General Plan adequately describes the impacts of the Climate Action Plan for the purposes of CEQA. Accordingly, a separate EIR for the Climate Action Plan is not necessary.

Environmental Review of Projects Under the Climate Action Plan

In response to the mandate of SB 97, the CEQA Guidelines (Section 15183.5) establish standards for the contents and approval process of plans to reduce GHGs. The Climate Action Plan has been prepared consistent with those standards.

As a CEQA Section 15183.5-qualified plan, the Climate Action Plan affords development applicants the opportunity to use CEQA streamlining tools for analysis of GHG emission and related impacts for projects that are consistent with the Plan. Details on how projects can achieve consistency with the Plan can be found in Section 4.6.

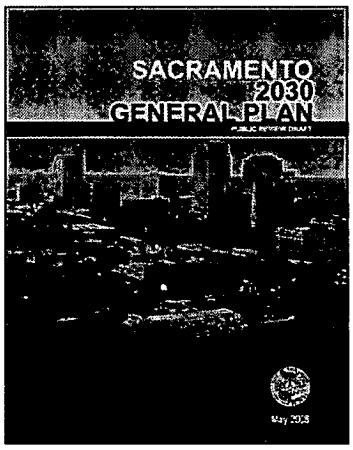
1.7 RELATIONSHIP TO OTHER CITY PLANS AND DOCUMENTS

Over the last decade, the City has adopted several key planning documents that promote sustainability and directly or indirectly address climate change. These prior plans provided background and resources for the development of the Climate Action Plan. Ongoing implementation of these plans will further the objectives of the Climate Action Plan. In many instances, specific programs and initiatives from these plans are included as actions in the Climate Action Plan.

In addition to the plans outlined below, the City has adopted several other planning documents and implemented dozens of programs and initiatives that are guiding Sacramento to a more sustainable future. A complete list of these can be found in the City's annual Sustainability Implementation Plans.

The following plans illustrate major efforts the City has established to further the objectives of the Climate Action Plan.

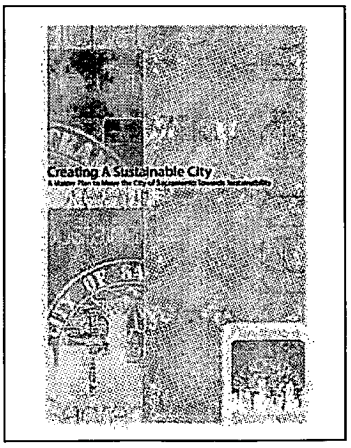
Sacramento 2030 General Plan



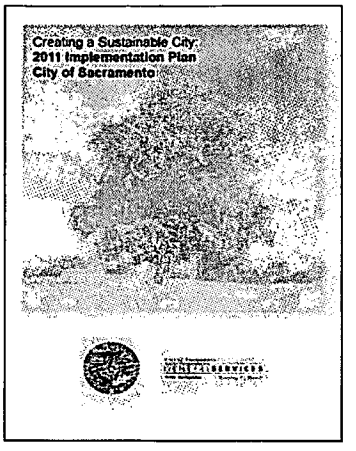
The 2030 General Plan provides the foundation upon which all future land use and public investment decisions are based. It is a guide for the development of the Climate Action Plan and all other planning documents, which must be consistent with General Plan policies. The General Plan includes goals and policies that guide the City's approach to addressing sustainability and climate change. The General Plan specifically identified the Climate Action Plan as an implementation program and a key mitigation measure for addressing and adapting to climate change. The existing General Plan goals and policies that are implemented by the Climate Action Plan can be found in Appendix C.

The Climate Action Plan is not part of the General Plan. Similar to other City-adopted plans and ordinances, the Plan is under the policy umbrella of the General Plan and must be maintained consistent with the General Plan. This structure allows the City to update the Climate Action Plan on an ongoing, as-needed basis without amending the General Plan. This approach ensures that Sacramento's climate action efforts can be more easily adjusted over time to effectively administer programs and policies and to reflect new legislation and emerging best practices.

Sustainability Master Plan

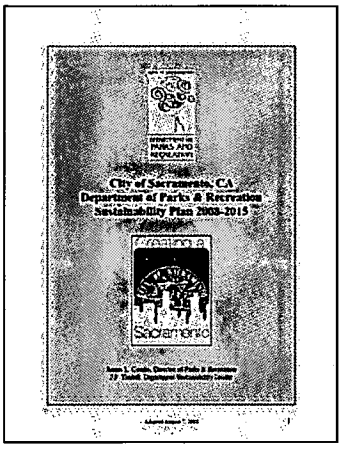


In December 2007 the City adopted the Sustainability Master Plan. The Sustainability Master Plan is a tool to guide future operational and policy decisions to create a more sustainable Sacramento. This Master Plan provides the policy framework to ensure that sustainability concerns are incorporated into the City's decision-making processes. It sets forth goals and long-term targets to guide the City and community toward reducing GHG emissions and promoting a greener path for doing business and for living. The Master Plan included the City goal of creating a Climate Action Plan as a tool to comply with the Global Warming Solutions Act (AB 32, 2006).



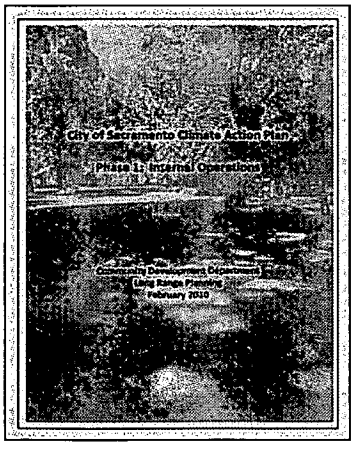
Sustainability Implementation Plans

Every year since adopting the Sustainability Master Plan, the City has annually prepared and adopted Sustainability Implementation Plans. These Implementation Plans are the City's action plan for the next 12 months to move toward long-term sustainability targets. These Plans include previous year successes, short- and long-term actions for the next year's actions, and 2030 goals. The Implementation Plans organize these actions according to the nine focus areas, identified in the original Sustainability Master Plan, which include: Energy Independence; Climate Protection; Air Quality; Material Resources; Public Health and Nutrition; Urban Design, Land Use, Green Building, and Transportation; Parks, Open Space, and Habitat Conservation; Water Resources and Flood Protection; and Public Involvement and Personal Responsibility. Because many of the Climate Action Plan strategies, measures, and actions address core sustainability issues, it is expected that the annual Sustainability Implementation Plan will be used to track and monitor progress in implementing the Climate Action Plan.



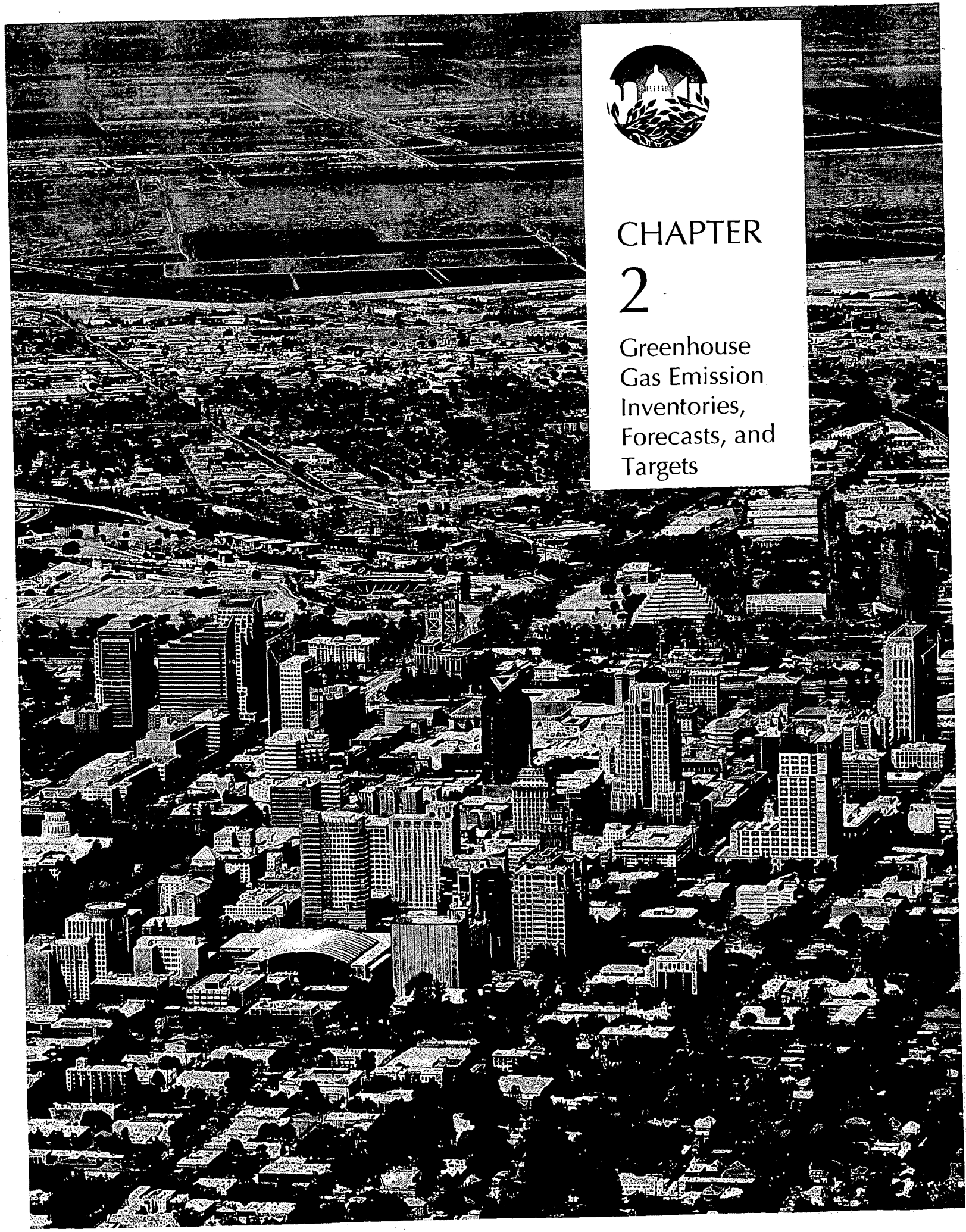
The Department of Parks and Recreation Sustainability Plan

In 2008 the City adopted the Department of Parks and Recreation (DPR) Sustainability Plan to guide the Department's efforts to implement the 2007 Sustainability Master Plan, City Parks & Recreation Master Plan 2005-2010, 2030 General Plan, and issues identified during the 2008 Parks & Recreation Master Plan Update. The DPR Sustainability Plan focuses on policies and actions to protect natural resources, open space, water corridors, and parkways, and to operate and maintain these resources in a more sustainable manner. The DPR Sustainability Plan functions as a supplement to the Parks & Recreation Master Plan, providing added focus on sustainability of the Department of Parks and Recreation programs.



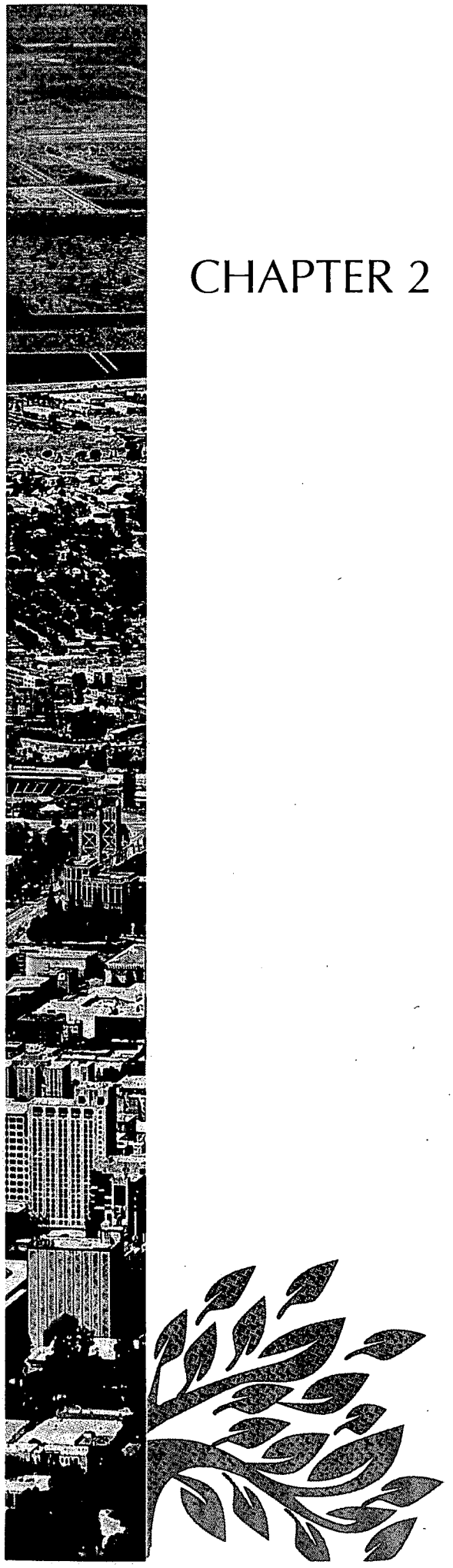
Climate Action Plan, Phase 1: Internal Operations

Phase 1 of the City of Sacramento's Climate Action Plan examines the City's internal government operations and identifies strategies to reduce GHG emissions in a cost-effective manner in the City's municipal buildings, vehicle fleet, streetlights and signals, parks maintenance, water and drainage pumping, and other facilities and operations that are within the City's immediate control. This Climate Action Plan (Phase 2) focuses on reducing communitywide GHG emissions within the City limits, as well as strategies to adapt to the effects of climate change.



CHAPTER 2

Greenhouse Gas Emission Inventories, Forecasts, and Targets



CHAPTER 2

GHG EMISSION INVENTORIES, FORECASTS, AND TARGETS

2.1 INTRODUCTION

This chapter summarizes our community's contribution to global warming by offering a rigorous accounting of greenhouse gas (GHG) emissions within Sacramento. It includes a discussion of the sources of GHG emissions for 2005 (i.e., inventory); describes likely trends if emissions are not reduced for 2020, 2030, and 2050 (i.e., forecasts); and sets a path forward to reduce our emissions for 2020, 2030, and 2050 (i.e., near term target and interim future goals). Emissions from communitywide activities are discussed first (Sections 2.2 through 2.4), followed by emissions from the City's internal municipal operations (Section 2.5).

Why Prepare a Greenhouse Gas Emissions Inventory?

As described in the Introduction, recent increases in global temperatures are highly correlated with elevated GHG emissions resulting from human activities. One of the main objectives of a climate action plan is to identify and reduce contributions to GHG emissions. The GHG emissions inventory can be thought of as a point-in-time estimate of emissions for a given year. This point-in-time estimate provides a baseline to begin the process of figuring out what we need to do to help stabilize global warming trends in the near term, and set a course to reverse them in the long term.

According to the scientific community, in order to avoid "dangerous climate change" in the Earth's climate system, we will need to stabilize GHG emissions so that global temperatures do not increase more than 3.6° F above pre-industrial levels. In order to achieve this, carbon dioxide (CO_2) emissions must be stabilized globally between 350 and 300 parts per million (ppm). This chapter is intended to serve as a foundation for the strategies, measures, and actions that will implement Sacramento's commitment to reducing GHG emissions.

Measuring GHG emissions is a critical first step in developing the Plan for several reasons. First, the GHG inventory identifies major sources and quantities of GHG emissions associated with the activities and choices made by residents, businesses, and public institutions. Second, the inventory provides the baseline that is used to forecast emissions trends and to develop an accurate near-term reduction target and interim goals consistent with State objectives. Finally, the inventory sets the baseline for the City to develop, evaluate, and implement strategies, measures, and actions to achieve its near-term target and interim goals.

The GHG emissions inventory also plays a role in ensuring that we stay on course to meet the City's GHG reduction near-term target and interim goals. After the Plan is adopted, the City will prepare regular GHG emissions inventories that will be compared to the baseline inventory and be used to track our progress in reducing emissions as we move forward with implementation.

GHG Emissions Inventory versus Carbon Footprint

Two common terms used when discussing climate change are "carbon footprint" and "GHG emission inventories." While related, these concepts are not synonymous.

A GHG emissions inventory is an estimate of a defined set of gases (e.g., CO_2, methane [CH_4], nitrous oxide [N_2O]) that contribute to climate change. This Plan's emissions inventory is limited to gases that are generated due to activities within Sacramento from a defined set of sources (e.g., transportation, electricity use, waste). These include gases that can be readily monitored and reduced by City actions and efforts that support the efforts of residents and businesses. However, this means that the GHG emissions inventory is limited and does not comprehensively address everyone's contribution to GHG emissions on a global scale (e.g., purchasing imported goods or traveling outside Sacramento).

Unlike a GHG emissions inventory, a carbon footprint is not limited to a defined geography or to a set of activities and sources that the City can influence. A carbon footprint includes all of the GHG emissions that result from each of our daily choices or the activities of a business or organization, such as the energy required to grow and ship our food; the energy we use to travel (e.g., car, bus, train, plane); or the embodied energy to make, market, and dispose of the products we use. As a result, not all of the GHG emissions we generate (i.e., our carbon footprint) are included in the City's GHG emissions inventory.

The Sacramento 2030 General Plan outlines a number of strategies for living lightly and reducing our carbon footprint both within Sacramento and beyond. As an implementing tool of the 2030 General Plan, this Climate Action Plan includes strategies, measures, and actions that will further the City's objectives to reduce GHG emissions, and in turn help residents, businesses, and organizations reduce their carbon footprint.

It should be noted that residents, businesses, and organizations make choices on a daily basis that produce GHG emissions that may be beyond the influence of the City and this Plan. This does not mean that we should limit our efforts to only those actions which affect the inventoried emissions. Rather, it means that we can make climate-friendly choices, such as buying locally grown foods and manufactured products that reduce electricity and energy use, that will reduce our carbon footprint and help reverse global warming trends on a global scale.

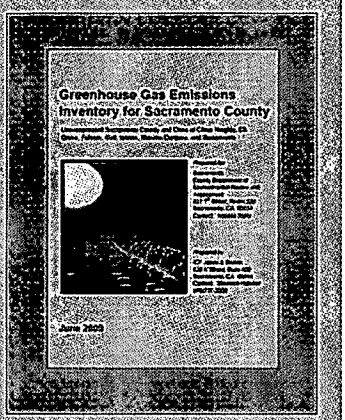
MEASURING OUR CARBON FOOTPRINT

The average American household produces approximately 20 metric tons of CO_2 every year, which is five times as much as the global per-capita average.

You can measure your carbon footprint using the online calculator found here:

www.carbonfootprint.com/calculator.aspx

Details on the methodology for the City of Sacramento GHG inventory can be found in the June 2009 Greenhouse Gas Emissions Inventory for Sacramento County report.



http://www.dera.saccounty.net/Portals/0/docs/Final_SACCTY_GHG_June09_stacked_small.pdf

2.2 CITY OF SACRAMENTO GHG EMISSIONS INVENTORY

The first step in addressing our contribution to global warming is to understand the sources and amounts of GHG emissions we generate from activities within Sacramento. In 2008 and 2009 both the County and the City, in partnership with the six other incorporated cities located in the county, completed an integrated countywide GHG emissions inventory for the baseline year of 2005, as well as a specific inventory for each individual jurisdiction within the county. For each jurisdiction a specific breakdown of GHG emissions by sector was provided for communitywide activities, along with emissions from internal municipal operations as a subset of each communitywide profile.

The countywide inventory of communitywide GHG emissions was broken down into the following 11 sectors:

- On-road transportation emissions associated with gasoline consumption from driving that occurred on roadways.
- Off-road transportation emissions associated with gasoline consumption from the operation of off-road equipment such as boats, industrial and construction equipment, lawn and garden equipment, and rail operations.
- Residential emissions associated with electricity and natural gas consumption and other alternative means of heating (e.g., fireplaces).
- Commercial and industrial emissions associated with the consumption of electricity and natural gas to power and heat commercial buildings and industrial processes.
- Industrial specific emissions associated with fuels used to power large industrial processes, such as boilers, incinerators, and internal combustion engines.
- Waste emissions associated with waste already located within landfills and garbage produced during 2005.
- Wastewater treatment emissions associated with the energy consumed and emissions produced to process domestic sewage and industrial wastewater.
- Water-related emissions associated with energy and fuel used to treat and deliver water for domestic, irrigation, and industrial purposes.
- Agricultural emissions associated with cattle, swine, and dairy cows, and the application of fertilizer.
- High global warming potential (GWP) GHGs produced by refrigerants and transmission lines.
- Sacramento International Airport emissions associated with aircraft, ground support equipment, and parking facilities.

While unincorporated areas were by far the largest contributor to the region's GHG emissions – accounting for almost half – Sacramento accounted for nearly one-third of GHG emissions produced in the county. Further details on the methodology for the inventory can be found in the June 2009 "Greenhouse Gas Emissions Inventory for Sacramento County" report.

While the GHG inventory included the 11 sectors described on the previous page, the City cannot influence reductions for all sectors studied. There are four sectors in the GHG emissions inventory over which the City has very limited control: off-road equipment, agricultural emissions, high GWP GHG emissions, and the Sacramento International Airport.

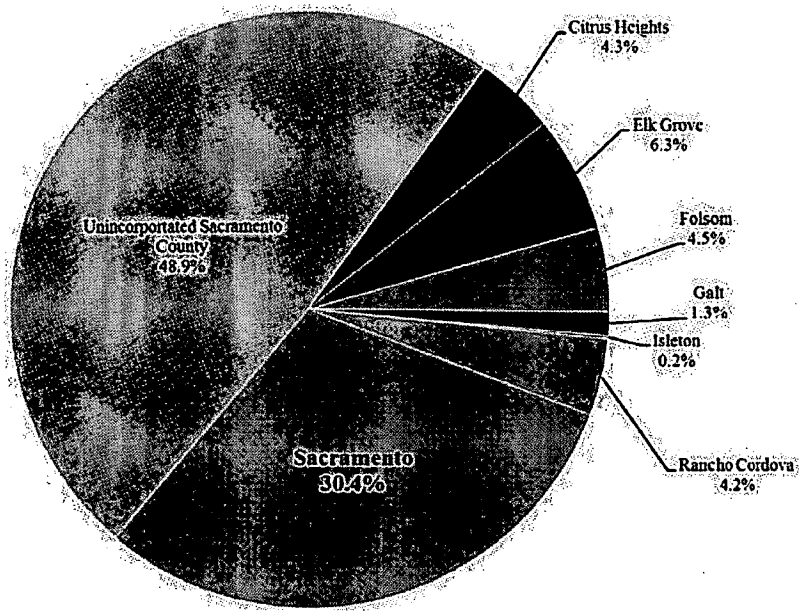
The City retains discretionary authority over most land use decisions within its incorporated limits that are known to influence vehicle miles traveled (VMT). It also has the ability to implement energy efficiency standards by ordinance for buildings constructed in Sacramento. However, the City has no jurisdiction over fuel economy standards, which are determined by the Federal government. Similarly, the City does not have authority over tail-pipe emissions from off-road vehicles and California Air Resources Board (ARB) programs address GWP GHGs. The City also does not control the composition of Sacramento Metropolitan Utilities District's (SMUD) energy portfolio, which is regulated at the State level, nor does the City have control over the operations of the Sacramento International Airport. Finally, there is very little agricultural land within City limits and agriculture-related emissions within Sacramento would actually be expected to decrease as development replaces agricultural lands.

For these reasons, these four sectors were separated from the inventory described on the proceeding pages and not included in the analysis to develop GHG emissions forecasts or during the development of the GHG emissions reduction near-term target and interim goals.

A DYNAMIC INVENTORY

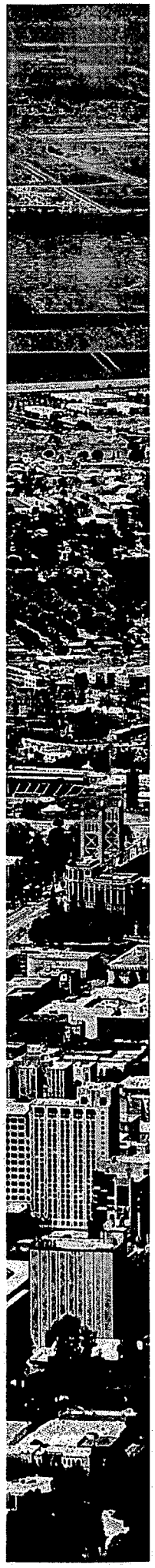
While based on extensive research and analysis, the City's GHG inventory represents a snapshot in time, using the best information available today. As technologies and markets change, and as the City implements the measures and actions included in the Plan, new inventories will be prepared to track progress. As a result, the GHG inventory will be updated regularly (e.g., every three years) with new data and assumptions.

SACRAMENTO COUNTY 2005 GHG EMISSIONS*



Source: ICF Jones & Stokes. 2009. GHG Emissions Inventory for Incorporated and Unincorporated Sacramento County. June 2009. (ICF J&S 00310.08.) Sacramento, CA. Prepared for: Sacramento County Department of Environmental Review and Assessment. Data compiled by Fehr & Peers and Ascent in 2011.

* The Sacramento County 2005 GHG Inventory in Appendix D shows Sacramento's emissions accounting for 32.8 percent of the countywide emissions inventory. The original County inventory was subsequently revised to reflect changes to jurisdictional VMT estimates prepared by Fehr & Peers and analysis by ICF Jones and Stokes. The updated share of GHG emissions shown for the city of Sacramento in the figure to the left is 30.4 percent.



Communitywide versus Municipal Operations Emissions?

Communitywide emissions include emissions resulting from the activities of residents that live in the city and businesses and organizations that operate within the city. Communitywide emissions are created when we use gasoline to drive our cars, use electricity in our homes and businesses, and create garbage. Municipal operations emissions come from the operation of City facilities and services. Municipal operations emissions are created when City employees use gasoline to drive police cars, fire trucks, or other municipal fleet vehicles, use electricity-run public facilities and buildings, and create garbage in City buildings.

City of Sacramento's 2005 GHG Emissions

An important aspect of GHGs is the unit of measurement used to inventory and estimate emissions. CO_2 is the largest contributor to global warming and the most recognized GHG; however, there are five other primary GHGs that must be addressed to meet State-mandated reduction targets, including: CH_4, N_2O, sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). To simplify discussion of these emissions collectively, climate action plans use a measurement known as a carbon dioxide equivalent (CO_2e).

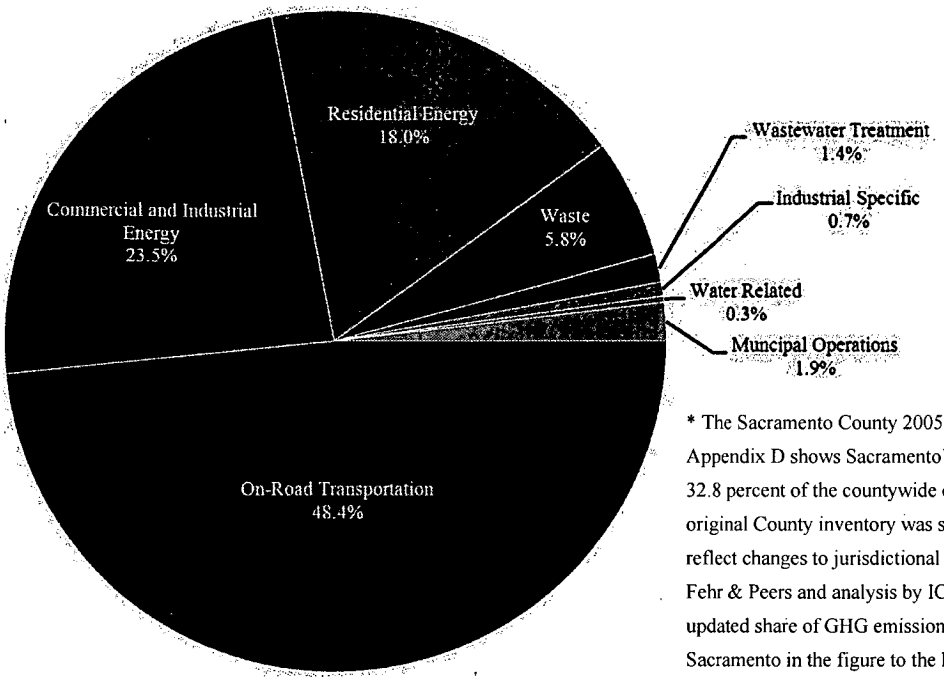
CO_2e measurement translates each GHG emissions gas to CO_2 by weighting it by its relative global warming potential. For example, CH_4 is 21 times more potent than CO_2 in its ability to trap heat in the atmosphere. Converting these gases into "carbon dioxide equivalents (CO_2e)" allows us to consider all the gases in comparable terms and makes it easier to communicate how various sources and types of GHG emissions contribute to global warming. A metric ton of CO_2e ($MTCO_2e$) is the standard measurement of the amount of GHG emissions produced and released into the atmosphere.

The City's 2005 communitywide activities accounted for 98 percent (4.08 million metric tons of CO_2e/year [$MMTCO_2e$]) of GHG emissions, while the City's 2005 municipal operations accounted for the remaining 2 percent (78,500 $MTCO_2e$/year) for a total of 4.08 $MMTCO_2e$. Gasoline and diesel consumption by vehicles driven in Sacramento (i.e., on-road transportation sector) is the single largest source of GHG emissions, accounting for just over 48 percent of the city's total emissions. Electricity and natural gas used to operate, heat, and cool commercial and industrial (including industrial specific) buildings and residential dwellings account for another 24 percent and 18 percent of emissions, respectively.

The total 4.08 $MMTCO_2e$ GHGs emitted in Sacramento in 2005 equaled about 9.09 $MTCO_2e$ for each of Sacramento's 457,837 residents or 23.30 $MTCO_2e$ for each of Sacramento's 178,699 household. To put this in more understandable terms, one $MTCO_2e$ is produced from using about 112 gallons of gasoline. The City's 4.08 $MMTCO_2e$ is equal to using over 498 million gallons of gasoline. Assuming an average car gets about 25 miles to the gallon, that would be like driving over 18.4 million miles, or driving around the earth 740 times.

A detailed technical analysis of the City's 2005 emissions inventory can be found in Appendix D, GHG Emissions Inventory for Sacramento County, June 2009.

CITY OF SACRAMENTO 2005 GHG EMISSIONS*



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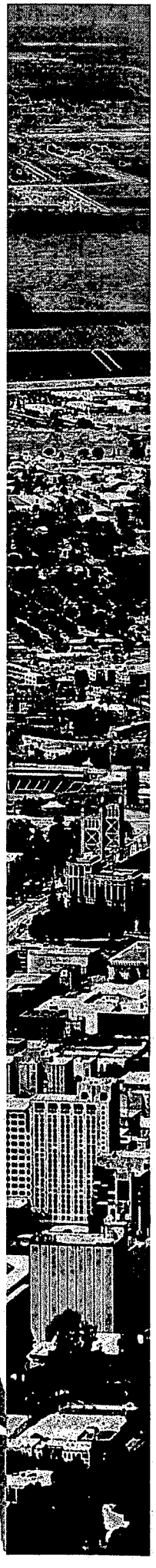
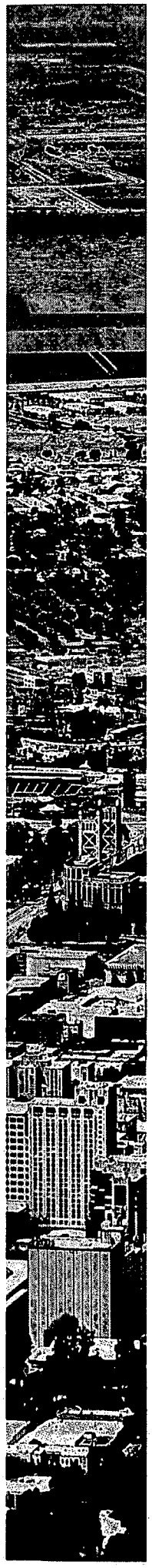
1) See Section 2.5 for a detailed breakdown of the City's emissions from municipal operations.
Source: ICF Jones & Stokes. 2009. GHG Emissions Inventory for Incorporated and Unincorporated Sacramento County. June 2009. (ICF J&S 00310.08.) Sacramento, CA. Prepared for: Sacramento County Department of Environmental Review and Assessment.

EMISSIONS SECTOR	$MTCO_2e$	PERCENT
On-Road Transportation	2,013,962	48.4%
Commercial and Industrial Energy	979,777	23.5%
Residential Energy	748,792	18.0%
Waste	241,862	5.8%
Wastewater Treatment	57,380	1.4%
Industrial Specific	28,656	0.7%
Water Related	12,810	0.3%
Municipal Operations	78,584	1.9%
Total Emissions	4,161,823	100%

The greenhouse gases included in the Sacramento 2005 GHG emissions inventory are equal to the emissions of a car driving around the earth 412,000 times!





2.3 GHG EMISSIONS FORECASTS

GHG forecasts estimate future emission levels based on a continuation of current trends or a "business-as-usual" scenario. Forecasts provide insights into the scale of reductions needed to change our behaviors and perspective on what it will take to achieve the GHG emissions near-term target and interim goals.

A "business-as-usual" forecast assumes no efforts would be made to reduce GHG emissions in the future. It assumes that historical and current energy consumption, transportation, solid waste, and water consumption trends will continue. Finally, it does not account for GHG emissions reductions associated with implementation of the Plan, advances in technology, or emission reductions programs initiated by the State or Federal government.

Details on how the forecasts were developed and the indicators used to estimate each sector can be found in the GHG Emissions Inventory for Sacramento County (2009), except for transportation, which was prepared by Fehr & Peers and Ascent Environmental as part of this Climate Action Plan (see Appendix D).

GROWING THE CITY SUSTAINABLY

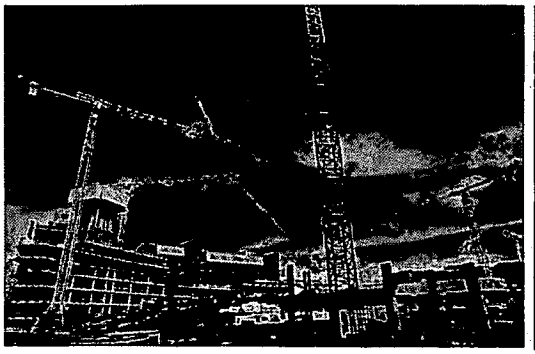
The business-as-usual GHG emissions forecasts in the Climate Action Plan assume a continued increase in population, housing units, and employment. Projections in the Plan are based on the City of Sacramento 2030 General Plan, which forecasts that by 2030:

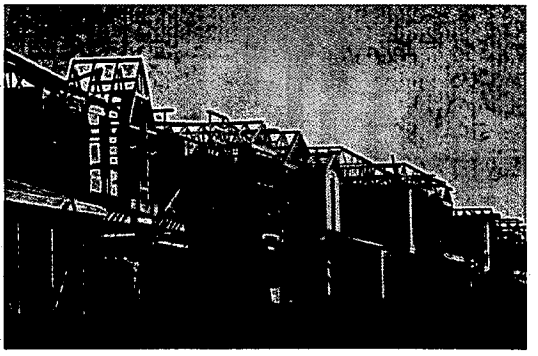
- Population will grow by 182,924
- Housing units will grow by 97,492
- Employment (jobs) will grow by 134,267

Demographic Trends

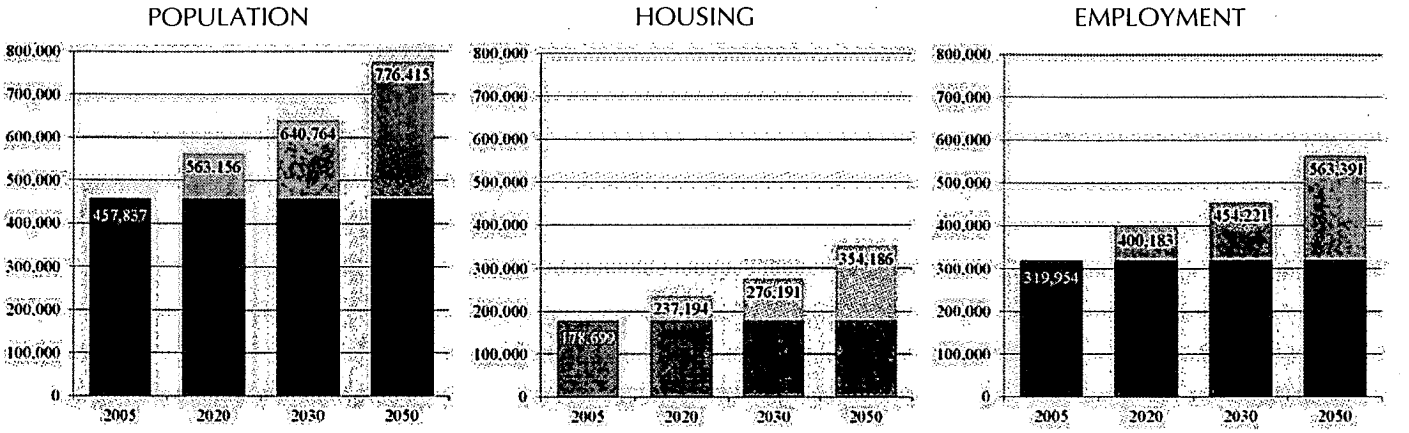
GHG emission forecasts were estimated for 2020, 2030, and 2050 using city-specific demographic projections based on assumed buildout of the City's 2030 General Plan. Projected growth from the GHG Emissions Inventory for Sacramento County (2009) show that Sacramento's population is expected to increase by about 23 percent by 2020, 40 percent by 2030, and nearly 70 percent by 2050. Growth in employment is expected at a rate slightly higher than population; however, the overall ratio of jobs per population is not expected to change dramatically from 2005 conditions.

A much greater percentage increase is expected for housing, which will be needed to accommodate additional population growth. From 2005 to 2020 a 32.7 percent increase in housing is expected to occur, and by 2030 housing is expected to increase by 54.6 percent. By 2050 it is expected that Sacramento's housing will nearly double to over 354,000 units. It is also expected that there will be fewer people per housing unit in the future. Compared to 2005, when it is estimated that



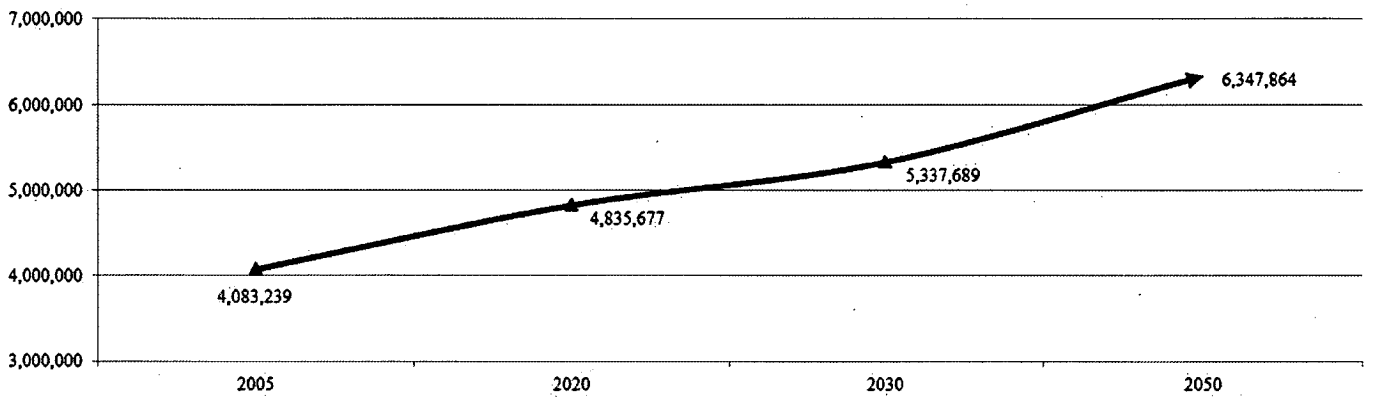


DEMOGRAPHIC PROJECTIONS



Source: ICF International 2011; data compiled by Fehr & Peers and Ascent in 2011.

BUSINESS-AS-USUAL GHG EMISSION FORECASTS

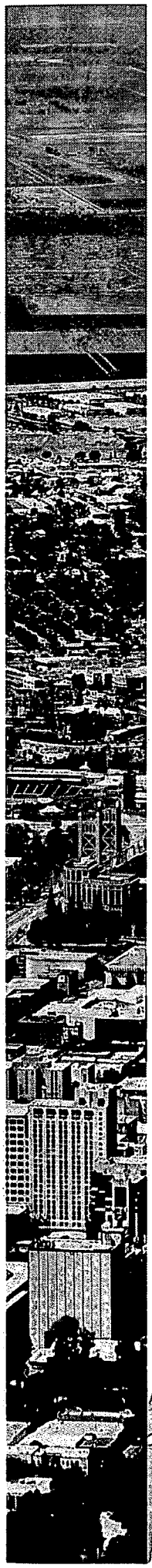


Source: ICF International 2011; data compiled by Fehr & Peers and Ascent in 2011.

there were about 2.56 people per housing unit, by 2020 that ratio is expected to drop to about 2.37 and hold steady through 2030 at about 2.32 persons per housing unit. However, by 2050 it is expected that this ratio will drop again to just 2.19 people per housing unit. This is important because fewer people per housing unit tend to consume more energy per capita compared to higher rates.

Business-as-Usual GHG Forecasts

Without the measures and actions included in this Plan (see Chapter 4) and other Federal and State programs, it is estimated that our GHG emissions would rise to over 4.84 $MMTCO_2e$/year by 2020, an increase of 18.4 percent. By 2030 emissions would increase by 30.7 percent over 2005 levels and to 55.5 by 2050. Under the business-as-usual forecasts, energy use (residential, commercial, industrial) would be responsible for the greatest increase in GHG emissions, with residential energy emissions nearly doubling by 2050. While gasoline and diesel consumption by vehicles driven in Sacramento were the single greatest source of emissions in 2005, the combined energy use of residential dwellings and commercial and industrial buildings and processes would surpass it by 2020, and significantly exceed it by 2030 and 2050.



Near-term Target and Long-term Goals

This Climate Action Plan identifies the following GHG emissions reduction near-term target and long-term goals for communitywide emissions:

- Target of 15 percent below 2005 levels by 2020;
- Goal of 38 percent below 2005 levels by 2030; and
- Goal of 83 percent below 2005 levels by 2050.

2.4: GHG EMISSIONS NEAR-TERM TARGET AND INTERIM GOALS

This Plan primarily focuses on reducing emissions by 2020, consistent with State mandates (i.e., California Global Warming Solutions Act [AB 32] 2006). While setting goals beyond 2020 is important to provide long-term objectives, it is difficult to establish targets beyond a 10–15 year time frame for which defensible reduction assumptions can be made. This is primarily due to uncertainty around future technological advances, demographic changes, and Federal and State laws.

According to ARB's *Climate Change Scoping Plan* (December 2008), 15 percent below 2005 emission levels would be comparable to 1990 statewide emission levels. It is estimated that in 1990 atmospheric concentrations of CO_2 were about 353 ppm, which is why we use 1990 emissions levels as the target to help stabilize climate change trends. The *Scoping Plan* recommends that local governments use this 15 percent reduction as a guide in their local target setting processes. It should be noted that this 15 percent reduction would be the minimum required to comply with statewide GHG emissions reduction efforts (e.g., AB 32) and current guidance offered by ARB.

In order to support the intent of Executive Order S-3-05 and set the City on a path toward continued GHG emission reductions beyond 2020, a 2030 reduction goal, consistent with the time frame of the 2030 General Plan, and a 2050 GHG reduction goal, consistent with Executive Order S-3-05, are identified. While the City is not under any obligation to achieve the 2030 or 2050 goals, it will use this Plan's strategies, measures, and actions to set the city on a path for further GHG reductions beyond 2020. It is expected that as this Plan is implemented and refined, additional strategies, measures, and actions will be identified and adopted to achieve these long-term goals.

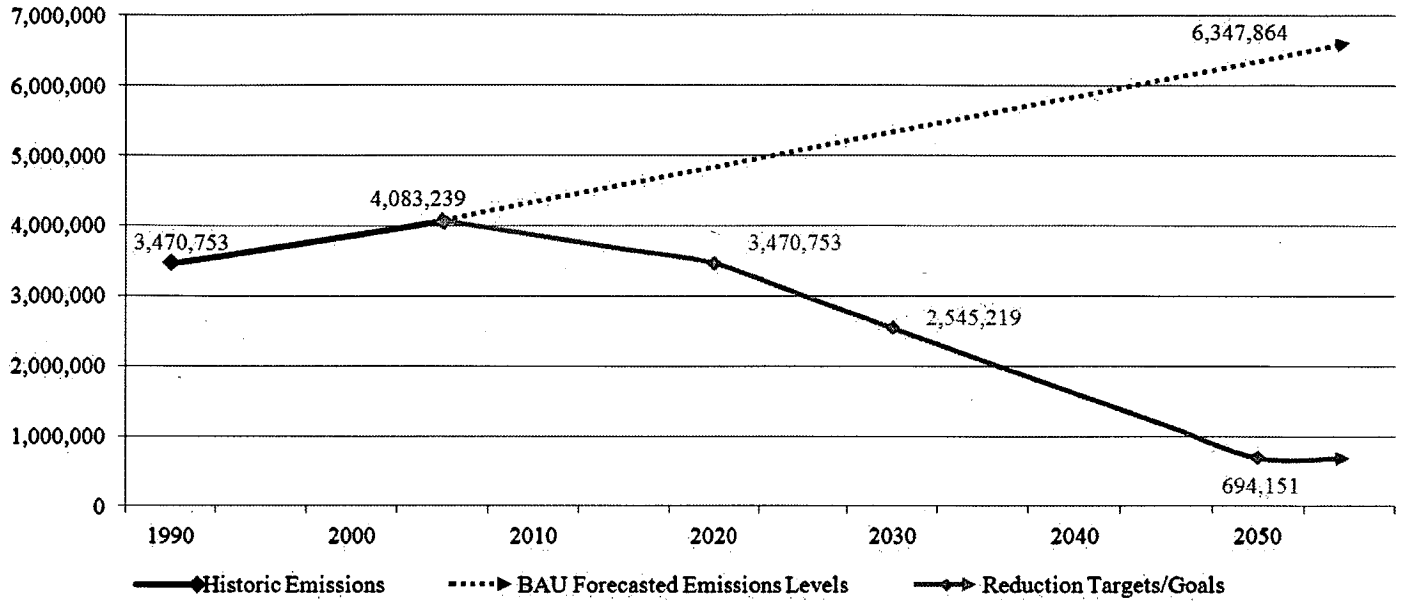
The City's communitywide GHG emissions reduction target and goals are based only on emissions for which the City can directly influence reductions. Attaining a 15 percent reduction in GHG emissions will require that we reduce our annual emissions to approximately 3.47 MMT CO_2e/year in 2020, which is about 612,500 $MTCO_2e$/year lower than 2005 levels. This represents a reduction of about 28 percent from forecasted "business-as-usual" 2020 levels.

In setting its 2030 and 2050 goals, the City assumed that 15 percent below 2005 levels is equivalent to 1990 emission levels in order to apply the 80 percent below 1990 emission goal established by Executive Order S-3-05. For 2030 the City estimated an interim point along the path to achieve the 2050 goal of 80 percent below 1990 levels.

In order to achieve long-term GHG reductions, the City will need to reduce its emissions to 2.55 $MMTCO_2e$/year by 2030, or about 1.59 $MMTCO_2e$ (38 percent) below 2005 GHG emissions levels. To achieve an 80 percent reduction in GHG emissions from 1990 levels by 2050, the City will need to reduce its emissions to about 694,200 MT CO_2e per year in 2050, which is about 3.39 $MMTCO_2e$ (83 percent) lower than 2005 levels. A detailed technical analysis of the City's emissions reduction target and goals can be found in Appendix E.

NEAR-TERM GHG TARGET AND LONG-TERM GOALS

($MTCO_2e$/YEAR)



YEAR	EXISTING (2005)/ BAU FORECASTED	REDUCTION TARGET/GOALS	PERCENT BELOW EXISTING (2005)	PERCENT BELOW 2020 BAU FORECASTED
2005	4,083,239	—	—	—
2020	4,835,677	3,470,753	15%	28%
2030	5,337,689	2,545,219	38%	52%
2050	6,347,864	694,151	83%	89%

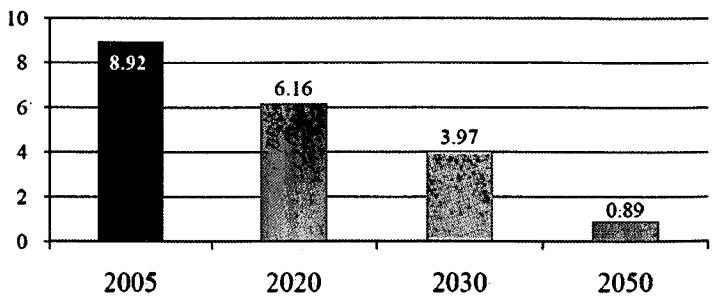
1) 1990 GHG emissions levels assumed based on 2020 target.
Source: Ascent Environmental, 2011

It will be a challenge for the city's existing residents and businesses to achieve the City's GHG emission reduction objectives; however, this near-term target and interim goals must also be achieved with the addition of new residents living in the city and additional people working in the city. As described in Section 2.3, an additional 116,400 people, 58,500 housing units, and 80,200 employees are forecasted to be in the city by 2020.

On a per capita basis (including new residents), we will need to reduce our emissions to about 6.2 MTCO2e per person by 2020. This represents a reduction of 31 percent (2.8 MTCO2e/year) from current (2005) per capita emissions levels (8.9 MTCO2e/year) and is equivalent to a person driving 7,000 fewer miles/year or planting 60 trees. [12] By 2030 we will need to reduce our per capita emissions by another 30 percent or by over 55 percent (4.0 $MTCO_2e$/year) from 2005 levels.

PER CAPITA GHG EMISSIONS GOALS

($MTCO_2e$/PERSON/YEAR)



ESTIMATED EFFECTS OF FEDERAL AND STATE PROGRAMS ON SACRAMENTO GHG EMISSION FORECASTS

SCOPING PLAN MEASURE	AFFECTED EMISSIONS SECTOR	SCOPING PLAN-ESTIMATED EMISSION REDUCTION (2020)	PROJECTED STATEWIDE 2020 EMISSIONS OF SECTOR ($MMTCO_2E$)	PERCENT EMISSION REDUCTION (STATEWIDE)	PERCENT EMISSION REDUCTION (LOCAL)	INVENTORY SUBSECTOR	PERCENT EMISSION REDUCTION FROM 2020 PROJECTED EMISSIONS
Federal Fuel Economy Standards; AB 1493 (Pavley Advanced Clean Cars 2002)	Transportation	30.1	210.0	14.3%	-	80.3% (light-duty vehicles)	5.2%
Energy Efficiency Measures; California Green Building Code	Energy	11.9	167.7	7.1%	-	-	3.3%
Renewable Electricity Standard; Renewable Portfolio Standard	Energy	23.4	167.7	14%	21%	51.6% (electricity)	5.1%
Total							13.6%

Note: Energy Efficiency Measures and Green Building Code assumes that development would implement the basic Green Building Code Standards (CalGreen); CO2e = carbon dioxide equivalent; MMT= million metric tons.
Source: ARB 2010; SACOG 2010; SMUD 2008. Data compiled by Ascent in 2011

Reductions from Federal and State Regulations

It would be unreasonable to expect that the City could achieve the aggressive emission reduction target presented without the aid of statewide programs, changes in technology, and/or funding assistance. Identification of potentially feasible, post-2020 actions will require subsequent analysis, City planning decisions, and coordination with State programs. There are several Federal and State programs that can be applied to the transportation and energy sectors that will help meet the city's overall emissions reduction near-term target and long-term goals. These include Federal regulations addressing GHG emissions from passenger cars and trucks (e.g., Corporate Average Fuel Economy [CAFE]) standards revised in the 2007 House Energy Bill) and State regulations to increase the amount of electricity generated from renewable sources (e.g., California Renewable Energy Portfolio Standard Program).

The California Climate Change Scoping Plan contains the strategies the State of California will implement to achieve reduction of approximately 118 $MMTCO_2e$, or approximately 22 percent from California's projected 2020 emission level of 545 $MMTCO_2e$ under a business-as-usual scenario (this is a reduction of 47 $MMTCO_2e$, or almost 10 percent, from 2008 emissions). The following GHG emission reductions anticipated at the State level were also anticipated to affect emission factors used to develop the City of Sacramento's emissions inventory projections:

- improved emissions standards for light-duty vehicles (estimated reduction of 26.1 $MMTCO_2e$)
- energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems (11.9 $MMTCO_2e$)
- a renewable portfolio standard for electricity production (23.4 $MMTCO_2e$)

If all programs are implemented as described in the Scoping Plan, the City's 2020 emissions would be reduced by a maximum of 13.6 percent by 2020 (659,415 $MTCO_2e$/year).

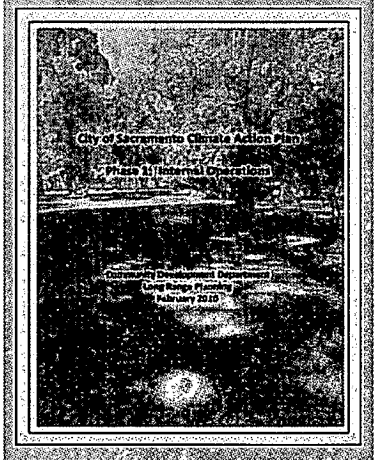
2.5 MUNICIPAL OPERATIONS GHG EMISSIONS, FORECASTS, AND NEAR-TERM TARGET AND INTERIM GOALS

In February 2010 the City Council approved Phase 1 of the Climate Action Plan, which summarized the City's municipal buildings, vehicle fleet, streetlights and signals, parks maintenance, water and drainage pumping, and other facilities and operations; forecast future municipal emissions; and set near-term target and interim goals for municipal GHG emission reductions. The following section is a summary of the Phase 1 effort. Details on the City's Phase 1 emissions inventory, forecasts, and near-term target and interim goals can be found in the *City of Sacramento Climate Action Plan Phase 1: Internal Operations* (February 2010). A copy of the complete Phase 1 report can be found in Appendix B.

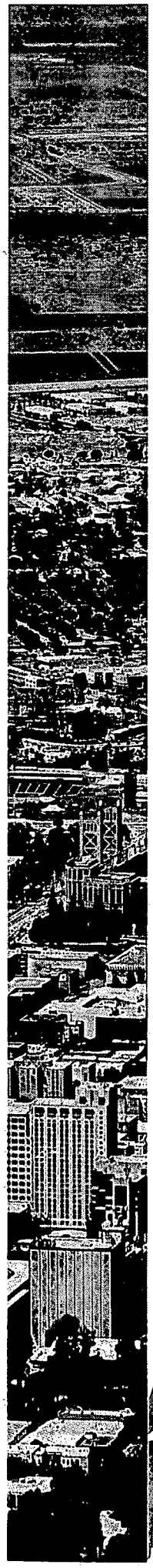
As described in Section 2.1 of this Chapter, the City's municipal operations are a subset of the city's overall communitywide contribution to GHG emissions. Municipal operations GHGs include emissions resulting from activities carried out by the City to provide public services, such as energy used to operate City buildings and facilities and gasoline used to run City vehicles. Because these emissions are specific to government operations, the sector categories differ from those described for communitywide emissions, and they are dealt with separately in this Climate Action Plan. The municipal operations GHG inventory is divided among the following four sectors:

- Building energy associated with electricity and natural gas to power and heat City buildings and facilities.
- Energy associated with electricity used by streetlights and traffic signals in public rights-of-way or adjacent to City facilities.
- Vehicle fleet fuel use associated with gasoline, diesel, liquefied natural gas (LNG), and other fuels used in City vehicles and other motorized equipment, such as police cars, fire trucks, garbage trucks, and parks maintenance vehicles.
- Landfill emissions associated with methane generated from waste disposed in prior years in the 28th Street City landfill at Sutter's Landing (closed in 1997).

Details on the City of Sacramento municipal operations GHG emissions inventory, forecasts, and targets can be found in the Climate Action Plan, Phase 1: Internal Operations report.



http://www.sacgp.org/documents/Phase-1-CAP_2-11-10.pdf



While economic recovery and growth remain uncertain, several projects have been approved in the city that are expected to trigger the need to increase services by 2020.

Municipal Operations GHG Emissions Inventory

The City's GHG emissions resulting from municipal operations in 2005 were about 78,500 $MTCO_2e$. City buildings represented the largest sector, at 45.5 percent (35,700 $MTCO_2e$). It is important to note that the "buildings" emissions category includes emissions from energy use in many types of facilities along with typical buildings. The largest user of electricity in City operations, for example, is pumping activities in the City's water, sewer, and drainage facilities. Vehicle fleet operations represent the second largest sector at 27.9 percent (21,900 $MTCO_2e$). Waste-in-Place emissions (primarily methane) from the former City landfill at Sutter's Landing amounts to approximately 17.8 percent (14,000 $MTCO_2e$) and streetlights and traffic signals represent the fourth largest sector at 8.7 percent (6,800 $MTCO_2e$).

2020/2030/2050 Greenhouse Gas Emissions Forecast

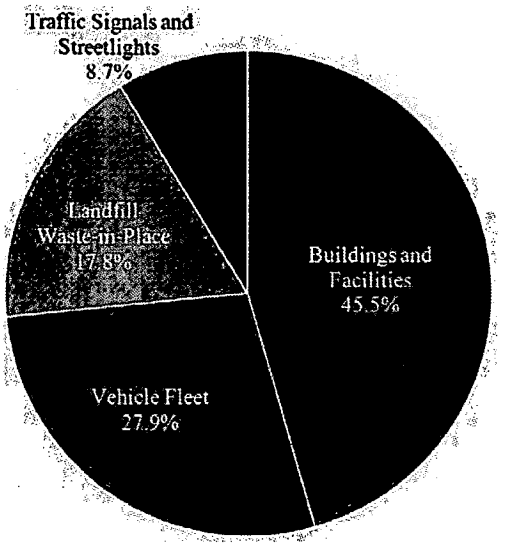
The City's internal municipal operations grew steadily up to and after 2005, commensurate with increases in population and the gradual increase in service demands within Sacramento. However, the recent economic recession slowed the rate of growth in the city and led to cuts in City staff and services due to severely reduced revenues. The City expects that similar reductions in City services and staffing levels could continue in the near term. Therefore, it is not expected that the City's internal operations will expand significantly in the near future.

While economic recovery and growth are expected to resume sometime in the future, it remains uncertain as to when the City's operations will match or exceed 2005 levels. However, projects have been approved in a number of significant infill and greenfield development areas in the city that are expected to trigger the need to increase services by 2020.

The "business-as-usual" forecast assumes no action and growth in GHG emissions from City operations in accordance with these growth rates. For the purposes of this Plan, it is assumed that any resumed growth in City operations would be close to an average of about 1 percent annually between 2005 and 2020, taking into account a period of significant expansion in City operations that occurred between 2005 and 2008, a period of reductions in staffing and services in 2009-2011, and conservative to modest growth between 2012 and 2020.

The City's "business-as-usual" forecast for 2020, 2030, and 2050, assuming limited growth in GHG emissions from City operations, demonstrate that emissions would increase from the 2005 baseline of 78,584 $MTCO_2e$ to about 90,000 $MTCO_2e$ by 2020, about 100,000 $MTCO_2e$ by 2030, and about 120,000 $MTCO_2e$ by 2050.

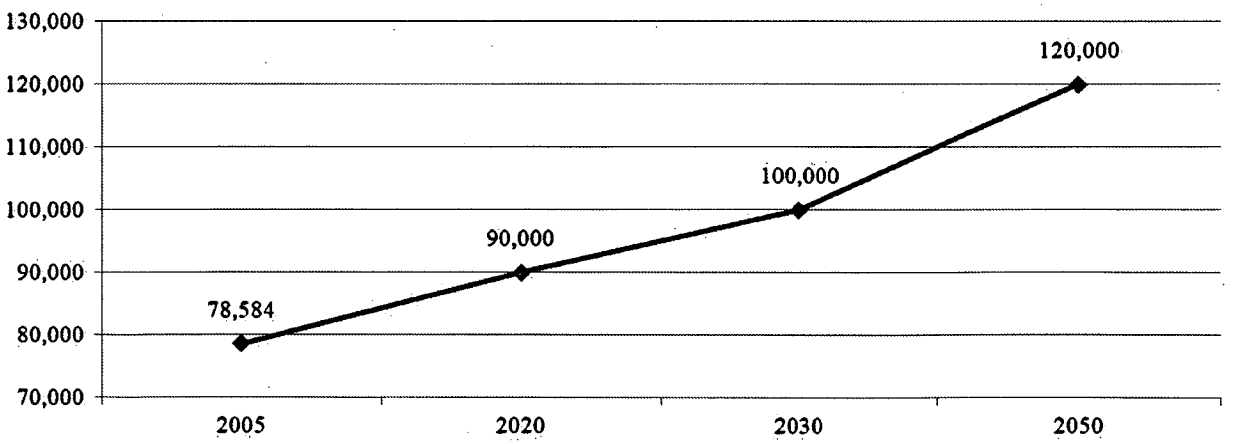
CITY OF SACRAMENTO MUNICIPAL OPERATIONS 2005 GHG INVENTORY



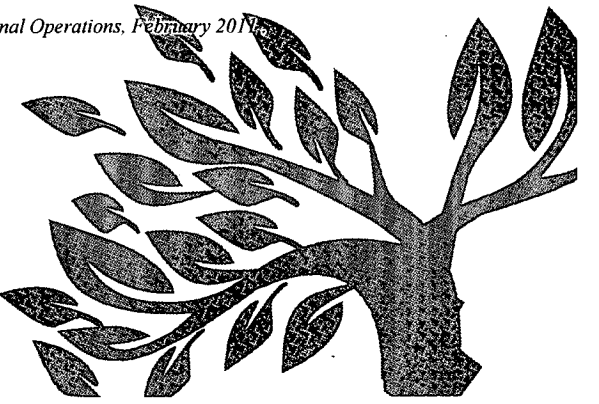
EMISSIONS SECTOR	$MTCO_2e$	PERCENT
Buildings and Facilities	35,773	45.5%
Vehicle Fleet	21,927	27.9%
Landfill Waste-in-Place	14,012	17.8%
Traffic Signals and Streetlights	6,872	8.7%
Total	78,584	100%

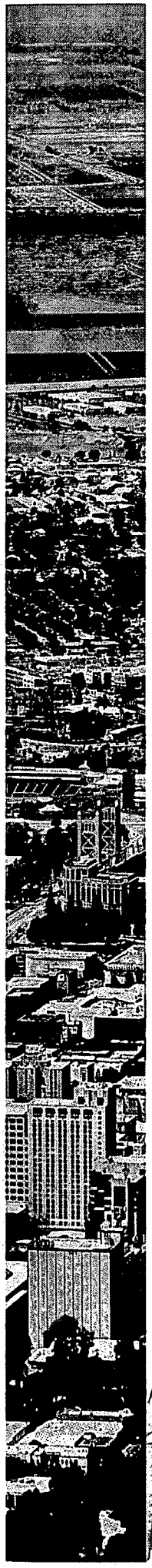
Source: City of Sacramento Community Development Department, Climate Action Plan, Phase 1: Internal Operations, February 2010

CITY OF SACRAMENTO MUNICIPAL OPERATIONS GHG EMISSIONS FORECASTS



Source: City of Sacramento Community Development Department, Climate Action Plan, Phase 1: Internal Operations, February 2010





What municipal operations GHG reduction Target and Goals Does the City have?

The municipal operations GHG reduction target for 2020 show that the City will need to reduce its annual emissions by about 26 percent from forecasted 2020 levels. In order to achieve long-term goals, the City would need to further reduce emissions by about 50 percent below forecasted 2030 levels and 83 percent below forecasted 2050 levels.

2020 Target/2030 and 2050 Goals

The Sustainability Master Plan (2007) set a specific 2020 reduction target of 54,000 MT CO_2e for municipal operations, which was based on a preliminary staff estimate of the City's operational GHG levels in 1990. However, the 1990 estimate was not based on a formal inventory using Local Government Operations Protocol and was included in the Sustainability Master Plan prior to the completion of the 2005 GHG emissions inventory.

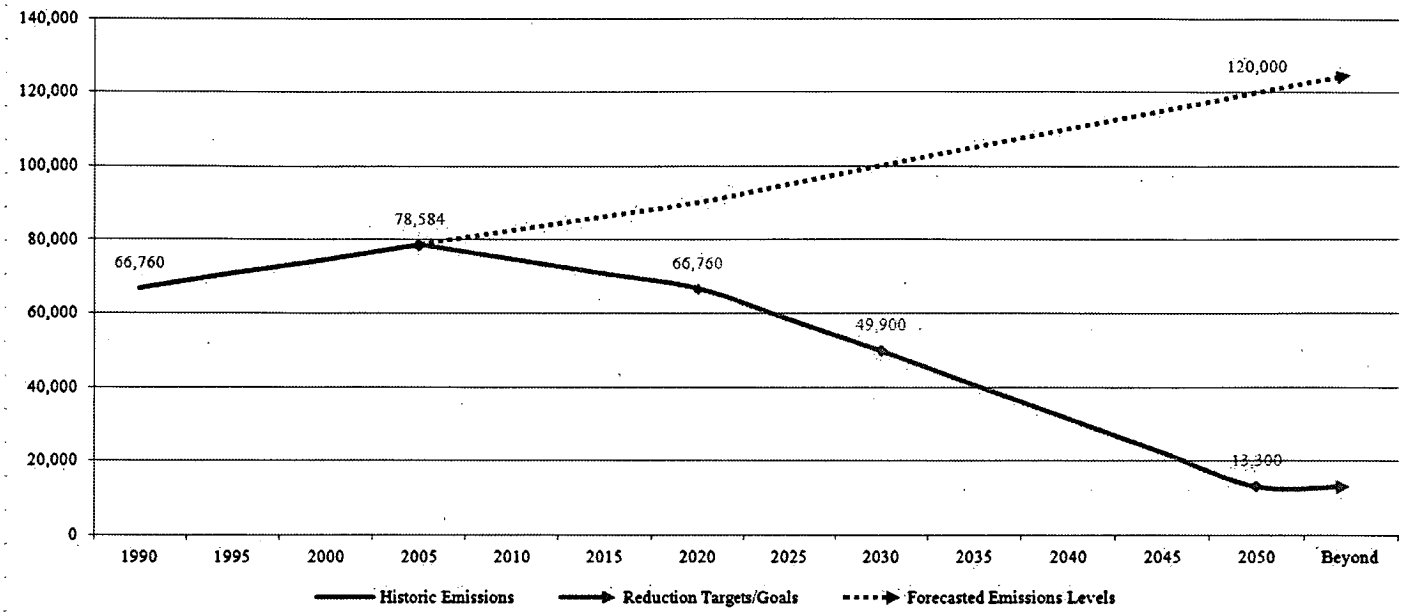
For the purposes of Phase 1 Climate Action Plan analysis, it was assumed that the preliminary Sustainability Master Plan target for internal operations would need to be updated per guidance issued by ARB in the AB 32 Scoping Plan, which set a minimum target of 15 percent below 2005 levels by 2020 for local government operations. The City's municipal operations GHG emissions reduction target for 2020 and goals for 2030 and 2050 show that the City will need to reduce its annual GHG emissions from 78,584 $MTCO_2e$ in 2005, to 66,760 MT CO_2e/year in 2020, a reduction of approximately 11,800 $MTCO_2e$. This represents a reduction of about 26 percent (23,200 $MTCO_2e$) from forecasted 2020 levels.

The City also outlined three potential GHG emission reduction scenarios based on variations in reductions for goals beyond 2020. The scenarios were intended to compare the relative trends associated with meeting the Sustainability Master Plan targets noted above from 2020 through 2050. Simply complying with the minimum 15 percent reduction target and maintaining that trend over time (approximately 1.1 percent annual reductions through 2050) would not put the City on track to reduce its internal operations GHG emissions to 80 percent below 1990 levels by 2050.

For the purposes of the Phase 1 analysis, however, the City identified preliminary goals for 2030 and 2050 that would be needed to achieve long-term GHG reductions consistent with long-term State objectives. In order to meet State objectives, the City would need to reduce its GHG emissions from 78,584 $MTCO_2e$ in 2005 to 49,900 $MTCO_2e$/year in 2030, a reduction of about 28,600 $MTCO_2e$/year. This represents a reduction of about 50 percent (50,100 $MTCO_2e$) from forecasted 2030 levels. By 2050 the City would need to further reduce emissions to 13,300 $MTCO_2e$/year. This represents an 83 percent reduction from 2005 emissions levels and an 89 percent reduction (106,700 $MTCO_2e$) from forecasted 2050 emissions levels.

In the Phase 1 Climate Action Plan analysis, the City noted that meeting these goals for GHG emission reductions would need to be phased in over time and/or the City could choose to cut emissions more aggressively in the future.

CITY OF SACRAMENTO MUNICIPAL OPERATIONS NEAR-TERM TARGET AND LONG-TERM GOALS ($MTCO_2e$)



	2020 TARGET	2030 GOAL	2050 GOAL
Percentage Reduction[1]	15%	37%	83%
Emissions Target/Goal	66,760	49,900	13,300
Net Reduction from 2005 Levels	11,824	28,684	65,284
Net Reduction from Forecasted levels	23,240	50,100	106,700
Percentage Below Forecast	26%	50%	89%

1) The GHG Emissions Reduction Goal for 2050 is 80 percent below 1990 levels or 80 percent below the 2020 target.
Source: City of Sacramento Community Development Department, Climate Action Plan, Phase 1: Internal Operations, February 2011

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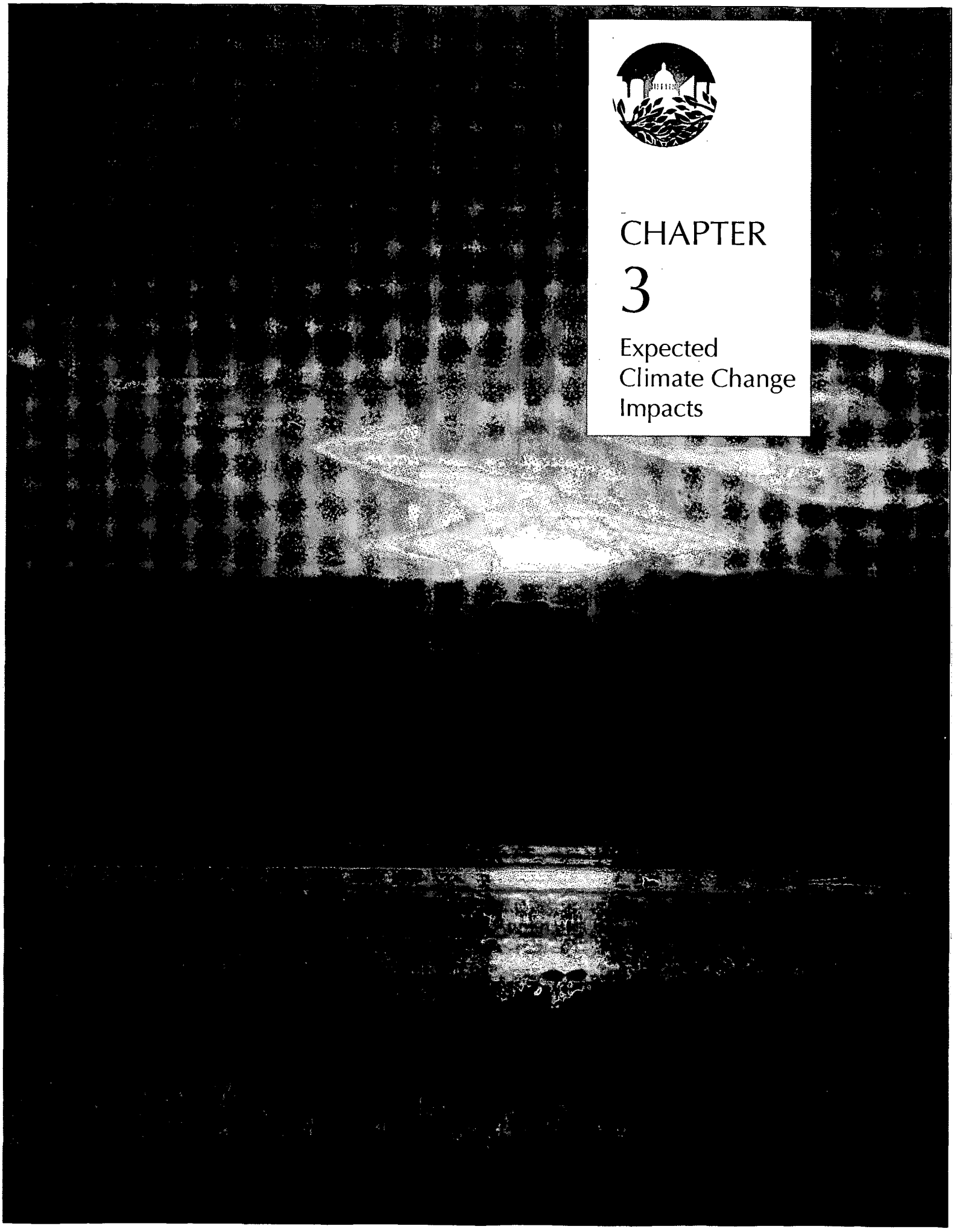


CHAPTER 3

Expected Climate Change Impacts

CHAPTER 3

EXPECTED CLIMATE CHANGE IMPACTS

3.1 INTRODUCTION

This chapter summarizes the impacts from climate change that we can expect to experience over the coming decades. It includes a discussion of the cause of climate change impacts, the effect of climate change, and how those effects will impact the Sacramento region. It highlights potential climate change-related factors that should be considered as part of the City's long-term planning processes. This chapter is intended to provide a foundation for the strategies, measures, and actions that will enable us to prepare for and adapt to climate change impacts.

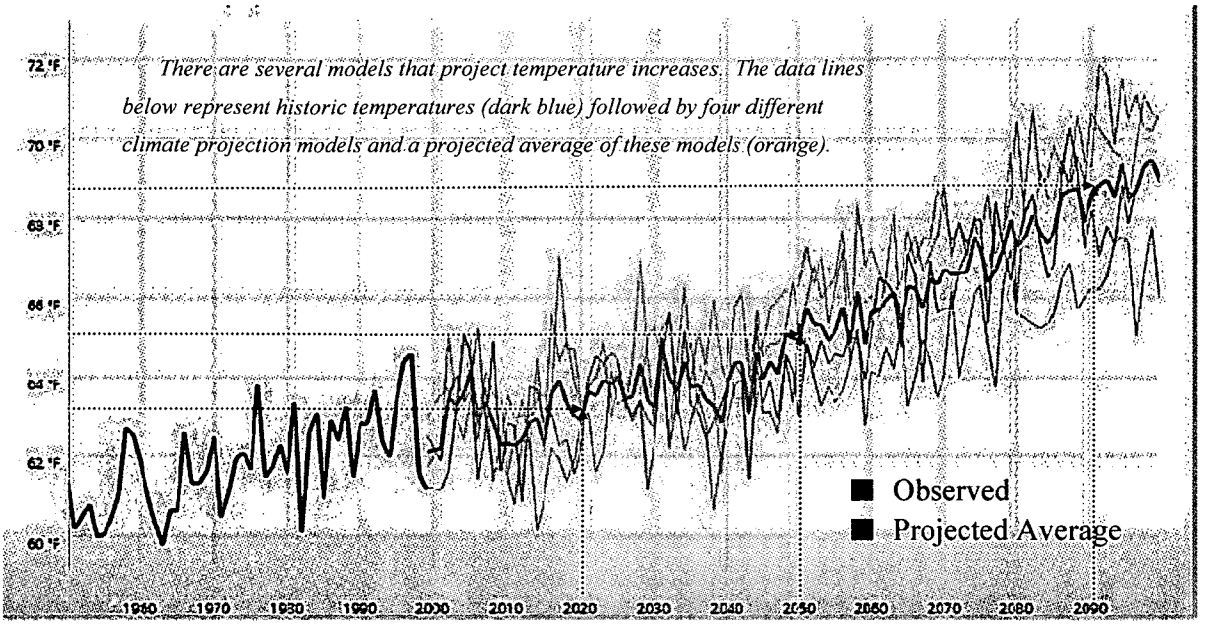
What is causing climate change?

As described in the Introduction, the greenhouse effect naturally regulates the Earth's temperature. However, human activity has increased the intensity of the greenhouse effect by releasing GHGs into the atmosphere. Increased concentrations of GHGs in the atmosphere result in increased air, surface, and ocean temperatures. Many of the effects and impacts of climate change stem from resulting changes in temperature and meteorological responses to those changes.

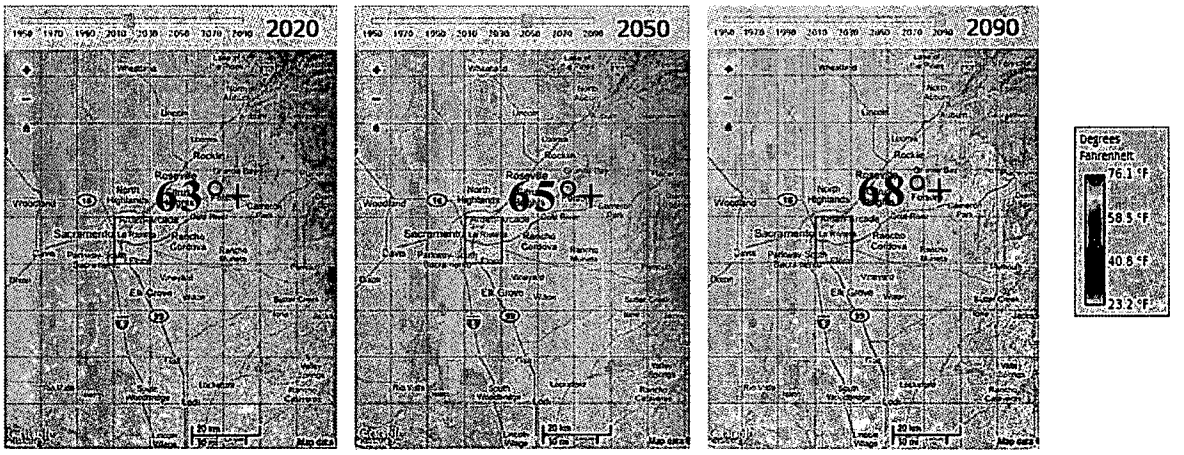
The Intergovernmental Panel on Climate Change (IPCC), which includes more than 1,300 scientists from the United States and other countries, estimated that over the last century, global temperatures have increased by about 1.3 degrees Fahrenheit (°F)[1]. IPCC forecasts indicate that global temperatures can be expected to continue to rise between 2.5 and 10°F over the next century. According to the California Climate Adaptation Strategy (ARB 2009), average state temperatures are currently predicted to increase 1.8 to 5.4°F by 2050 and 3.6 to 9°F by 2100.[2] Some regional models show average temperatures in California increasing as much as 10.8°F.

Temperature increase predictions are based on ranges of global GHG emissions expected within the next century. The IPCC temperature ranges mentioned above reflect a variety of low, medium, and high scenarios for emissions. Global GHG emissions are being monitored annually and they continue to increase. As a result, achieving the low emission scenarios has become unlikely, while the probability of reaching the medium and high scenarios is believed to be more likely to occur. For purposes of this discussion, the focus is mostly on the effects of the medium- or high-range emissions scenario, although information about low ranges is also presented where relevant or available.

OBSERVED AND PROJECTED AVERAGE TEMPERATURES FOR SACRAMENTO



Source: Cal-Adapt, Source: Cal-Adapt, http://cal-adapt.org/tools/factsheet/, June 2011.



Source: Cal-Adapt, http://cal-adapt.org/temperature/decadal/#, June 2011.

Sacramento's Rising Temperatures

The Sacramento region has experienced a rise in average temperatures. According to the U.S. Global Change Research Program winters are now shorter and warmer than they were 30 years ago. The Department of Water Resources (DWR) documented an increase of one degree in the Sacramento watershed over the last century.[3] According to Cal-Adapt, a climate change projection modeling tool developed by California Energy Commission, temperatures in the Sacramento region have historically averaged about 60°F. Temperatures are projected to rise between six and nine degrees by 2100, based on average low and high emissions scenarios.

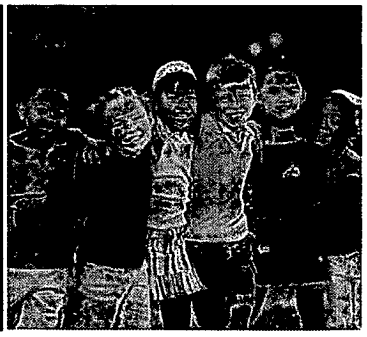
Climate change is expected to affect us all, threatening to harm the health and safety of residents and the economic growth and stability of businesses.

Who is at risk from climate change?

Climate change is expected to affect us all, threatening to harm our health and safety. In particular, climate change will affect physical and mental health, economic stability, and overall quality of life. It will affect people's access to, and the quality of, basic goods and services such as water, shelter, and food, as well as other key priorities for well-being such as education, employment, and crime rates. According to the U.S. Global Change Research Program climate change is already reshaping the United States, and warns that global warming could have serious consequences for how Americans live and work.

The impacts of climate change will not affect us equally. Some people are more likely to be impacted than others. People exposed to the most severe climate-related hazards are often those least able to cope with the associated impacts, due to their limited adaptive capacity. Globally, climate change is expected to have a greater impact on a larger number of people living in poorer and developing countries. People in these areas have lower incomes and rely on natural resources and agricultural systems that will likely be affected by changing climates. These countries also often lack the technology and social systems needed to address and adapt to climate change on a large scale.

Certain groups in developed countries like the United States will also experience more impacts from climate change than others. People in rural areas are more likely to be affected by climate change impacts, such as droughts or severe storms, compared to their urban counterparts. However, certain groups living in cities will also be at higher risk than others. Sacramento residents who are at greatest risk for the impacts described in this chapter include children, the elderly, those with existing health problems (e.g., heart and lung diseases), the socially and/or economically disadvantaged, those who are less mobile, and those who work outdoors.



What can we do to adapt to climate change?

Reducing GHG emissions will go a long way in helping to decrease the magnitude of climate change impacts; however, GHGs can remain in the atmosphere for decades. The GHG emissions that are already in the atmosphere will continue to cause climate change for years to come, just as the warming we are experiencing now is the result of emissions produced in the past. Climatic changes are happening now and are projected to increase in frequency and severity before the benefits of GHG emission reductions will be realized. Although reducing GHGs is critical in addressing climate change, proactive planning and action is equally important.

For natural environments, adaptation occurs when plants, animals, and other organism are forced to change (e.g., migrating to other regions that provide the climate necessary to sustain them). In some cases, plants and animals must also deal with competition or impacts from other migrating species. Those that are unable to adapt fast enough often face extinction. Human communities, on the other hand, can and are planning ways to help communities adapt to climate change. Public agencies and community leaders are taking steps to assess risks and find solutions to alleviate climate change impacts for vulnerable communities and natural environments. This is known as *adaptation planning.*

Adaptation planning is an increasingly valuable tool to prepare for the impacts of climate change. Because of the regional scale of climate change, decisions about how to best manage the expected impacts are best made at the local and regional levels by representatives from government, the private sector, and other organizations. Steps in adaption planning include identifying key climate change-related impacts and vulnerabilities, assessing local and regional sensitivity, and developing adaptation strategies.

California has pioneered adaptation efforts by developing a statewide climate adaptation strategy, which recognizes the potential adverse effects of climate change on the health, environment, and economy of the state. Communities throughout California are now starting to plan for how to mitigate these impacts locally and become resilient to the expected impacts of climate change. This Plan includes strategies that work in tandem with GHG reduction measures to help the City and its residents and businesses adapt to expected climate change impacts. By minimizing the risks associated with climate impacts now, future costs and public health concerns can be avoided and/or minimized in the future.

Chapter 4 of this Plan outlines the strategies, measures, and actions Sacramento will use to address expected regional climate change impacts.

MITIGATION VS. ADAPTATION

There are two primary methods for addressing climate change impacts:

- **Mitigation:** Actions that prevent future climate change by either reducing GHG emissions or removing GHGs from the atmosphere.
- **Adaptation:** Actions that protect communities, residents, businesses and ecosystems from climate change impacts that have already occurred or will occur in the future.

There is still uncertainty about when, where, and to what extent climate change effects will occur.

3.2 EXPECTED EFFECTS ON THE SACRAMENTO REGION

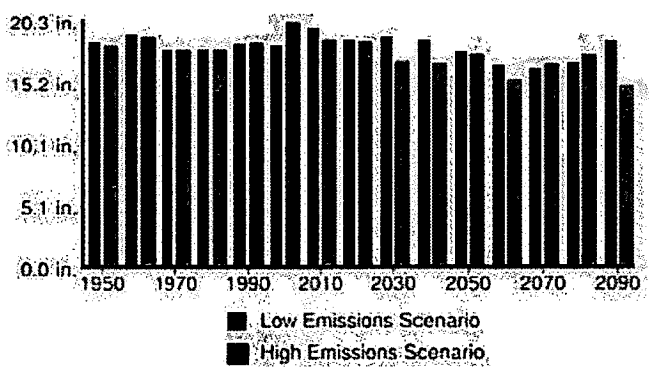
This section summarizes the climate change effects that the Sacramento region is likely to experience based on current scientific research, analysis, and understanding. There is broad scientific consensus about general categories of climate change effects and their likely consequences for the region. However, understanding the magnitude, timing, and scale of effects and the relationships among them is still evolving.

Variable Precipitation Patterns

Precipitation levels are difficult to predict compared to other indicators of climate change. Annual rain and snowfall patterns vary widely from year to year, especially in California. Generally, higher temperatures increase evaporation and decrease snowfall, resulting in a drier climate. A majority of scientific models have shown that northern California precipitation is expected to decrease after 2030. But, more precipitation is expected to fall as rain rather than as snow.

According to DWR, the Sacramento region has actually seen an increase in annual precipitation of about one inch over the last century.[4] DWR research from 1901 to 2000 shows that the Sacramento River system runoff volume has remained stable on an annual basis, but there has been a 9 percent reduction in runoff from April through July. This is likely the result of increased winter rainfall and less snowpack storage. DWR anticipates that over the next century the Sacramento region will likely experience a light increase in annual precipitation, with larger and more intense storms resulting in flood conditions, and longer drought periods. However, according to Cal-Adapt, the Sacramento region is projected to experience a slight decrease in annual precipitation levels (rain and snow) by 2090.[5]

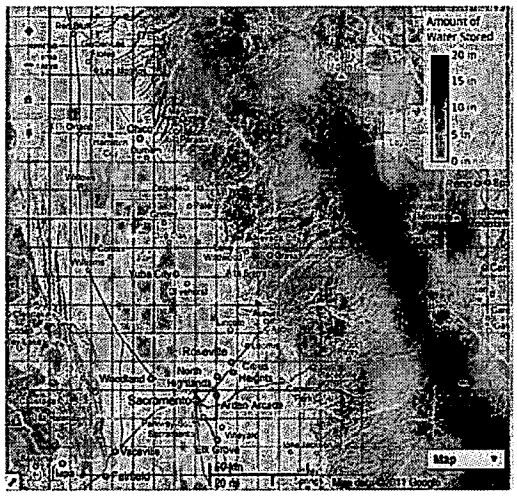
OBSERVED AND PROJECTED PRECIPITATION



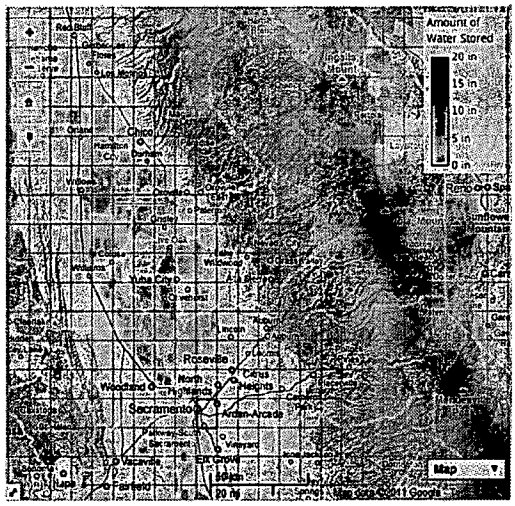
Source: Cal-Adapt, http://cal-adapt.org/precip/decadal/, June 2011.

PROJECTED AVERAGE SNOWPACK IN APRIL (SNOW WATER EQUIVALENT)

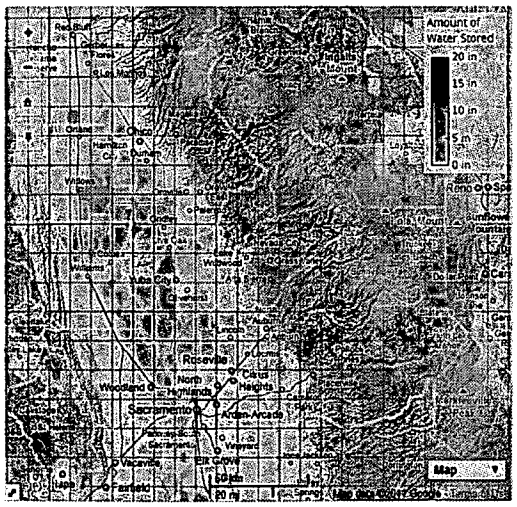
2010



2050



2090



Source: Cal-Adapt, http://cal-adapt.org/snowpack/decadal/#, June 2011.

Reduced Snowpack and Snowline at Higher Elevations

The Sierra Nevada snowpack acts as a large natural reservoir that stores water during the winter and releases it into the Sacramento and American Rivers in Spring and Summer. In Sacramento the timing and magnitude of the release for this water supply is especially important during the dry summer.

It is expected that there will be less snowfall in the Sierra Nevada and the elevations at which snow falls will rise. Coincidentally, there will be less snowpack water storage to supply runoff water in the warmer months. Already it has been documented that California's snow line is rising.

The spring snowpack in the Sierra Nevada has decreased by 10 percent in the last century and may decrease up to 80 percent by 2100.[6] DWR also estimates that for each one degree Celsius (°C) increase in Earth's average temperature, the Sierra snowpack will retreat 500 feet in elevation. According to DWR, the Sierra Nevada can expect to experience a decrease in snowpack at lower elevations and an overall reduction of 25 percent to 40 percent reduction in snowpack by 2050.[7]

There is general consensus that higher temperatures will continue to reduce the snowpack that feeds many Sierra Nevada foothill watersheds. This is particularly relevant to areas in the Sacramento region that rely on the Sacramento and American Rivers for water.

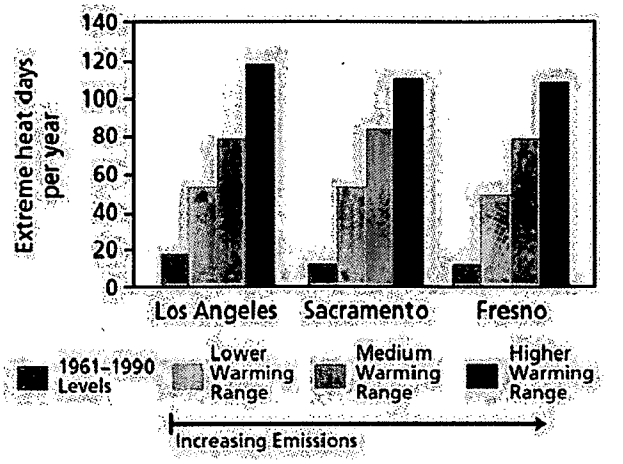
Earlier, Hotter, More Frequent, and Longer Heat Waves

Heat waves are projected to increase in frequency, intensity, and duration for the Sacramento region. Over the past 60 years, summer maximum temperatures have increased by 0.4°C.[8]

Extreme heat waves are expected to increase in number by ten times in the Sacramento region and could become an annual event by 2100.[9] Sacramento could experience up to 100 additional days per year with temperatures above 95°F and by 2090, the average July temperature could reach over 104°F.[10]

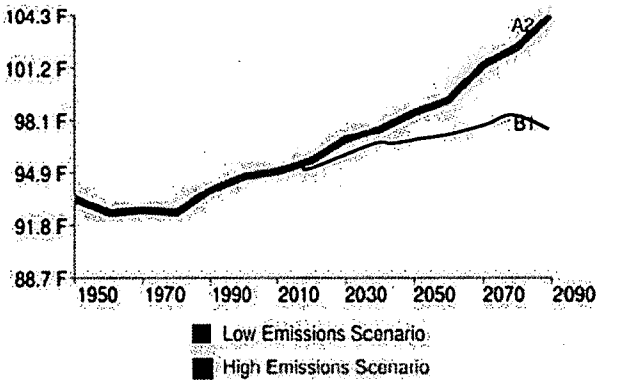
Of particular concern for Sacramento is the "urban heat island" effect, which is caused in urban areas where greater heat retention of buildings and paved surfaces result in higher ambient temperatures compared to vegetated areas. During heat waves, urban heat islands are especially dangerous because they are both hotter during the day and do not cool down at night.

INCREASE IN EXTREME HEAT (2070-2090)



Source: Luers, Amy L. et al. (2006). Our Changing Climate: Assessing the Risks to California. The 2006 Summary Report from the California Climate Change Center. CEC-PIER Report, CEC-500-2006-077.

PROJECTED AVERAGE HIGH TEMPERATURES



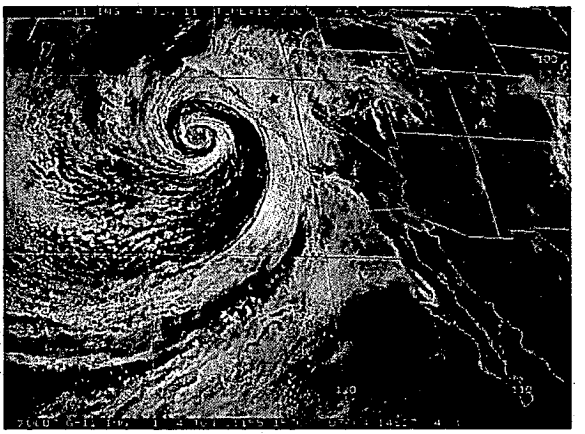
1) Average temperatures in July
Source: Cal-Adapt. http://cal-adapt.org/temperature/decadal/#, June 2009.

OBSERVED URBAN HEAT ISLAND EFFECT IN SACRAMENTO

Source: NASA, 2000

More Frequent and Extreme Storm Events

Extreme weather is expected to become more common throughout California. More extreme storm events are expected to increase water runoff to streams and rivers during the winter months, heightening flood risks. Warmer ocean surface temperatures have caused warmer and wetter conditions in the Sierra Nevada, increasing flood risk. When the Sacramento or American Rivers are already at peak capacity, additional flows from increased snowpack runoff or storm intensity could cause flooding. During the last 50 years peak flow patterns have increased in the Sacramento River, making floods more likely in the future, especially if there is an increase in intense storms.[11]



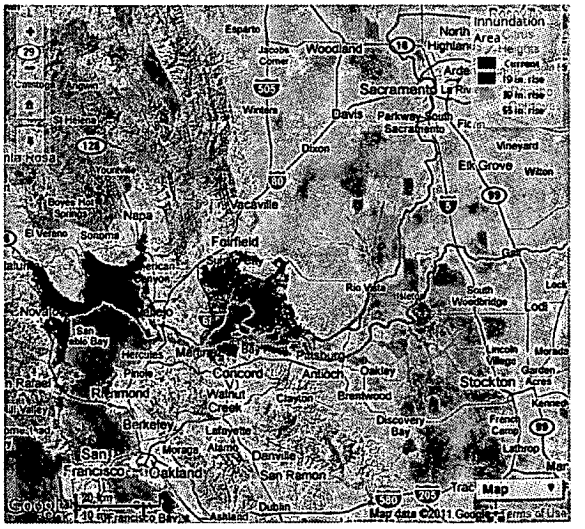
Diminished Air Quality

Climate change is expected to exacerbate air quality problems by increasing the frequency, duration, and intensity of conditions conducive to air pollution formation. Higher temperatures and increased ultraviolet radiation from climate change are expected to facilitate the chemical formation of more secondary air pollutants from ground-level sources. Conversely decreased precipitation is expected to reduce the amount of particulates cleansed from the air.[12] As one of the sunniest cities in the country, Sacramento has all the ingredients to create smog. Sunlight triggers the chemical reaction between nitrogen oxides and volatile organic compounds (VOCs) that creates ozone. In addition, incidents of wildfires in nearby foothills and mountain regions are expected to increase and further contribute to the air quality problems.

Sea Level Rise

Rising sea levels are expected due to temperature increases that cause ocean water to expand, Arctic and glacial ice to melt, and increased amounts of snowpack runoff to enter the sea. California's ocean surface temperature patterns have been warmer than normal for the past decade, a condition known as Pacific Decadal Oscillation.[13] California sea level appears to have risen by about seven inches over the 20th century and is predicted to rise up to 55 inches by the end of the 21st century.[14]

Sacramento's location (70 miles inland coast) limits the most significant effects from sea level rise. However, rising sea levels may lead to levee failures in the Delta causing infrastructure damage, flooding, and saltwater intrusion into groundwater aquifers that may affect Sacramento region groundwater sources. It is also possible that sea level rise could reduce the effectiveness of Delta and nearby Delta levees, or increase flood levels in tidally affected reaches of the Sacramento River, if storm flow and tide conditions coincide. An influx of saltwater would degrade California's inland estuaries, wetlands, and groundwater aquifers. Saltwater intrusion could threaten the quality and reliability of California's biggest fresh water supply that is pumped from the southern edge of the Sacramento/San Joaquin River Delta.



Source: Cal-Adapt. http://cal-adapt.org/sealevel/, June 2009.

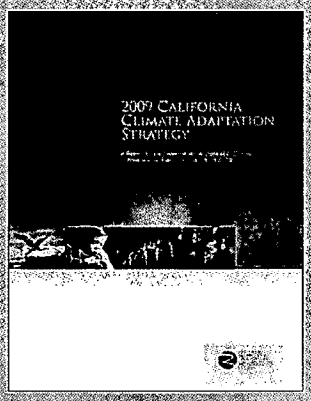
3.3 EXPECTED IMPACTS ON THE SACRAMENTO REGION

Climate change threatens the health and well-being of all Sacramento residents and businesses. This section summarizes the impacts of climate change that the Sacramento region could expect. The Sacramento region can expect many negative impacts that affect our health, economy, environment, and quality of life.

According to the 2009 California Climate Change Adaptation Strategy (Cal Adaptation Strategy), California can expect to experience increased average temperatures with overall hotter and drier conditions, reductions in winter snow, increases in winter rains, accelerating sea-level rise, and more extreme weather events. The Cal Adaptation Strategy indicates that extreme weather events (e.g., heat waves), wildfires, droughts, and floods are likely to be some of the earliest climate impacts.

The information and assessments outlined in this section are based on the effects described in Section 3.2. Similar to the expected effects of climate change, there is uncertainty about when, where, and to what extent these impacts will affect the Sacramento region's residents, businesses, and natural environments.

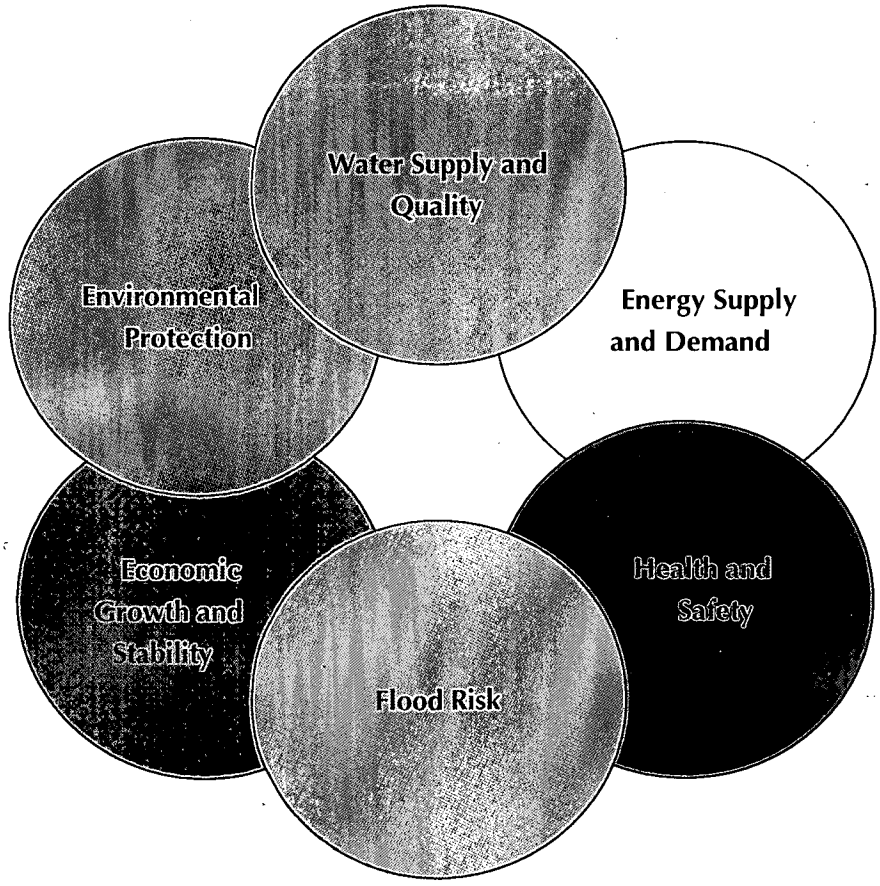
Additional details on the expected effects and impacts of climate change on California can be found in the California Adaptation Strategy and the Cal-Adapt scenario tool.



www.climatechange.ca.gov/adaptation

cal-adapt

www.cal-adapt.org



Water Supply and Quality

Climate Change is expected to increase pressure on and competition for California's water resources, further exacerbating already stretched water supplies. Decreasing snowpack and spring stream flows and increasing demand for water from a growing population and hotter climate could lead to increasing water shortages. Water supplies are also at risk from rising sea levels.

The Sacramento region is expected to experience hotter and drier conditions and reduced snowpack that could cause reduced reservoir supplies and Sacramento and American River flows. It is also expected that the region will experience more intense rainfall events that could increase demand for reservoir capacity to provide for water capture and storage. Despite these uncertainties, it is still widely accepted that changes in water supply will occur and water yields from reservoirs are expected to be unreliable. As Earth's temperature rises, it is expected that water demands will increase and could result in a longer season of peak treated water demands. Due to these effects it is expected that competition for water will increase among cities, farmers, and the environment.

Changes to air and land temperatures will have an impact on the timing, amount, type, and location of precipitation and runoff in the Sacramento and American Rivers watersheds. This will impact the quantity of water supplies, the management of those quantities, the quality of the source water, and the demand for treated drinking water. DWR has identified anticipated changes to the source water conditions in the watershed that will likely impact the quality of the source waters, including more intense storm events, longer drought periods, reduced snowpack at lower elevations, and earlier spring runoff.[15]

Modeling for the Central Valley Project indicates that there are likely to be significant shortages of water in drought years in North of the Delta operations.[16] Current flood control operations would prevent the capture of increased winter runoff and, therefore, operational changes would be required to avoid shortages. These possible future changes in source water management could also impact source water quality, such as increased water temperature, nutrient loading, sediment transport, carbon loading, and pathogen transport.

Changes in source water quantity and quality may impact the treatment necessary to produce potable drinking water. These changes could result in additional treatment processes required and increased costs for treated drinking water in order to avoid potential for human health risk via drinking water consumption.

Climate Change is expected to increase pressure on and competition for California water resources, further exacerbating stretched water supplies.

Energy Supply and Demand

Climate change is expected to cause higher electricity demands and costs and increased air pollution from dirtier sources of energy used to meet increased demand.

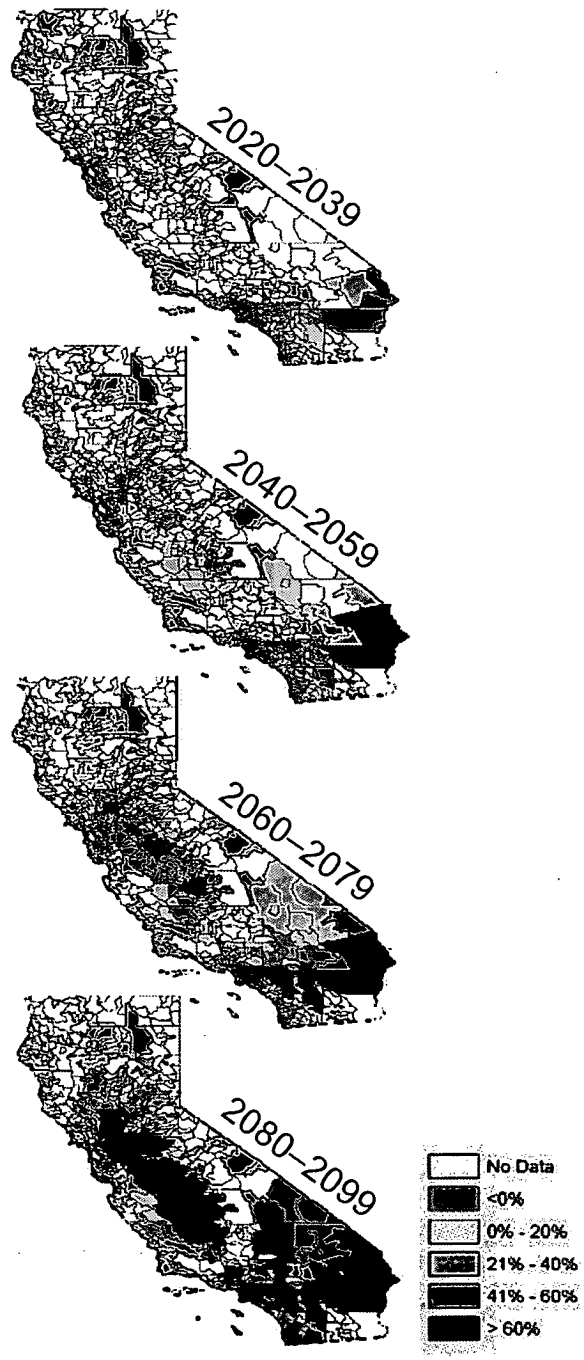
Decreased snowpack, earlier snow melt, and increased precipitation events and droughts may all contribute to less stability in those electricity supplies. Using a network of eight power plants and 11 reservoirs, the Sacramento Municipal Utility District uses hydroelectric power to provide 15 percent of the energy used in Sacramento county.[17] Higher variability of runoff flows could cause a loss in hydroelectric power if reservoir dams are forced to use spillways to avoid overcapacity.

Similarly, prolonged periods of drought may lower reservoir levels, limiting the amount of water that may be released to generate hydroelectric power for the Sacramento region and beyond. Overall, hydroelectric power production could decrease by a total of 30 percent across California.[18]

In addition, increasing average temperatures and more prolonged, intense heat waves are expected to increase demand for energy (i.e., to operate air conditioners). While winter temperatures will be higher on average, the reduced use of energy for heating is not expected to compensate for the increased energy demand for cooling.

Overall energy demand could increase 6 percent by 2020[19] and electricity demand by residential dwellings could increase by up to 55 percent by 2100.[20] With rising energy demand due to higher temperatures and decreased energy supply due to hydroelectric power losses, the Sacramento region could be susceptible to blackouts and electricity shortages in the future. With rising energy demand, it can be expected that energy costs will increase.

PROJECTED HOUSEHOLD ELECTRICITY CONSUMPTION BASED ON MODELED HIGHER AVERAGE TEMPERATURES



Source: Aroonruengsawat, Anin, Maximilian Auffhammer (2009). Impacts of Climate Change on Residential Electricity Consumption: Evidence from Billing Data. California Climate Change Center, CEC-500-2009-018-D. Model NCAR PCM forced by IPCC SRES A2.

Health and Safety

The various effects of climate change are expected to increase risks to the health and safety of residents. Those most likely to suffer include children, the elderly, and other vulnerable populations.

Respiratory Illness

As temperatures rise from global warming, the frequency and severity of heat waves will grow and increase the potential for bad air days, which can lead to increases in illness and death due to dehydration, heart attack, stroke, and respiratory disease. Californians experience the worst quality air in the nation, especially in the Sacramento region. More than 90 percent of California's population lives in an area that has ozone or particulate matter levels above the state air quality standard.[21]

Presently, poor air quality results in 8,800 deaths per year across California.[22] Sacramento County is designated a severe nonattainment area for exceeding a number of State and national ambient air quality standards based in regulation.[23] Sacramento's poor air quality has significant effects for public health.

More highly impaired air quality from climate change may result in increased incidence of respiratory disease and asthma and lead to more heat-related deaths.

Heat-related Illness

Higher temperatures and the increased frequency of heat waves associated with climate change are expected to significantly increase heat-related illnesses, such as heat exhaustion and heat stroke, while also exacerbating conditions associated with cardiovascular and respiratory diseases, diabetes, nervous system disorders, emphysema, and epilepsy.

In California heat waves have killed more people than all other disaster events in the last 15 years, usually affecting vulnerable populations such as infants, the sick, the elderly, or those of low incomes who lack access to air conditioning or work outdoors.[24] An increase of every 10°F in average daily temperature is associated with a 2.3 percent increase in mortality.[25] During heat waves mortality rates can increase to about 9 percent. Hot summers make Sacramento especially susceptible to an increase in heat-related illness. Deaths from heat-related illnesses in Sacramento are projected to increase from ten in 1990 to as many as 148 by 2090.[26]

Vector-borne Diseases

As climate change affects the temperature, humidity, and rainfall levels across California, some areas could become more suitable habitats for insects (especially mosquitoes), ticks, and mites that may carry diseases. Wetter regions are typically more susceptible to vector-borne diseases, especially human hantavirus cardiopulmonary syndrome, Lyme disease, and West Nile virus.[27]

The amount and pattern of precipitation as well as warmer winter weather affects the abundance of vector habitat and food supply. The Sacramento region is projected to have wetter and warmer winter s that may attract vector populations (e.g., mosquito inhabited still-water pools may become more prolific).

Flood Risk

Increased flood frequency and elevated flood risk are expected in California as a result of sea level rise, more intense storm events, and shifts in the seasonal timing of rainfall and snowpack runoff. Densely populated, low-lying areas like Sacramento are at the greatest risk from flooding and the Sacramento region has been identified as one of the highest flood prone areas in the country.

The Sacramento region is protected by an elaborate system of levees and dams to protect residents and property from flooding. However, the region's levee system will be further strained to meet the challenges expected from shifting snow and rain patterns and more extreme storm events.

Floods can also increase the food supply available to rodents that may transmit Lyme disease, plague, tularemia, and rickettsial infections.[28] In each of these cases the increase in vector-borne disease occurrences is expected to impact public health and increase demand on health care systems.

Health Care Systems

Finally, increased health and safety impacts are expected to cause a corresponding demand for health care and place additional strain on health care systems by overloading emergency rooms and medical facilities. As a result, residents and businesses may experience increased health care costs and higher insurance premiums.

Potential statewide direct costs due to climate change-induced damage, if no action is taken, could exceed tens of billions of dollars annually.

Economic Growth and Stability

Economic impacts due to climate change will likely affect all sectors of the economy with negative consequences. A study conducted in 2008 by the University of California, Berkeley and Next10, estimated that potential statewide direct costs due to climate change-induced damage, if no action is taken, could exceed tens of billions of dollars annually, with even higher direct economic costs and the placement of trillions of dollars of real estate at risk. Consequently, the economic well-being of communities is diminished with higher risk, and greater uncertainty about the future. Residents, businesses, and public agencies will likely see everyday costs for food and services increase. Costs will increase to cover energy, water, food, and health related issues, leaving less money for discretionary household spending, business investment and profits, and government services.

- Energy costs are expected to rise as demand increases to cool buildings due to higher temperatures, especially in urban areas affected by the urban heat island effect. Energy prices may also be affected due to more variable energy supplies locally and from increased competition for electricity, natural gas, and oil.
- Water costs will likely rise due to increased demands for potable, landscaping, and irrigation water use (e.g., metered water cost increases) and scarcity of and competition for water supplies.
- Food prices are expected to increase as the agricultural sector experiences lower yields or crop patterns shift due to higher temperatures and droughts, crops are damaged from extreme weather events, and/or operation costs increase (e.g., irrigation water costs).
- Heath care and insurance costs are likely to increase to meet the increasing demand and risks due to climate change impacts.

For businesses, workforce productivity may experience more frequent disruptions from climate-change induced health impacts to residents and employees due to vector- and water-born disease; heat related illness; and increased demand for and costs of health care. Outdoor labor/industries (e.g., construction) may be at even higher risk as more frequent, unhealthy working conditions become more common (e.g., higher temperatures, poorer air quality, heat waves, extreme weather events). Workers may be harmed when climate-related events, such as floods, cause them to lose their jobs and incomes. The indirect effects of climate change also may lead to similar outcomes, as businesses move away from areas affected by climate change impacts to less affected areas.

Finally, climate change impacts will likely result in property damage due to hotter temperatures, more extreme weather events, and flooding. Preparation for and adaptation to new and changing conditions will likely generate new costs that were not necessary to address similar concerns in the past. Residents, businesses, and the City can expect increased costs for maintenance and upgrades to address these issues, or to make repairs in the event of damage. As climate change generates conditions not experienced in the past, preparation and adaptation will be more costly in terms of requiring new information, institutions, infrastructure, and behaviors.

Environmental Protection

Climate change effects will have broad impacts on local and regional ecosystems, habitats, and wildlife as average temperatures increase, precipitation patterns change, and more extreme weather events occur. Although species have adapted to environmental changes for millions of years, a quickly changing climate could require adaptation on larger and faster scales than in the past. Similarly, the timing of many natural events, such as growing seasons and migrations, is linked to temperature, moisture availability, and amount of daylight. Changes in weather patterns and extreme events associated with climate change will disrupt these natural patterns. Species that cannot adapt are at risk of extinction. Even the loss of a single species can have subsequent impacts on other species connected through food webs and other interactions. Climate change is expected to radically and quickly change the ecosystems that many plants and animals rely on for survival.

Habitats that currently support local wildlife are expected to change, forcing plants and animals to either adapt to the new environment or move to more hospitable areas. Some species will be able to adapt to changing habitats by shifting their range or altitudes in order to adjust to rising temperatures. Others, however, might not be able to adapt fast enough to keep pace with the rate of climate change. For some species, climate change may allow them to increase the range of habitat where they can live; however, where plants and animals need to move to survive they may find wildlife corridors blocked or competition from other species.

The risk of extinction could increase for many species, especially those that are already endangered or at risk due to isolation by geography or human development, low population numbers, or a narrow temperature tolerance range. Additionally, as species move to more favorable areas there may be new competitions formed for food and resources. Some species that thrive may be invasive (not native to a region) and could gradually drive out or even kill native species.

CHANGING ECOSYSTEMS

Climate change is affecting U.S. biodiversity and ecosystems, including changes in growing season, life cycle, primary production, and species distributions and diversity. In an analysis of 866 scientific papers that explore the ecological consequences of climate change, nearly 60 percent of the 1,598 species studied exhibited shifts in distributions and/or life cycles over time frames of 20 to 140 years. Analyses of field-based life cycle responses show shifts as great as 5.1 days per decade, with an average of 2.3 days per decade across all species.

Source: The Effects of Climate Change on U.S. Ecosystems, USDA, November 2009.

Source: Pacific Southwest Region U.S. Fish and Wildlife Service, October 15, 2010

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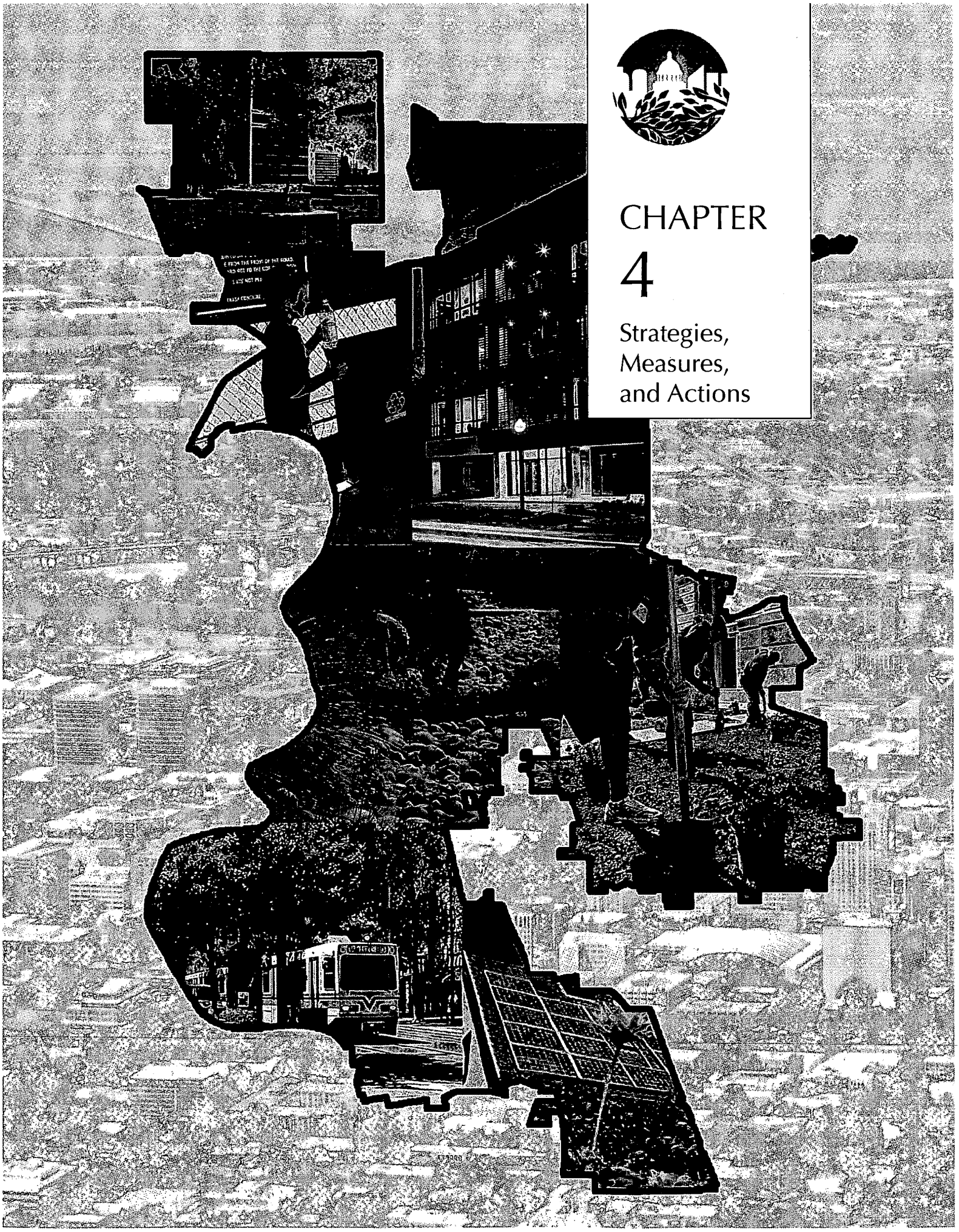
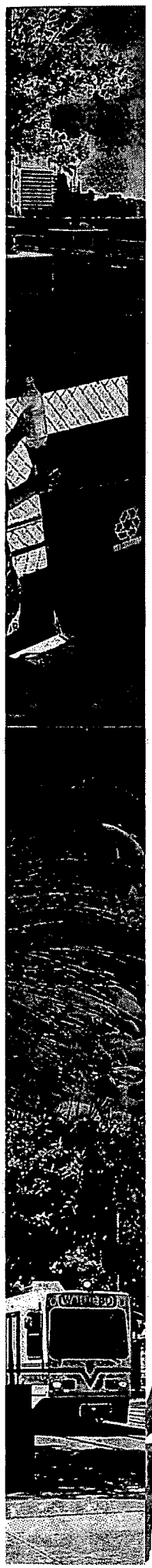


CHAPTER 4

Strategies, Measures, and Actions



CHAPTER 4

STRATEGIES, MEASURES, AND ACTIONS

4.1 INTRODUCTION

If the City of Sacramento were to continue "business-as-usual" practices and activities, the City's communitywide GHG emissions could increase by more than 1.5 times before 2050, exacerbating global warming and climate change. Even with reductions, existing GHG emissions already in the atmosphere are expected to cause increasingly frequent and intense heat waves, hotter summers, frequent and persistent droughts, unpredictable flooding, increased stress on local utilities and infrastructure, and threats to our public health and the City's economy. This chapter outlines the strategies, measures, and actions to be implemented by the City to achieve its climate protection goals over the coming decades.

The measures and actions defined here focus on both mitigating and adapting to future climate change by implementing strategies that address GHG emissions and prepare for the future effects of a changing climate. The Climate Action Plan strategies, measures, and actions are divided into two categories – community scale strategies and municipal operations strategies – in order to address both public and private responsibility for climate change. Through partnerships with and among residents, businesses, and other organizations, these actions will provide net benefits for everyone, such as cost savings, a strengthened economy, and greater quality of life, while also making a difference in the world.

The strategies in the Plan build upon the City's decade-long tradition of sustainability, resource efficiency, conservation, and smart growth. The City's 2030 General Plan is the foundation for the Climate Action Plan. It contains dozens of goals, policies, and implementation programs that provide direction to become *the most livable city in America* and to make great places, grow smarter, maintain a vibrant economy, create a healthy city, live lightly, reduce our carbon footprint, and develop a sustainable future. The measures and actions within the Plan outline specific tasks and steps the City will take to implement the 2030 General Plan. Dozens of other City plans, programs, and initiatives support this vision and also contribute to addressing climate change issues.

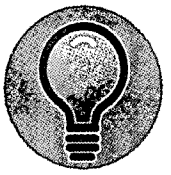
In addition to defining new measures and actions, the Plan has taken into account existing plans, programs, and activities that the City has already undertaken to reduce GHG emissions and adapt to climate change impacts. The Plan acknowledges these efforts and, in some cases, builds or expands on them.

4.2 CLIMATE ACTION PLAN STRATEGIES

The Plan is organized by seven overarching strategies. The strategies represent the primary ways to reduce identified GHG emissions and adapt to climate change impacts. Within each strategy are a series of measures that define the programs, policies, and regulations the City will implement to achieve its climate action objectives. These are grounded in actions directly influenced by the City, but are reliant on partnerships with the business community and participation by community members. Below are the seven strategies included in the Plan:

Sustainable Land Use: Using land efficiently, while preserving the character of existing neighborhoods, and providing for complete neighborhoods that incorporate natural resources and green infrastructure. Goal: Reduce vehicle miles traveled (VMT) per capita in new development by 35 percent, compared to statewide averages.

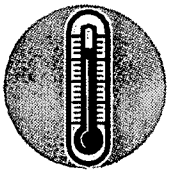
Mobility and Connectivity: Creating a connected multi-modal transportation network that increases the use of sustainable modes of transportation (i.e., walking, biking, transit) and reduces dependence on automobiles. Goal: Reduce total communitywide vehicle miles traveled (VMT) per capita, a minimum of 7 percent by 2020, and 16 percent by 2035.



Energy Efficiency and Renewable Energy: Increasing the energy efficiency of existing and new buildings and maximizing the use and generation of renewable energy. Goals: Achieve zero net energy in all new construction by 2030. Achieve an overall 15 percent reduction in energy usage in all existing residential and commercial buildings by 2020.

Waste Reduction and Recycling: Reducing the production, consumption, and disposal of waste materials, while encouraging reuse, recycling, and composting. Goals: Achieve 75 percent diversion of solid waste by 2020, and work towards becoming a "zero waste" community by 2040.

Water Conservation and Wastewater Efficiency: Increasing water conservation and management and wastewater treatment practices that reduce energy demand and promote efficient use of this limited resource. Goal: Reduce water consumption 20 percent per capita by 2020.

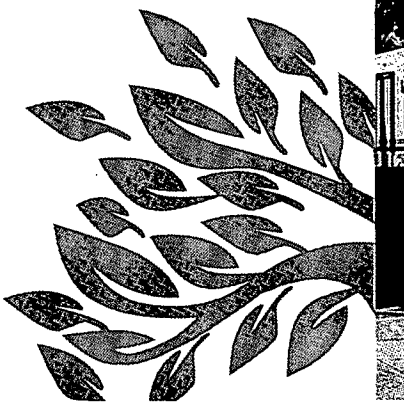


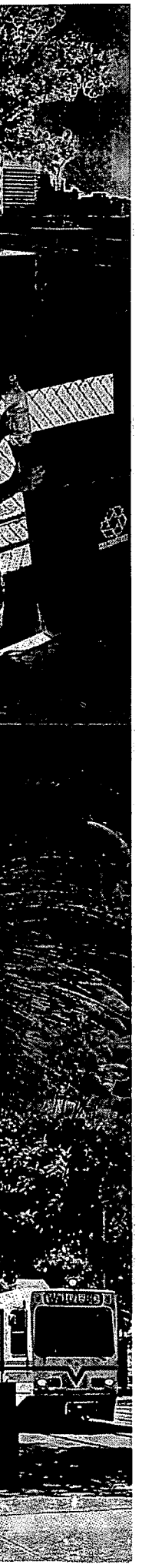
Climate Change Adaptation: Planning for and adapting to future climate change risks and creating resilient communities, economies, and environments. Goal: A community that is resilient to the effects and impacts of climate change.

Community Involvement and Empowerment: Enlisting the ideas and energy of residents and businesses to help achieve the City's climate action objectives and maximize co-benefits. Goal: Involve the community in climate action efforts.

CLIMATE ACTION CONSIDERATIONS

- Without action, climate change impacts to Sacramento could be significant.
- Fossil fuel-based energy used to power our homes and businesses and move our cars and trucks represents over 90 percent of our GHG emissions.
- Even with steps to reduce GHG emissions, we must also prepare for climate change impacts that are inevitable.
- Making a difference will require many actions, but the benefits of action will improve quality of life and create a more sustainable community.





The measures and actions included in this Plan exceed the 2020 reduction target established by the City. However, over the coming decades, additional measures and actions will be needed to meet long-term goals.

4.3 GHG EMISSIONS REDUCTION SUMMARY

The Plan includes 7 strategies and 31 measures to reduce GHG emissions. As described in Chapter 2, if we were to continue "business-as-usual" (BAU) practices and activities, the City's GHG emissions would increase by more than 18.4 percent by 2020, 30.7 percent by 2030, and 55.5 percent by 2050. To prevent the continued escalation of GHG emissions, the City has established a 2020 target (15 percent below 2005 levels) and 2030 and 2050 goals (38 percent and 83 percent below 2005 levels, respectively) to reduce annual emissions levels consistent with State laws and guidelines.

2020 Reduction Potential

The actions that could be quantified at this time, along with those that could not, outline a path to meet the City's 2020 reduction target, consistent with State laws and guidelines. When combined with quantified State and Federal legislative reductions and the reductions included in the City's Phase 1 Climate Action Plan, primary actions offer a potential reduction of about 1.37 $MMTCO_2e$/year. This level of reduction exceeds the City's 2020 target of 15 percent (1.36 $MMTCO_2e$/year) by 6,227 $MTCO_2e$, and is consistent with State law. See Appendix E for a more detailed explanation of how the primary actions in this plan achieve the 2020 target.

Long-term Reduction Potential

In the long term, the primary actions that could be quantified fall short of meeting the City's 2030 and 2050 reduction goals. However, as described in Chapter 2, the City is under no obligation to meet these goals at this time. Furthermore, the science and politics surrounding climate change are continually evolving. Over the coming decades new innovations and technologies will become available that improve our ability to achieve further GHG reductions. New methodologies may become available to quantify actions that currently are identified as supporting actions. Finally, new Federal and State laws may further reduce emissions in sectors currently addressed by City measures. As climate change science and policy continues to advance, the City will be able to apply new reductions toward meeting its long-term GHG emissions goals.

PROJECTED GHG EMISSIONS REDUCTIONS

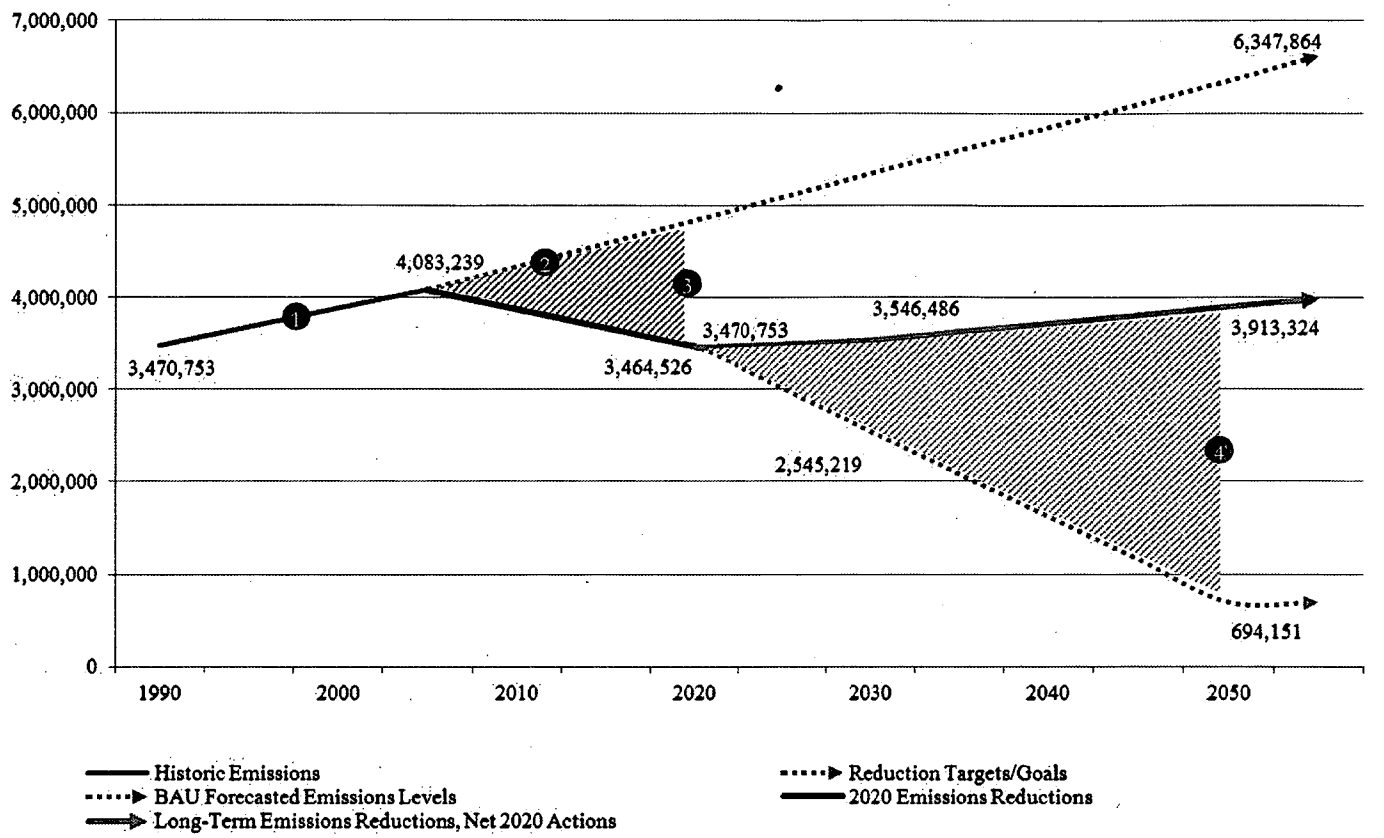
($MTCO_2e$/YEAR)

YEAR	EXISTING/ BUSINESS AS USUAL (BAU) FORECASTED	REDUCTION TARGET/GOALS	REDUCTION POTENTIAL	GAP/ (SURPLUS)
2005	4,083,239	—	—	—
2020	4,835,677	3,470,753	3,464,526	(6,227)
2030	5,337,689	2,545,219	3,546,486	1,001,267
2050	6,347,864	694,151	3,913,324	3,219,173

Source: Source: Ascent Environmental, 2011; ICF International 2011; Fehr & Peers 2011; data compiled by Ascent in 2011.

PROJECTED GHG EMISSIONS REDUCTIONS

($MTCO_2e$/YEAR)



Note: 1990 GHG estimates are assumed to be the same as the calculated 2020 reduction target.
Source: Ascent Environmental, 2011; ICF International 2011; Fehr & Peers 2011; data compiled by Ascent in 2011.

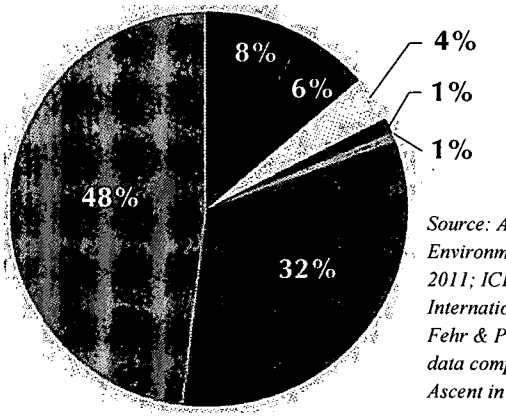
❶ GHG emissions have been rising to current levels seen today. Sacramento's 2005 estimated GHG emissions were over 4.08 $MMTCO_2e$/year.

❷ Left unchecked, GHG emissions will continue to rise. Forecasted emissions levels are expected to increase to almost 6.35 $MMTCO_2e$/year by 2050, contributing to global warming and more severe climate change impacts.

❸ The measures and actions in this Plan are expected to reduce GHG emissions to 3.46 $MMTCO_2e$/year by 2020, which is below the City's GHG reduction target of 3.47 $MMTCO_2e$/year.

❹ However, the measures and actions included in this Plan at this time will not achieve long-term 2030 and 2050 emissions reduction goals of 2.55 $MMTCO_2e$/year and 0.69 $MMTCO_2e$/year, respectively. In fact, with additional population and employment growth, emissions are expected to rise slightly after 2020. Additional reduction measures and actions will be needed to achieve an additional 1.00 $MMTCO_2e$/year by 2030 and 3.22 $MMTCO_2e$/year by 2050.

2020 GHG REDUCTIONS BY SECTOR



Source: Ascent Environmental, 2011; ICF International 2011; Fehr & Peers 2011; data compiled by Ascent in 2011.

- Sustainable Land Use
- Mobility and Connectivity
- Energy Efficiency and Renewable Energy
- Waste Reduction and Recycling
- Water Conservation and Wastewater Efficiency
- Phase 1 CAP: Municipal Operations
- State and Federal Reductions

In addition to the specific measures and actions directed toward adapting to climate change, many GHG emissions reduction measures and actions also provide adaptation benefits.

4.4 CLIMATE CHANGE ADAPTATION SUMMARY

The Plan outlines a number of strategies for reducing GHG emissions. However, even when target emissions levels are reached or exceeded, our region will still be affected by some level of climate change. It is essential to plan to address climate change effects to avoid potentially detrimental impacts to the economy and health of Sacramento's residents and businesses. By preparing now, we will be better equipped to deal with a changing climate in the future.

Chapter 3 of the Plan identifies the causes, effects, and impacts of climate change, and describes Sacramento's likely vulnerabilities. This is a critical first step in planning and managing the likely consequences of climate change.. However, the severity and timing of expected impacts are still largely unknown. An important part of climate action planning includes regularly monitoring climatic changes and associated effects.

The Plan includes seven specific measures to help the City and its residents and businesses build adaptive and resilient systems that can respond to the challenges ahead. Measures addressing climate change adaptation include:

1. Prepare for Increases in Average Temperature
2. Preserve and Expand Water Sources and Respond to Variable Water Supplies
3. Respond to Increases in Energy Demands and Variable Supplies
4. Protect the Public from Increased Health Risks and Safety Hazards
5. Promote a Climate-Resilient Economy
6. Respond to Potential Impacts to Public Infrastructure
7. Protect Natural Ecosystems and Migration Routes

In addition to the specific measures and actions directed toward adaptation, many of the GHG emissions reduction measures and actions also provide adaptation benefits. For example, creating a multi-modal transportation network reduces dependence on driving and prepares Sacramento for possible future gasoline shortages. Conserving water not only reduces energy, but also prepares Sacramento for drought and reduced run-off supply in the summer. Roof gardens and a healthy urban forest reduce energy demand and the urban heat island effect and prepares Sacramento for hotter summers and heat waves. The Plan calls out those GHG reduction measures that also provide adaptation benefits.

4.5 GUIDING AND IMPLEMENTING THE PLAN

In order to achieve the objectives of the Plan, the City will conduct regular monitoring of GHG emissions and Plan implementation and maintenance. The Plan identifies a comprehensive set of actions that the City will use to reduce GHG emissions and adapt to climate change impacts. These actions include a combination of programs, incentives, outreach and education activities, and regulations. As implementation occurs, each strategy, measure, and action will be continuously assessed and monitored.

The City of Sacramento recognizes the need for proper staffing, financing, and resource allocation to ensure the success of each action included in the Plan. The following describes the ways the City will commit staff and resources to implement the Plan.

Monitoring GHG Emissions

Within the Plan the City has identified existing and business-as-usual GHG emissions, as well as GHG reduction target and goals. In order to monitor the success of the Plan in achieving the target and goals, the City will conduct communitywide GHG inventories at least every five years in coordination with the five-year review of the 2030 General Plan and Master EIR, depending on available funding and resources. The City has inventoried and reported GHG emissions from internal operations to the California Climate Action Registry on an annual basis for the last several years, and will continue to do so as funding and resources allow. By monitoring GHG emissions, the City will be able to track its progress, highlight achievements, and identify additional measures and actions to continue meeting its GHG reduction target and goals.

Maintaining and Updating the Plan

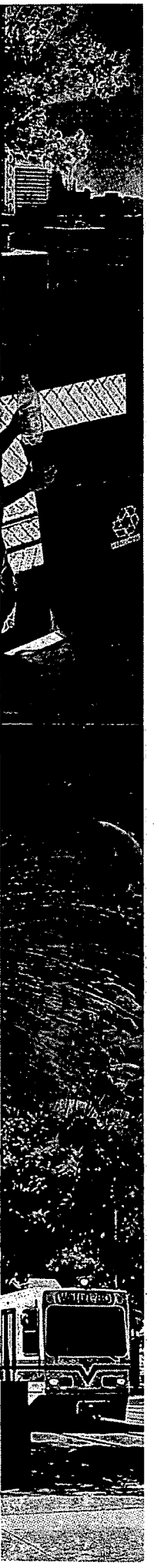
The Plan will need to be updated and maintained if it is to remain relevant and effective. Technologies may advance, new State and Federal laws may be passed, and local resources may change. Based on findings gathered during annual Plan reviews, data from future GHG inventories, and future year conditions the City will prepare updates to the Plan in coordination with the five-year review of the 2030 General Plan and Master EIR, depending on available funding and resources.

The City will monitor both the GHG reduction capacity and level of community participation for each action to measure progress and performance. The City will review the actions within the Plan to understand the effectiveness of individual measures as well as the Plan as a whole. The target indicators for actions identify the level of participation and performance required to achieve the expected level of GHG reduction. The City will identify successful measures and reevaluate or replace underperforming actions to manage success of the Plan over time.

Monitoring and Reporting on Plan Implementation

IMPLEMENTATION FLEXIBILITY

Implementation of the Climate Action Plan will require the City to be nimble and flexible. The science and policy surrounding climate change are continually evolving. Over the coming decades, new technologies will become available and new State and Federal laws will pass that influence how GHGs are measured and mitigated. To remain effective, the City will need to evolve its climate protection efforts accordingly. Regular updates (e.g., every five years) to the GHG inventory, climate change impact assessment, and strategies and measures will ensure that the Plan remains effective and relevant.



As implementation occurs, each strategy, measure, and action must be continuously assessed and monitored.

Upon adoption the Plan's measures and actions will continue to be or begin to be implemented by the City. In order to track progress, the City will evaluate and report on the progress of implementing the Plan's measures and actions annually in conjunction with the 2030 General Plan and Sustainability Annual Report and the Livability Index. To the extent feasible, the City will use the Plan's benchmarks and target indicators as part of the Livability Index. This ongoing monitoring will enable the City and residents to see where progress is being made and where further efforts and additional resources may be needed.

The Plan identifies the time frame for which each action will be implemented. The City will develop an implementation schedule based on staff requirements and funding opportunities available for implementing the actions outlined in the Plan. Priority will be given to projects based on cost effectiveness, GHG reduction potential, available funding, and the ease and length of time for implementation. However, some actions may not be completed as indicated due to budget or resource constraints.

Administration and Staff

Within the Plan the City has identified responsible departments for each action. The City will also assign a coordinator to oversee the implementation of all actions outlined in the Plan. To increase efficiency and reduce costs, the City will integrate these actions into the context of existing workloads and programs whenever possible. Climate action will be a part of standard operating procedure.

Financing and Budgeting

The City will incur costs to implement some of the actions outlined in the Plan. These include initial start-up, ongoing administration, and enforcement costs. While some actions will only require funding from public entities, others will result in increased costs for businesses and residents. However, most of the actions provide substantial savings in the long term. The City will be diligent in seeking strategic funding opportunities and use partnerships to share the cost.

4.6 METHODS OF IMPLEMENTING ACTIONS

The City will implement the measures and actions of the Plan through many tools and activities that can be grouped according to the five categories listed below.

- **New Ordinances.** Several of the actions in the Plan are implemented through new regulations adopted by the City, such as the Residential or Commercial Energy Conservation Ordinances (RECO/CECO). New ordinances will ensure that City requirements are in place to further the objectives of the Plan.
- **Code Updates.** Similar to adopting new ordinances, the City's existing codes will be updated to implement the Plan, such as incorporating CalGreen Tier 1 "reach codes" into the City's building codes and preparing the Green Development Code to update and enhance the existing Zoning Code.
- **Financing and Incentives.** Providing mechanisms for funding and allocating resources, such as the Commercial PACE program and various SMUD rebates, will help ensure that the Plan is successfully implemented by the City and residents and businesses.
- **Education and Outreach.** Education efforts about the objectives of the Plan and methods of implementation, and outreach to residents to include them in implementation efforts, such as the Energy Efficiency Challenge, will create support for the Plan and involve the community in its implementation.
- **Changes to City Services.** In addition to the actions applicable to community-wide activities, the City's internal operations will also need to change. Actions outlined in the Phase 1 Climate Action Plan will ensure that the City does its part to meet Plan objectives.

Role of New Development

Implementation of the Plan requires a change in the way the City and development community design and construct projects. New development projects will need to attain higher levels of energy efficiency and incorporate sustainable design standards. However with these additional regulations also come added benefits. State law allows new developments that are consistent with the actions in the Plan that reduce GHG emissions to be eligible for CEQA streamlining, per the provisions of CEQA Guidelines section 15183.5. Under these provisions, if a project can show consistency with a Climate Action Plan designed to reduce greenhouse gas emissions on an area-wide basis (e.g. communitywide), the level of environmental review for the project required under CEQA with respect to GHG emissions can be reduced considerably. This Climate Action Plan meets the criteria identified in section 15183.5 of the CEQA guidelines, and is therefore a "qualified CAP".

In order to help new development applicants plan and design projects consistent with the Plan, the City has identified in Appendix C the primary actions resulting in GHG emissions reductions, which apply to new development projects and existing development.

4.7 STRATEGY AND MEASURES READERS'GUIDE

The structure of the strategies, measures, and actions included in the remainder of this chapter are described below. The image on the next page explains the layout for each measure and set of actions included under each strategy.

STRATEGY, MEASURE, AND ACTION NUMBERING SYSTEM

Each strategy identified in this chapter includes several supporting measures and discrete actions. Strategies, measures, and actions are organized using their numeric order:

- Strategy 1
  - Measure 1.1
    - Primary Action 1.1.1
      - Supporting Actions
- Strategy 2
  - Measure 2.1
    - Primary Action 2.1.1
      - Supporting Actions
  - Measure 2.2
    - Primary Action 2.2.1
      - Supporting Actions
    - Primary Action 2.2.2
      - Supporting Actions

Strategies

Strategies organize the measures and actions that the City will use to reduce GHG emissions and adapt to climate change. The cover page for each strategy includes a title, representative icon, and co-benefits that may be achieved by implementing each strategy. Each strategy is then introduced and described. The introduction includes the GHG reduction potential that will be achieved and a list of implementing measures. Each strategy is followed by the measures and actions associated with implementation.

Measures

Measures organize the specific programs, policies, and actions that the City will carry out to achieve its climate action strategies. Each measure includes an introduction and description of pertinent background information, such as the City's objectives, past efforts, and future intent. Following the description is a summary of the measure's GHG reduction potential and community/public co-benefits. For GHG reduction measures, adaptation and resiliency potential are also identified. Each measure is followed by the actions associated with its implementation.

Actions

Within each measure are the detailed actions and steps that the City or others will take to implement the measures. Actions are organized to help ensure that appropriate staff and resources are allocated to implement the Plan.

Actions are included in tables following each measure description. They are split into two categories: primary actions and supporting actions. Primary actions include those actions that could be quantified for GHG reduction potential using verified methods, evidence, and reasonable assumptions to support calculations. For primary actions, the tables identify GHG reduction potential, target indicators, responsible City departments or other entities, and an implementation time frame for when the action will be completed. This information will be used by the City to track implementation and monitor overall progress.

There are numerous other actions included in the Plan that could not be quantified at this time, but are still expected to reduce GHG emissions. These supporting actions could not be quantified because of a lack of reliable data and/or methodology to quantify emissions reductions. Supporting actions are included in the Plan and treated as supplemental to the actions that were quantified.

READER'S GUIDE

Strategies and Measures

STRATEGY IDENTIFIER
Identifies the strategy name, number, and logo.

GHG REDUCTION CHART
Shows the GHG reduction potential of each strategy.

MEASURE LIST
Provides a list of measures associated with each strategy.

STRATEGY IDENTIFIER
Provides the strategy name and logo each measure is organized under.

MEASURE HEADER
Identifies the measure name and number.

MEASURE DESCRIPTION
Introduces the measure and associated actions.

STRATEGY DESCRIPTION
Introduces the strategy and associated measures.

GHG REDUCTION
Shows the GHG reduction potential of each measure.

ADAPTATION/RESILIENCY
Lists the potential for each measure to help adapt to the impacts of climate change.

CO-BENEFITS
Lists the community and public co-benefits that can be achieved by implementing each measure.

Actions

PRIMARY ACTIONS
Identifies the primary action and its number.

GHG REDUCTION
Shows GHG reduction potential of each primary action.

RESPONSIBILITY
Identifies which City department(s) and/or other organizations or agencies) are responsible for implementing each primary action.

TIMELINE
Identifies an estimated timeline for when the action will be completed. Actions may not be completed as indicated due to budget or resource constraints.

TARGET INDICATORS
Identifies key indicators that the City can use to measure implementation success.

SUPPORTING ACTIONS
Organizes actions that support the primary actions.

Action 1.1.1 Require new development within the city to demonstrate that it would reduce vehicle miles traveled (VMT)/capita by 35 percent compared to the statewide average VMT/capita based on project density, diversity, design, destination accessibility, and distance to transit.

GHG Reduction Potential
51,507 $MTCO_2e$/year

Implementation Time Frame				
2012-2015	2015-2020	2020 +	Annual	Ongoing
				X

Responsibility: Community Development

Target Indicators: Reduce VMT 28.6 percent per capita below 2009 statewide VMT average by 2020

Supporting Actions:

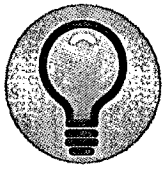
- Continue to analyze potential for building-energy savings from the transition to more compact urban form, which tends to increase densities and multi-family housing, and decrease the average area of residential units.
- Continue pursuing local, State, and Federal grants to fund a comprehensive update of the City's Zoning, Subdivision, and other development-related sections of the City Code in order to create designations that support more sustainable development patterns and streamline infill development.

EVERYONE CAN TAKE ACTION AGAINST CLIMATE CHANGE,

Take Action Today...

- Support City sustainable land use and complete neighborhood infill, mixed-use, and higher-density efforts and initiatives.
- Check your home's "Walk Score" at www.walkscore.com to find out how your home and neighborhood compare with other parts of Sacramento, and amenities and activities that are within walking distance of your home.

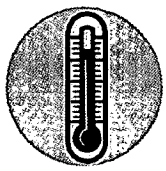
- Shift daily trips to walking, bicycling, transit, and carpooling to reduce driving.
- Drive more efficiently: avoid rapid acceleration or braking, observe the speed limit, remove excess weight, avoid excessive idling, and use cruise control or overdrive.
- Keep your car in top shape: make sure the engine is properly tuned, tires are inflated, the air filter is changed regularly, and that you use the manufacturer's recommended grade of motor oil.



- Replace incandescent light bulbs with compact fluorescent light (CFL), LED or other energy-efficient bulbs.
- Turn down water heater temperature and turn off your water heater during extended periods of non-use.
- Use only cold water to wash laundry.
- Air dry clothes whenever possible and avoid overusing the dryer (clean the lint trap, check on clothes regularly).
- Unplug appliances, televisions, and computers when not in use.
- In the winter turn your thermostat down three degrees during the day and ten degrees during the night. During summer turn up the thermostat by three degrees.
- Use SMUD energy saving tips. Visit www.smud.org.

- Reduce the amount of new products you buy, or if you do need to buy new products, look for items with less packaging, that are long-lasting, and made from recycled materials.
- Reuse things you already have instead of buying new products.
- Donate items you no longer need instead of throwing them away.
- Buy locally: support Sacramento businesses and local farmer's markets: www.california-grown.com.
- Recycle glass, metal, plastic, and paper products, as well as electronic devices.
- Use reusable bags every time you go shopping and reusable mugs when you go to coffee shops.

- Show us your blue thumb! Take the Spare the Water Sacramento pledge at: www.bewatersmart.info.
- Use water conservatively: avoid taking baths and limit showers to ten minutes or less, scrape dishes rather than rinsing them before putting them in the dishwasher, wash only full loads of laundry and dishes, and turn off the faucet when brushing teeth or shaving.
- Fix leaks right away.
- Reduce outdoor water use: water your yard 1-3 minutes less and only during off-peak hours, use drip irrigation or hand watering, use a broom to clean driveways and patios, adjust sprinklers to avoid overspray and repair leaks, and get an auto shut-off hose nozzle.



- Get familiar with emergency evacuation routes and shelter locations in the event of an extreme storm event.
- Drink lots of water and avoid going outside during poor air quality or extreme temperature events.
- Wear protective bug spray when outdoors.
- Check the air quality index at SMAQMD: www.sparetheair.com.

- Encourage friends, neighbors, and co-workers to reduce their carbon footprint: www.carbonfootprint.com/calculator.aspx.
- Attend a City or local homeowner's association meeting to lobby for infill and mixed-use development, complete streets/neighborhoods, and coordinated transit, bicycle, and pedestrian systems.
- Attend a water conservation workshop at the City of Sacramento Department of Utilities Water Conservation Office.
- Learn with SMUD! Take an electricity efficiency class at the Energy and Technology Center: www.smud.org.

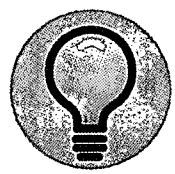
HERE ARE JUST SOME OF THE WAYS YOU CAN PARTICIPATE

...And Plan for Tomorrow

- Move into housing in a higher-density, mixed-use, or transit-oriented development.
- Find a job close to home or find a home closer to work.
- Telecommute or work from home more often in place of driving.

- Stagger work hours, carpool, and combine trips to reduce congestion and vehicles miles traveled if you need to drive.
- Use a car-sharing program like Zipcar, rather than owning a car or owning more than one car.
- Purchase a fuel-efficient vehicle and take advantage of the Clean Vehicle Rebate Project: www.energycenter.org.

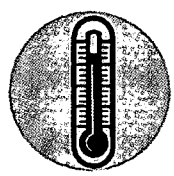
- Schedule a home energy audit through SMUD and participate in an energy efficiency program: www.smud.org/
- Increase heating and cooling efficiency: change the air filter regularly, tune up HVAC equipment, seal ducts, add more insulation, replace windows with dual pale models, plug door leaks, and install a programmable thermostat that allows you to adjust temperatures when you are away from home.
- Purchase Energy Star electronics and appliances that save energy. You may be eligible for SMUD, CEC or EPA rebates: www.smud.org or www.energy.ca.gov or www.epa.gov.
- Purchase SMUD green power generated from renewable sources: www.smud.org.
- Generate your own renewable energy: install solar panels, a solar water heater, or a wine turbine.



- Try to borrow or rent things you will only need to use for a short amount of time.
- Compost organic materials to use as garden fertilizer. Learn how at www.cityofsacramento.org.
- Plant a vegetable garden or participate in a community garden to access fresh produce close to home: www.cityofsacramento.org.
- Donate business waste that could be reused for art and educational purposes. Learn how at www.raftsac.org and www.recreate.org.
- Do your own waste audit at home or work to see what can be reduced, reused, recycled or composted, and then commit to making the change.
- Plan your next meeting or special event using Zero Waste principles.

- Schedule a Water Wise House Call to check for leaks and learn about potential water savings: www.cityofsacramento.org.
- Install low-flow or high-efficiency fixtures and appliances like showerheads, toilets, dishwashers, and washing machines. You may be eligible for rebates from the City of Sacramento Department of Utilities, SMUD, or PG&E.
- Greenscape your yard using drought-tolerant plants.
- Increase the amount of permeable surfaces and pavement allowing stormwater absorption.
- Install a plumbing system that reuses rainwater or graywater for irrigation.

- Plant a tree to reduce home energy consumption and provide shade.
- Install a cool roof on your home. You may be eligible for SMUD rebates: www.smud.org.
- Get vaccinated against vector-borne diseases.
- Use only native species when landscaping to preserve ecosystems.



- Join a community organization working to reduce GHG emissions and plan for climate change.
- Become a Sacramento Area Sustainable Business: http://sacberc/web/programs/ssbp/index.php.
- Become a Water Conservation Ambassador: www.sparesacwater.org.

ADDRESSING THE CHALLENGE OF CLIMATE CHANGE

SUSTAINABLE LAND USE

5 MEASURES – 26 ACTIONS

GHG REDUCTION POTENTIAL BY 2020= 51,507 $MTCO_2e$/YEAR

MOBILITY AND CONNECTIVITY

7 MEASURES – 30 ACTIONS

GHG REDUCTION POTENTIAL BY 2020= 107,894 $MTCO_2e$/YEAR

ENERGY EFFICENCY AND RENEWABLE ENERGY

4 MEASURES – 42 ACTIONS

GHG REDUCTION POTENTIAL BY 2020= 445,590 $MTCO_2e$/YEAR

WASTE REDUCTION AND RECYCLING

3 MEASURES – 23 ACTIONS

GHG REDUCTION POTENTIAL BY 2020= 79,404 $MTCO_2e$/YEAR

WATER CONSERVATION AND WASTEWATER EFFICIENCY

2 MEASURES – 18 ACTIONS

GHG REDUCTION POTENTIAL BY 2020= 17,267 $MTCO_2e$/YEAR

CLIMATE CHANGE ADAPTATION

7 MEASURES – 43 ACTIONS

COMMUNITY INVOLVEMENT AND EMPOWERMENT

3 MEASURES – 14 ACTIONS

196 WAYS TO CREATE A MORE SUSTAINABLE CITY

GHG REDUCTION POTENTIAL BY 2020= 701,662 $MTCO_2e$/YEAR

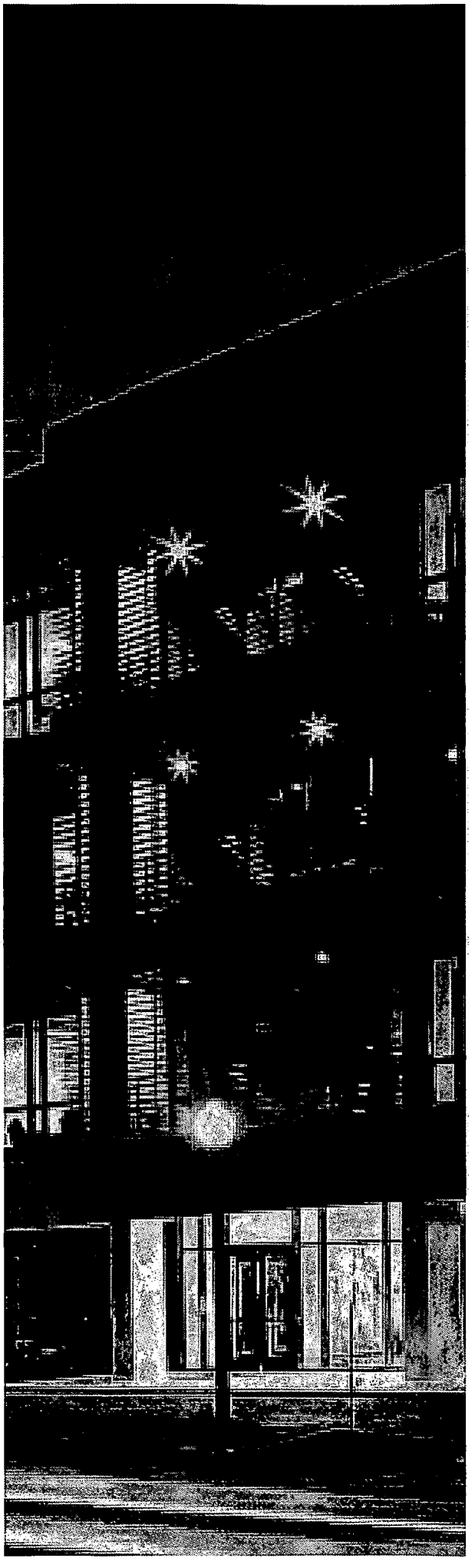
STRATEGY 1

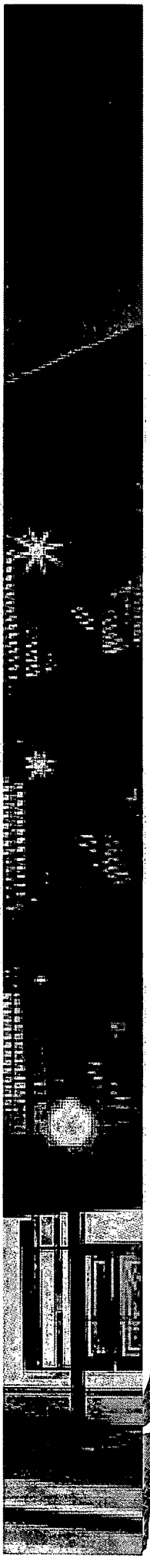
SUSTAINABLE LAND USE

CO-BENEFITS

- Lower Operating Costs for Businesses
- Increase Home and Building Equity and Resale Value
- Increase Building Rent/Lease Rates
- Keep Energy Dollars in the Community
- Lower Energy and Fuel Bills
- Improve Traffic/Air Quality
- Reduce Congestion
- Lower Commute Times
- Lower Energy Demand
- Improve Energy Security
- Conserve Water
- Improve Connections to Home, Services and Work
- Increase Access to Open Space
- Prevent Destruction of Natural Habitats
- Create a Healthy Living Environment
- Increase Social Interaction
- Improve Quality of Life

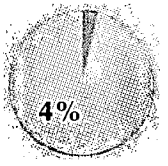
Using land efficiently, while preserving the character of existing neighborhoods, and providing for complete neighborhoods that incorporate natural resources and green infrastructure.





STRATEGY 1

SUSTAINABLE LAND USE



of total 2020 GHG reductions = 51,507 $MMTCO_2e$/year

MEASURES

1. Promote Sustainable Growth Patterns and Infill Development
2. Create More Complete Neighborhoods
3. Encourage Mixed-use Development Projects
4. Require Sustainable Development Practices
5. Ensure Quality Development and Project Design

GOAL:

Reduce vehicle miles traveled (VMT) per capita in new development by 35 percent, compared to statewide averages.

Sustainable land use strategies include the use of more compact development patterns, a mix of land uses, complete neighborhoods, and "green" building practices. The places we live, the methods used to construct our homes, and where we work dictate how far and by what means we travel and how much energy we consume. In Sacramento the City's 2030 General Plan provides the foundation for the city's overall approach to achieve sustainable land use. This Sustainable Land Use strategy builds upon the goals and policies of the 2030 General Plan and complements the other strategies included in this Climate Action Plan and the objectives of the SACOG Regional Blueprint, particularly those that reduce GHG emissions from transportation and energy. The City's goal is to reduce vehicle miles traveled (VMT) per capita in new development by 35 percent, compared to statewide averages. The 2030 General Plan already results in an 8 percent VMT/per capita improvement by 2020 and 13 percent by 2035.

The City is largely built out and it is anticipated that most neighborhoods will experience little change; however, many key centers and corridors within the City are expected to experience infill and redevelopment and will accommodate a majority of the city's growth and development. Sustainable land use patterns will include more compact development patterns, "infill" and reuse of underutilized properties, intensify development near transit and mixed-use activity centers, and locate jobs closer to housing. According to the Local Government Commission (2009), in the long term (i.e., beyond 2020) combining a robust transit system with sustainable, compact, mixed-use development patterns can help reduce GHG emissions by as much as 11.5 $MTCO_2e$ per household.

Designing more complete neighborhoods and developing mixed-use projects increases the viability of sustainable modes of transportation, such as walking, biking, and transit use; lowers automobile dependency; and reduces trip lengths. Similarly, "green" buildings, when part of a broader sustainability plan, consume less energy, produce fewer emissions, protect occupant health, minimize waste, and create jobs. Collectively, Sustainable Land Use measures also help to create communities and buildings that are more resilient to the effects and impacts of climate change.

STRATEGY 1: SUSTAINABLE LAND USE

MEASURE 1.1: PROMOTE SUSTAINABLE GROWTH PATTERNS AND INFILL DEVELOPMENT

A majority of future development in Sacramento will occur within key infill opportunity areas and, to a lesser extent, in new growth areas adjacent to the city. Infill development includes redevelopment and re-use of existing sites and buildings in the City's existing neighborhoods and commercial corridors. Due to size, location, site conditions, and development economics and requirements, infill development faces many challenges. New growth areas include expansion of City boundaries to include development on undeveloped "greenfield" lands. A key objective in both cases is to create diverse, mixed-use, smart growth neighborhoods, centers, and corridors that sustain healthy communities, place people near their jobs and everyday needs, and provide the foundation for the use of sustainable modes of transportation that reduce dependence on the automobile.

The City of Sacramento has a robust Infill Program that includes an adopted Infill Strategy (2002) as well as a companion "Shovel Ready" program. The City dedicates staff to administering the City's infill policies and programs and identifying and promoting additional activities to encourage quality infill projects. The Infill Program provides plans, ordinances, and systems that anticipate and support quality infill development and strives to create and maintain a predictable and supportive development review process for infill development. The Shovel Ready program complements the Infill Program by proactively addressing infrastructure and planning issues for key infill sites so they can more easily develop. The City also has dedicated staff that monitor, plan, and manage new growth areas, consistent with the vision of the City. The City produces regular activity reports highlighting the City's efforts related to new growth areas.

The City is also currently implementing several actions that further the objectives of this measure, including updating the Zoning Code to support infill development. The City intends for this measure to implement key 2030 General Plan programs to update and maintain the Infill Strategy, expand the Shovel Ready program for key infill sites, provide guidance for mixed-use projects to achieve CEQA streamlining, and coordinate with other stakeholders in the region to promote sustainable development.

GHG Reduction Potential by 2020

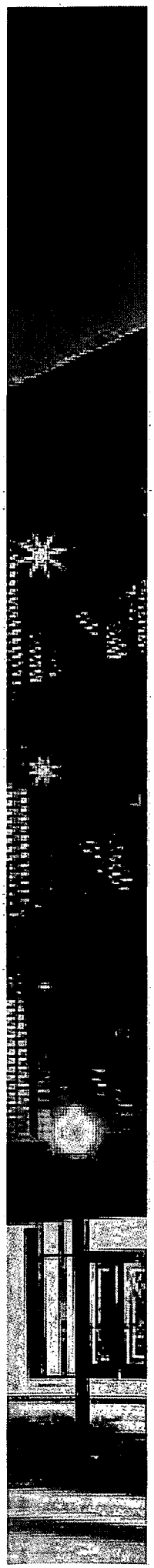
51,507 $MTCO_2e$/year

Adaptation/Resiliency

- Improve Impaired Air Quality
- Limit Conversion of Habitat and Loss of Native Species

Community/Public Co-Benefits

- Reduce Congestion
- Lower Commute Times
- Improve Connections to Home, Services, and Work
- Create a Healthy Living Environment
- Increase Social Interaction
- Preserve Farmland
- Prevent Destruction of Natural Habitats



STRATEGY 1: SUSTAINABLE LAND USE

MEASURE 1.1: PROMOTE SUSTAINABLE GROWTH PATTERNS AND INFILL DEVELOPMENT

Action 1.1.1 **Require new development within the city to demonstrate that it would reduce vehicle miles traveled (VMT)/capita by 35 percent compared to the statewide average VMT/capita based on project density, diversity, design, destination accessibility, and distance to transit.**

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020 +	Annual	Ongoing
51,507 $MTCO_2e$/year					✕

Responsibility: Community Development

Target Indicators: Reduce VMT 28.6 percent per capita below 2009 statewide VMT average by 2020.

Supporting Actions:

- Continue to analyze potential for building-energy savings from the transition to more compact urban form, which tends to increase densities and multi-family housing, and decrease the average area of residential units.
- Continue pursuing local, State, and Federal grants to fund a comprehensive update of the City's Zoning, Subdivision, and other development-related sections of the City Code in order to create designations that support more sustainable development patterns and streamline infill development.
- Implement the destination and accessibility (i.e., centers) policies of the General Plan to achieve an increase in the number of jobs and other attractions that can be reached within reasonable amounts of time by walking, biking, or transit.
- Implement the transit center policies of the General Plan to locate appropriate projects near transit and achieve an increase in the use of transit by people traveling to and from the projects.
- Implement the affordable housing and transit-oriented development policies of the General Plan to integrate affordable and below market-rate housing near transit.
- Provide CEQA streamlining benefits for residential mixed-use projects and Transit Priority Projects pursuant to State Law (SB375), consistent with 2030 General Plan.
- Work with regional partners to adopt and implement guidelines that will protect and preserve open space, prime farmland and key habitat, including wildlife and riparian corridors.
- Recognize the value of agricultural, habitat, and open space lands as carbon sinks, and establish easements and other mechanisms to preserve them.
- Support the implementation of the SACOG Sustainable Communities Strategy through implementation of the 2030 General Plan and encouraging infill development in Transit Priority Project areas.

STRATEGY 1: SUSTAINABLE LAND USE

MEASURE 1.2: CREATE MORE COMPLETE NEIGHBORHOODS

Sacramento has a wide variety of neighborhoods, often defined by a public amenity or commercial center. However, many of Sacramento's neighborhoods were designed and built in such a way that residents are physically separated from stores, work, schools, community services, and open spaces. This separation has fostered a dependence on automobiles and longer and more frequent automobile trips. How neighborhoods are organized and what they include is a major factor in transportation choice and trip lengths required for daily activities and quality of life issues, such as raising a family, commuting to work and school, shopping for food, operating a business, and participating in community activities. More complete neighborhoods can foster livable neighborhoods that place services, jobs, gathering places, and resources closer to where people live, and, in turn, provide more opportunities for people to walk and bike rather than make frequent and longer automobile trips.

A complete neighborhood is one where all residents have access to amenities and resources. Most of Sacramento's existing neighborhoods are built out and it is not expected that significant changes will occur in these areas in the future. The 2030 General Plan has made it a priority to preserve existing neighborhoods, but to also enhance their physical layout and land use mix through infill and redevelopment of nearby opportunity areas so that residents can easily access public transit, parks, shopping, childcare centers, farmers markets, and restaurants. For new growth areas and major infill areas, the 2030 General Plan requires that new neighborhoods include all the elements of a complete neighborhood.

The City intends for this measure to implement the policies of the 2030 General Plan to enhance the City's existing neighborhoods to include elements of complete neighborhoods. The City will also proactively plan residential neighborhood centers in areas that lack services to provide places for additional housing and access to shopping and services, employment opportunities, and transportation options. For new neighborhoods the City will create a green neighborhood checklist that will be used to ensure development of complete, sustainable neighborhoods.

Adaptation/Resiliency

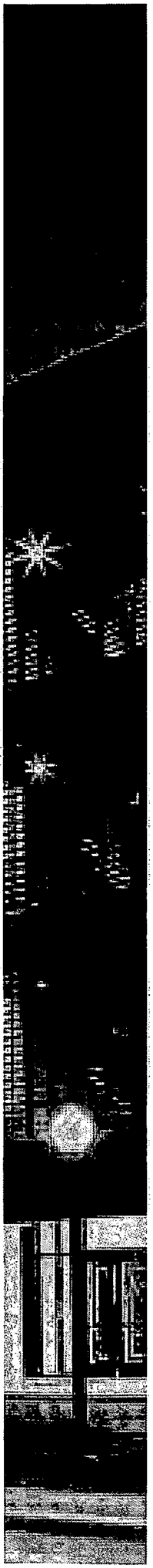
- Improve Impaired Air Quality

Community/Public Co-Benefits

- Improve Traffic/Air Quality
- Reduce Congestion
- Lower Commute Times
- Improve Connections to Home, Services, and Work
- Create a Healthy Living Environment
- Increase Social Interaction
- Improve Quality of Life

Supporting Actions:

- Proactively plan residential neighborhood centers for existing neighborhoods (rather than waiting for development plans to be submitted), either as Community Plan Updates or City-initiated Community Plan Amendments.



STRATEGY 1: SUSTAINABLE LAND USE

MEASURE 1.3: MIXED-USE DEVELOPMENT PROJECTS

Mixed-use development combines homes, shopping and gathering spaces (e.g., restaurants, cafes), work places, and civic uses, placing these key community elements and destinations closer to one another and within a short walk, bike ride, or near a transit stop. Mixed-use developments take many forms, but generally are either vertical, meaning that uses vary from one floor to another in a building (e.g., apartment above a storefront) or horizontal (e.g., side-by-side storefront for office and retail). By bringing different uses closer together, residents and employees are more likely to walk or ride a bike to nearby stores and services, or only need to take short car trips. Biking, walking, and short trips can benefit the health of residents, and reduce traffic congestion and energy consumption for transportation, which leads to reduced GHG emissions.

The City intends for this measure to implement the policies of the 2030 General Plan to encourage mixed-use projects, remove barriers to their development, and provide incentives to facilitate their review, processing, and construction. While historically mixed-use developments have primarily been developed in Sacramento's Downtown and Mid-town areas, the City will focus on encouraging mixed-use projects in outlying commercial and transit centers, along commercial corridors, and in major employment centers. The City will also revise the Zoning Code, as part of the Green Development Code update, to allow for a greater mix of uses in the city's neighborhoods, corridors, and centers.

Adaptation/Resiliency

- Improve Impaired Air Quality

Community/Public Co-Benefits

- Improve Traffic/Air Quality
- Reduce Congestion
- Lower Commute Times
- Improve Connections to Home, Services, and Work
- Create a Healthy Living Environment
- Increase Social Interaction
- Improve Quality of Life

Supporting Actions:

- Implement the mixed-use policies of the General Plan to achieve an increase in the diversity of uses in urban and suburban developments.
- Improve the job-housing balance by revising the Sacramento City Zoning Code to allow for a greater mix of uses in neighborhoods, corridors and centers.

STRATEGY 1: SUSTAINABLE LAND USE

Supporting Actions:

- Amend the Subdivision Ordinance to include standards for street and lot configuration to accommodate solar access. Amend City Zoning Code to provide standards for site design and building orientation to optimize potential for passive solar design.
- Reduce Impact Fees to more accurately reflect the impacts associated with all types of building, including Green Building, such that those building practices that result in lower impacts have lower fees.
- Encourage development projects to use sustainable building materials that are sourced and processed locally and/or contain recycled materials.
- Review and revise the City Code for consistency with the 2030 General Plan, including but not limited to: Zoning Code, subdivision regulations, street design standards, parking regulations, annexation regulations, and design guidelines.
- Develop and adopt development standards for bicycle support facilities (e.g., bicycle racks, personal lockers, showers, other support facilities) which meet or exceed CalGreen Tier 1 requirements.
- Develop standards that require developments of a certain size to include dedicated parking for electric cars and NEVs.
- Develop a fast-track permit process for electric vehicle charging stations on private property.

Green buildings will save residents and businesses money on energy, water, and maintenance; enhance residential health; and result in greater worker productivity through improved air quality and day lighting.

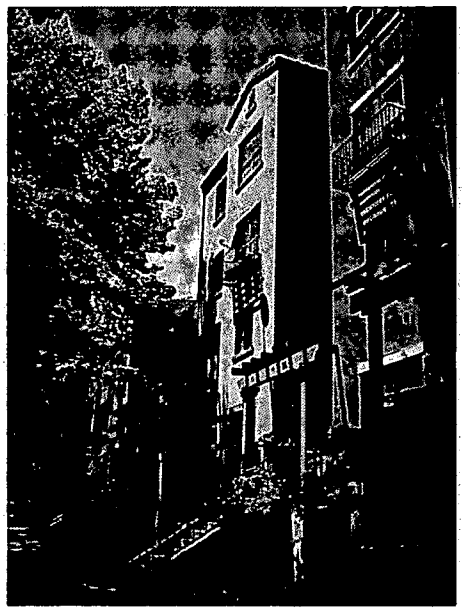
STRATEGY 1: SUSTAINABLE LAND USE

MEASURE 1.5: ENSURE QUALITY DEVELOPMENT AND PROJECT DESIGN

Quality development and project design concerns the characteristics of the public realm, that is, the area of the city experienced from the street, sidewalk, plaza, or public park. It includes the arrangement, appearance, and functionality of buildings, public spaces, streets, transportation, and open spaces. More specifically, quality development and project design address how the built environment can positively affect the experience of people living, working, or moving throughout the city. Neighborhoods, centers, and corridors that are more enjoyable can help make walking and bicycling a part of daily life and create desirable gathering places near homes and jobs, reducing the need to drive to other areas.

The City of Sacramento has adopted guidelines, standards, and processes to create well-planned mixed-use communities that are diverse, but also aesthetically unified. The City has a Design Review Director and staff who review development projects for consistency with the urban design policies of the 2030 General Plan, Neighborhood Design Guidelines, City's Design Review Code, and other area-specific design guidelines, ordinances, and standards.

The City intends for this measure to implement the policies of the 2030 General Plan to create a distinct, high-quality built environment that reflects Sacramento's unique character.



Adaptation/Resiliency

- Improve Impaired Air Quality
- Limit Conversion of Habitat and Loss of Native Species
- Improve Efficiency of Infrastructure

Community/Public Co-Benefits

- Increase Home and Building Equity and Resale Value
- Improve Traffic/Air Quality
- Reduce Congestion
- Increase Access to Open Space
- Create a Healthy Living Environment
- Increase Social Interaction
- Improve Quality of Life
- Keep Energy Dollars in the Community

STRATEGY 1: SUSTAINABLE LAND USE

MEASURE 1.5: ENSURE QUALITY DEVELOPMENT AND PROJECT DESIGN

Supporting Actions:

- Implement the urban design policies of the 2030 General Plan to enhance walkability and connectivity and improve street network characteristics within a neighborhood.
- Provide incentives for development projects that separate the costs of rented parking from leased building space so that the charges from parking are borne more explicitly by the user.
- Incorporate a parking cash-out program option into the TSM ordinance.
- Limit parking in areas of the City that are readily served by transit and are accessible by bicycle by limiting on-street parking, and reduce minimum parking requirements standards over time, and promote shared parking programs.
- Provide accessible public park or recreational open space within one-half mile of all residences and restore public access along all waterways and riparian corridors (Sacramento and American Rivers, urban creeks).

Neighborhoods, centers, and corridors that are well designed will make walking and bicycling a part of daily life and create desirable gathering places near homes and jobs, thereby reducing the need to drive to other areas.

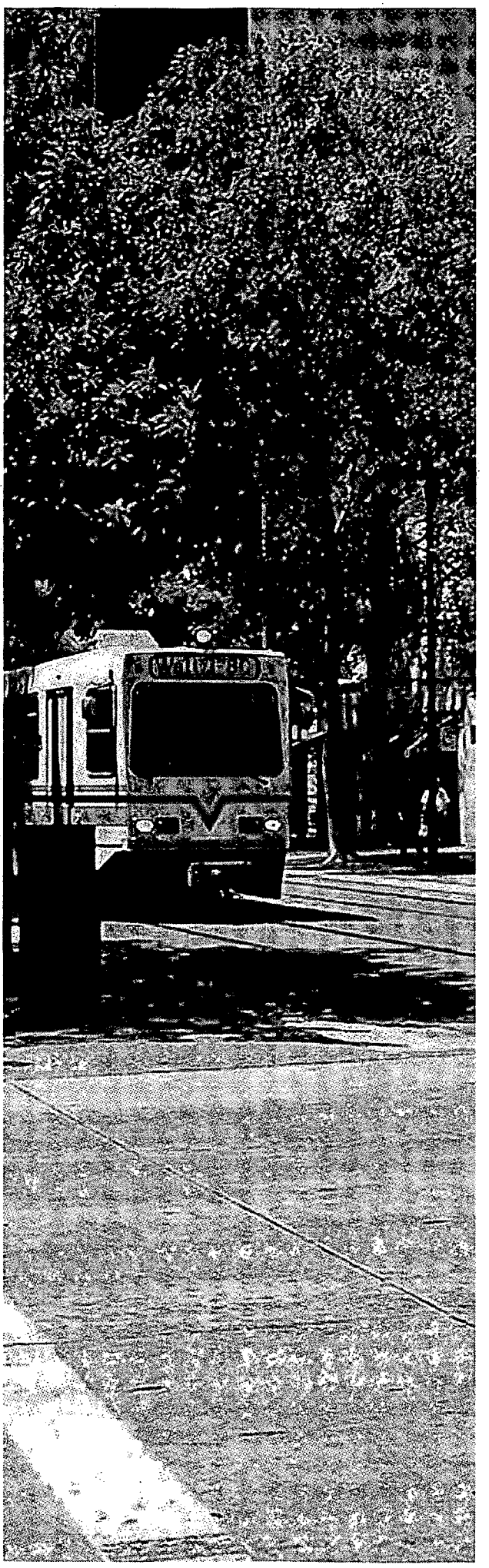
STRATEGY 2

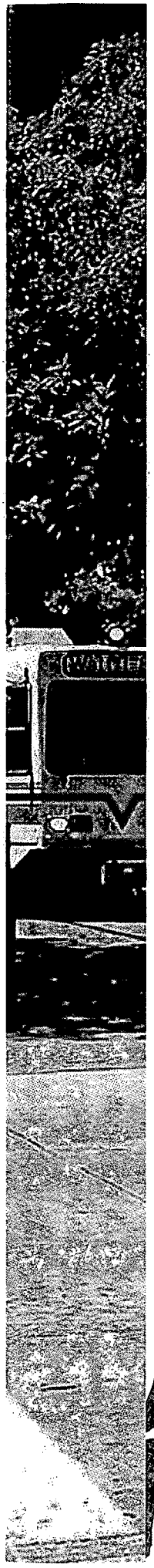
MOBILITY AND CONNECTIVITY

CO-BENEFITS

- Lower Operating Costs for Businesses
- Lower Energy and Fuel Bills
- Improve Traffic/Air Quality
- Reduce Congestion
- Lower Commute Times
- Improve Connections to Home, Services, and Work
- Lower Energy Demand
- Create Jobs
- Increase Recreation Choices
- Improve Public Health
- Create a Healthy Living Environment
- Improve Quality of Life

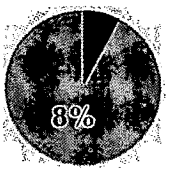
Creating a connected multi-modal transportation network that increases the use of sustainable modes of transportation (e.g., walking, biking, transit) and reduces dependence on automobiles.





STRATEGY 2

MOBILITY AND CONNECTIVITY



of total 2020 GHG reductions = 107,894 $MMTCO_2e$/year

MEASURES

1. Multi-modal Travel Options
2. Improved Pedestrian Environment
3. Increased Bicycle Mode Share
4. Increased Transit Mode Share
5. Low Emission Vehicles/Efficient Goods Movement
6. Connected Transportation System
7. Transportation Demand Management

GOALS:

Reduce total communitywide vehicle miles traveled (VMT) per capita, at minimum of 7 percent by 2020 and 16 percent by 2035.

Gas and diesel consumption by vehicles is the largest source of GHGs in Sacramento, making up 48 percent of citywide emissions. While considerable action is needed to reduce vehicle emissions, there are many benefits for doing so. Reducing vehicle miles traveled (VMT) by increasing the availability, efficiency, and appeal of alternative forms of transportation, such as walking, bicycling, and riding public transit, will not only reduce GHG emissions, but will improve air quality, public health, and quality of life. The City's communitywide goals for VMT include a 7 percent per capita reduction by 2020, and a 16 percent per capita reduction by the year 2035. The City's goal for new development is to reduce VMT by 35 percent compared to statewide averages.

Land use and transportation are inextricably linked and decisions about land use planning and transportation funding greatly influence GHG emissions. A well-connected transportation network includes higher-density and mixed-use neighborhoods with complete streets that provide infrastructure for vehicles, bicycles, and pedestrians. Transit-oriented development reduces the number and distance of vehicle trips and encourages mode shifts to walking, biking, and public transit. Vibrant neighborhoods with safe and engaging pedestrian environments will encourage more people to choose walking or biking over automobile use.

While personal automobile use is a major source of vehicle emissions, goods movement also contributes significantly to GHG emissions. Shifting away from personal automobile use will make freight movement on highways more efficient by relieving congestion and improving traffic flow for all vehicles.

The City of Sacramento recognizes the importance of establishing an efficient, multi-modal transportation network that minimizes impacts to natural resources and improves the quality of life for city residents.

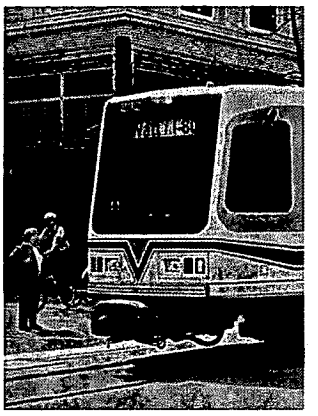
STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.1: MULTI-MODAL TRAVEL OPTIONS

To reduce GHG emissions and energy consumption, Sacramento residents need access to a variety of travel modes that provide for the diverse needs of users, including: commuting, running errands, traveling to entertainment, and recreation. By creating opportunities for the use of high-quality and accessible alternative modes of transportation, the City of Sacramento can influence modal choice. Expanded use of sidewalks and pedestrian trails, public transportation, bikeways, rail, and waterways will promote a healthy lifestyle, while improving air quality. Multimodal transportation systems can also be economically advantageous. A study by the Surface Transportation Policy Project noted that households in automobile-dependent communities devote 50percent more to transportation (more than $8,500 annually) than households in communities with more accessible land use and more multi-modal transportation systems (less than $5,500 annually) . While some trips may still require automobile use, options like carshare, rideshare, or vanpool services offer alternative choices.

The City of Sacramento will enhance multi-modal travel options through a number of actions. Adopting multi-modal design standards will lead to streets that are more complete, with a preference for alternative modes of transportation.

Incorporating traffic calming measures and green infrastructure into street design will make streets safer and more attractive for use by residents. A transportation infrastructure fee could be used to fund these improvements.



GHG Reduction Potential by 2020

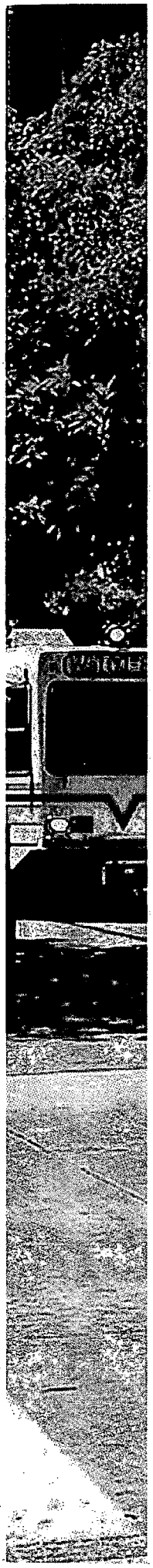
1,097 $MTCO_2e$/year

Adaptation/Resiliency

- Adjust to Transportation Energy Demand Increases
- Improve Impaired Air Quality
- Improve Efficiency of Infrastructure

Community/Public Co-Benefits

- Improve Traffic/Air Quality
- Reduce Congestion
- Improve Connections to Home, Services, and Work
- Lower Energy Demand
- Lower Energy and Fuel Bills
- Improve Public Health
- Improve Quality of Life



STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.1: MULTI-MODAL TRAVEL OPTIONS

Action 2.1.1 **Continue to increase the use of traffic calming measures within the City to reduce motor vehicle speeds and encourage pedestrian and bicycle trips. Traffic calming features may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others.**

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020 +	Annual	Ongoing
1,097 $MTCO_2e$/year					✕

Responsibility: Transportation

Target Indicators: 0.05 percent reduction in VMT

Supporting Actions:

- Conduct a study to analyze bike and pedestrian facilities on existing bridges to identify deficiencies and feasible improvements.
- Prepare and adopt a citywide Transportation Development Impact Fee Program to support the development of all travel modes needed for new development.
- Green Infrastructure Master Plan: Consider preparing a long-term planning document for integrating the City's green infrastructure — parkways, waterways, parks, open space, shaded bicycle parkways and pedestrianways.
- Conduct a study to identify underused rights-of-way, such as street lanes, drainage canals, and railroad corridors to convert to bikeways and/or pedestrian ways.
- Continue to consider additional one-way streets for two-way conversion to make them more transit-, bicycle-, and pedestrian-friendly.
- Conduct a study of the existing street network to identify streets that can be more complete based on adopted design standards and the policies in the 2030 General Plan.

STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.2: IMPROVED PEDESTRIAN ENVIRONMENT

Vibrant neighborhoods where residents are active and engaged are essential for a sustainable city. Providing an enhanced pedestrian environment will encourage residents to drive less often and consume less energy. While areas of Sacramento are highly walkable, over 400 miles of roads in the city lack sidewalks; roads with sidewalks often lack well-marked street crossings; and high-speed arterial roadways are designed to accommodate vehicles, which create unsafe conditions for pedestrians. To encourage walking as a mode of transportation, Sacramento residents need a universally accessible, safe, convenient, and integrated pedestrian system.

The Sacramento Pedestrian Master Plan estimates that the total cost of implementing all of the sidewalk and crossing improvements needed in the city will cost about $800 million. In order to be successful, pedestrianways must have a pleasant environment with amenities like public art, benches, landscaping, wide sidewalks, scaled lighting, and meaningful destinations. Pedestrianways should also be safe and convenient for users. The pedestrian system must include a complete and connected network of pathways, including carefully designed bridges and crossings that minimize pedestrian and vehicle conflicts. The City of Sacramento must pay particular attention to the location, type, design standards, and schedule of improvements for sidewalks.

The City of Sacramento plans to improve the pedestrian environment and encourage walking in a number of ways. Increasing pedestrian awareness through safety outreach programs will make residents more comfortable and more prepared for walking to their destinations. By continually updating the Pedestrian Master Plan and implementing and expanding facilities identified in the plan, the City will provide more opportunities for convenient and accessible use of sidewalks. Finally, speed management and improved crossing measures will ensure that residents can walk safely and comfortably.

GHG Reduction Potential by 2020

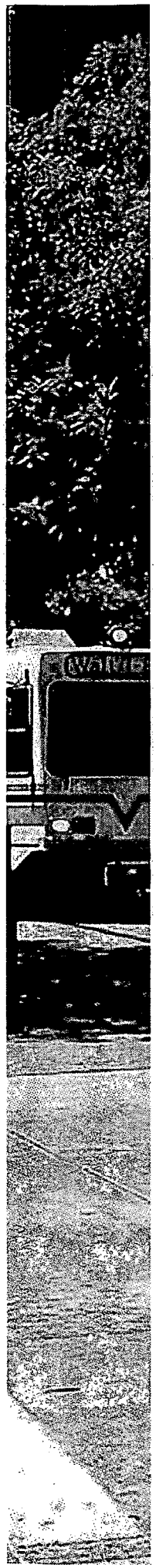
6,582 $MTCO_2e$/year

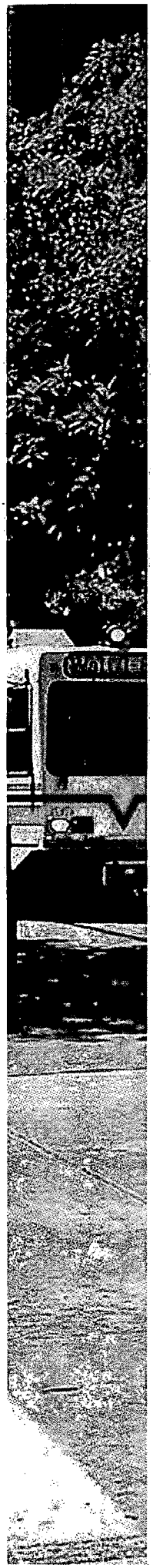
Adaptation/Resiliency

- Adjust to Energy Demand Increases
- Improve Impaired Air Quality
- Improve Efficiency of Infrastructure

Community/Public Co-Benefits

- Improve Traffic/Air Quality
- Reduce Congestion
- Improve Connections to Home, Services, and Work
- Lower Energy and Fuel Bills
- Increase Recreation Choices
- Improve Public Health
- Improve Quality of Life





STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.2: IMPROVED PEDESTRIAN ENVIRONMENT

Action 2.2.1 Implement Pedestrian Master Plan facilities to achieve an annual expansion of 1 percent of the existing (2011) system.

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020 +	Annual	Ongoing
6,582 $MTCO_2e$/year					✕

Responsibility: Transportation

Target Indicators: 0.3 percent reduction in VMT

Supporting Actions:

- Initiate a pedestrian safety outreach program and continue outreach to the public through DOT's website.
- Continue to identify and prioritize pedestrian improvement projects as part of the Transportation Programming Guide.
- Improve connections to transit, thereby extending a pedestrian's/cyclist's potential trip length.

Sacramento residents will have a universally accessible, safe, convenient, and integrated pedestrian system.

STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.3: INCREASED BICYCLE MODE SHARE

By choosing to bike instead of driving a car, residents reduce road congestion and improve air quality. Biking also promotes a healthy lifestyle and greater quality of life, especially for those without access to a car. The major impediments to biking are a lack of support facilities, connected bikeways, and public education. Sacramento can increase bicycle use by creating and maintaining a safe, comprehensive, and integrated bicycle system with support facilities throughout the city. Expanding street width, lowering volumes of motor vehicle traffic, and reducing speeds promote shared use by motorists and bicyclists. Providing bicycle support facilities such as bike racks, showers, and lockers, and increasing bicycle accessibility on transit, make biking more convenient.

The City of Sacramento has been working and will continue to work to enhance the bicycle system through a variety of actions. Sacramento has 55 miles of pathways and trails for bicycle use and 1,150 miles of public streets (Pedestrian Master Plan/Bikeway Master Plan). The City recently (2011) completed an update to the Bikeway Master Plan. By continually updating and implementing the Bikeway Master Plan, the City estimates that it will expand the existing bikeway system by 5 percent annually. The City is launching a new pilot bicycle rack program to install accessible bicycle racks in the public rights-of-way near businesses in the city. The City also offers low-cost rentals of bicycle lockers at key locations in the downtown. Continuing to install bicycle parking throughout the city will provide better support facilities for bicyclists using the more integrated bicycle system. Finally, bike-sharing programs may improve bicycling options for residents and visitors.

GHG Reduction Potential by 2020

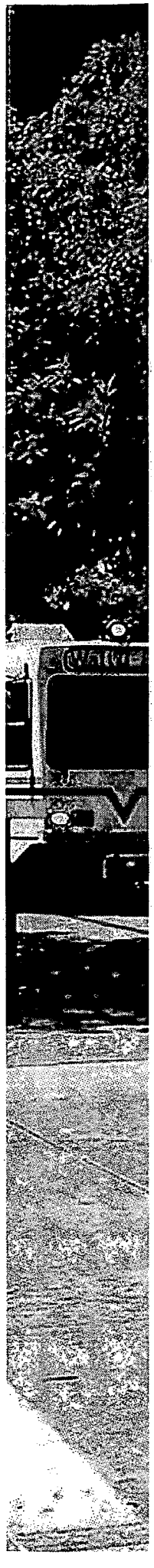
32,909 $MTCO_2e$/year

Adaptation/Resiliency

- Adjust to Energy Demand Increases
- Improve Impaired Air Quality
- Improve Efficiency of Infrastructure

Community/Public Co-Benefits

- Improve Traffic/Air Quality
- Reduce Congestion
- Improve Connections to Home, Services, and Work
- Lower Energy and Fuel Bills
- Increase Recreation Choices
- Improve Public Health
- Improve Quality of Life



STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.3: INCREASED BICYCLE MODE SHARE

Action 2.3.1 Implement Bikeway Master Plan facilities to achieve an annual expansion of 5 percent of the existing system.

GHG Reduction Potential
32,909 $MTCO_2e$/year

Implementation Time Frame				
2012-2015	2015-2020	2020 +	Annual	Ongoing
				✖

Responsibility: Transportation

Target Indicators: 1.5 percent reduction in VMT

Supporting Actions:

- Increase the amount of secure bicycle parking within the City by 50 locations annually for the next 5 years, funded in part by the Sacramento Metropolitan Air Quality Management District bike parking program.
- Work with community partners to establish a bicycle mode share goal and methodology.
- Continue to work with community partners to locate bicycle racks, lockers, and bike-share programs in or near transit stops to help cyclists lengthen their trip potential as well as facilitate the start and completion of the transit-rider's trip.
- Establish a bicycle mode share goal and establish a methodology for monitoring progress to achieve that goal.

More biking opportunities will promote a healthy lifestyle and greater quality of life, especially for those without access to a car.

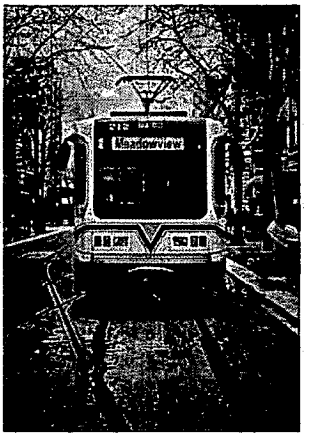
STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.4: INCREASED TRANSIT MODE SHARE

Regional Transit (RT) operates 64 bus routes and 37.5 miles of rail serving an average of 108,100 passengers daily in Sacramento County[1]. RT's fleet includes over 180 compressed natural gas (CNG) powered buses, which are much cleaner and emit fewer GHG emissions. In addition to RT, numerous other transit operators provide service in the city. Transit use produces fewer GHG emissions to move a larger number of people, making it a more efficient and sustainable mode of transportation than the single-occupant motor vehicle. A safe, comprehensive, and integrated transit system is an essential component of a vibrant transportation system.

One of the most important elements in increased transit use is the provision of direct pedestrian and bicycle access to transit station areas. Transit stops and hubs located along pedestrian and bicycle networks and near transit-oriented neighborhoods ensure that the greatest number of riders have convenient access. Comprehensive transit networks provide a variety of transit types for diverse users along intra- and inter-city routes. By extending existing lines, increasing frequency of service, and adding new routes, RT and other transit operators in the region can increase the transit mode share.

The City will support the efforts of RT and others to increase transit service in a number of ways. In addition to the heavy rail, light rail, urban bus, and neighborhood bus service, the City is conducting a study on the potential to implement a streetcar system. By ensuring that fares are affordable and bus stops are no further than one-quarter mile from neighborhoods, regional transit providers will ensure that transit is accessible to a diverse group of users.



GHG Reduction Potential by 2020

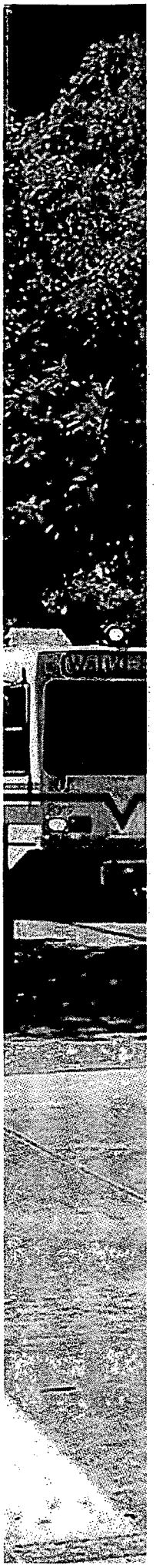
54,848 $MTCO_2e$/year

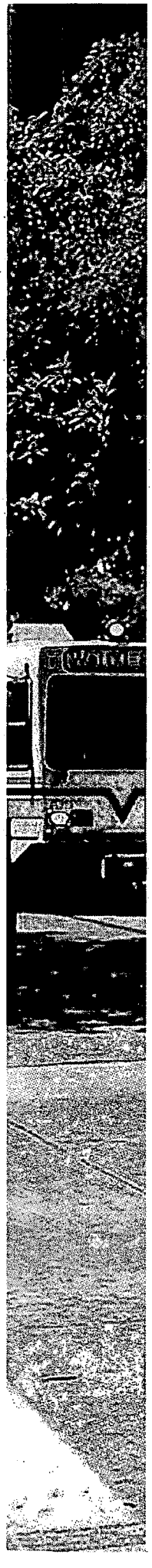
Adaptation/Resiliency

- Adjust to Energy Demand Increases
- Improve Impaired Air Quality
- Improve Efficiency of Infrastructure

Community/Public Co-Benefits

- Improve Traffic/Air Quality
- Reduce Congestion
- Improve Connections to Home, Services, and Work
- Lower Energy and Fuel Bills
- Create a Healthy Living Environment
- Create Jobs





STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.4: INCREASED TRANSIT MODE SHARE

Action 2.4.1 Work with transit operators and community partners to increase public transit service (i.e. frequency, number of lines and stops, dedicated transit lanes) above and beyond what is already planned in the Metropolitan Transportation Plan by 5 percent in 2020 and 10 percent in 2030.

GHG Reduction Potential
54,848 $MTCO_2e$/year

Implementation Time Frame				
2012-2015	2015-2020	2020 +	Annual	Ongoing
				✘

Responsibility: Community Development supported by Transportation

Target Indicators: 2.5 — 5 percent reduction in VMT

Supporting Actions:

- Work with transit operators and community partners to develop and implement a policy that expands affordable public transportation coverage to within one-quarter of a mile of all city residents.
- Expand transit and mode options to fill transit gaps, including streetcars, car-sharing, and bike-sharing by establishing a car-sharing program, bike-sharing facilities near car-sharing locations, and conducting a study on potential for streetcars.
- Work with transit operators and community partners to identify funding to expand affordable transit coverage.

Greater transit use will produce fewer GHG emissions while moving a larger number of people, creating a more efficient and sustainable transportation system.

STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.5: LOW EMISSION VEHICLES/EFFICIENT GOODS MOVEMENT

The way in which goods are transported, as well as the route taken, trip length, and fuel technology are all factors in efficiency. Rail is usually the most efficient way to transport goods, while air travel is usually the least efficient. All shipping modes may be made more efficient by reducing traffic jams and replacing aging or outdated infrastructure. Increasing the amount of goods shipped by rail and marine transportation, while also facilitating the clearance, timely movement, and security of trade, and providing facilities for intermodal transfer between all transportation modes will ensure efficient goods movement.

Alternative fuels, electric vehicles, and other cleaner forms of transportation help reduce the amount of GHGs emitted into the atmosphere. In 2009 the City of Sacramento consumed about 150,000 fewer gallons of fuel than in 2005 through the use of 640 alternative fuel vehicles. While local governments have limited opportunity to affect the technological improvements necessary to increase vehicle fuel efficiency, vehicle emissions standards enacted at the Federal, State, and regional levels can help lower GHG emissions. Federal, State, and Regional agencies can also provide the resources necessary to develop infrastructure that supports low-emission and alternative fuel vehicles.

Many of the measures aimed at increasing the mode shift to walking, biking, and transit, described earlier, will benefit goods movement by relieving congestion and improving traffic flows for all users. Increasing the efficiency of moving large diesel trucks will not only reduce fuel use, but also reduces emissions of soot, which contributes to poor air quality. The City of Sacramento will implement infrastructure improvements and use emerging technologies to support the use of alternative fuels and the efficient movement of people and goods. By collaborating between government entities on high emissions vehicle buyback programs and low emissions vehicle infrastructure, such as electric vehicle road networks and charging facilities, the City of Sacramento will provide opportunities for residents to use cleaner forms of transportation.

GHG Reduction Potential by 2020

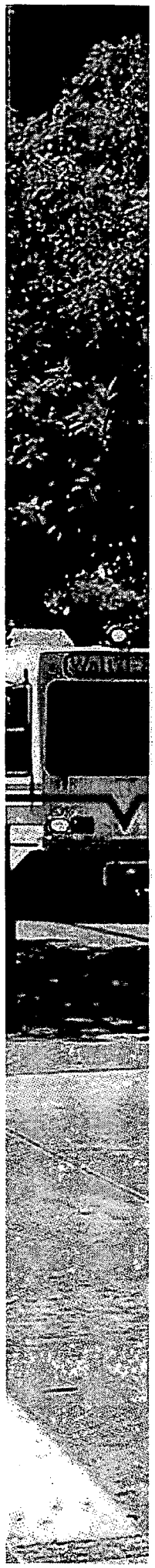
1,804 $MTCO_2e$/year

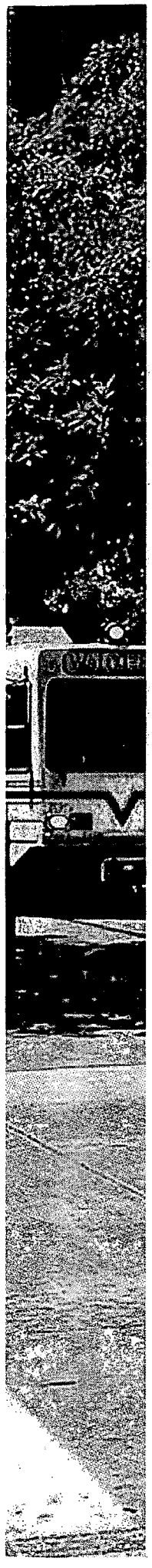
Adaptation/Resiliency

- Adjust to Energy Demand Increases
- Improve Impaired Air Quality
- Improve Efficiency of Infrastructure
- Reduce Damage to Infrastructure

Community/Public Co-Benefits

- Improve Traffic/Air Quality
- Reduce Congestion
- Lower Energy Demand
- Lower Energy and Fuel Bills
- Lower Operating Costs for Businesses
- Create a Healthy Living Environment





STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.5: LOW EMISSION VEHICLES/EFFICIENT GOODS MOVEMENT

Action 2.5.1 **Transport waste generated by residents and businesses to landfill facilities within the region rather than out of state, which will result in a reduction of over 1.2 million vehicle miles traveled per year.**

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020 +	Annual	Ongoing
1,804 $MTCO_2e$/year					✘

Responsibility: Utilities – Solid Waste Division

Target Indicators: Reduction of approximately 1,279,389 VMT per year

Supporting Actions:

- Participate in planning efforts for public charging infrastructure to support plug-in electric vehicles (PEVs). Provide public charging stations according to plan.
- Develop and implement Route Smart software for solid waste trucks to decrease VMT and increase fuel efficiency.

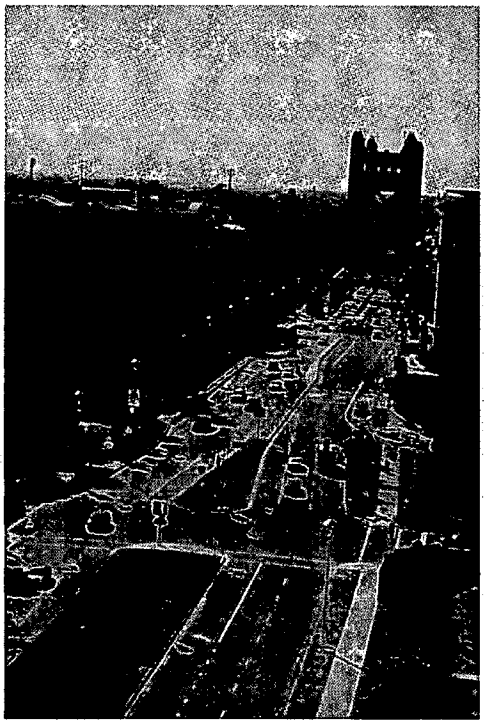
Alternative fuels, electric vehicles, and other cleaner forms of transportation will help reduce the amount of GHGs emitted into the atmosphere.

STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.6: CONNECTED TRANSPORTATION SYSTEM

In addition to creating a multi-modal network of complete streets, the City of Sacramento can increase efficiency and access through a connected transportation system. All modes of transportation should have networks that are cohesive and continuous, allowing residents to easily navigate the system. Improving the connectivity of the transportation system will improve efficiency, which will result in decreased GHG emissions.

The City of Sacramento will strive to remove and minimize the effect of natural and manmade barriers and obstacles between and within existing neighborhoods, corridors, and centers to ensure that the transportation network is continuous. The City has already prepared a study of crossings over the Sacramento River to identify major barriers to connectivity, and has been awarded funding to prepare a similar study for the American River. The City will also identify and fix gaps in the existing system to ensure that the transportation network is cohesive.



GHG Reduction Potential by 2020

10,431 $MTCO_2e$/year

Adaptation/Resiliency

- Adjust to Energy Demand Increases
- Improve Impaired Air Quality
- Improve Efficiency of Infrastructure

Community/Public Co-Benefits

- Improve Traffic/Air Quality
- Reduce Congestion
- Improve Connections to Home, Services, and Work
- Lower Commute Times
- Lower Energy and Fuel Bills
- Create a Healthy Living Environment

STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.6: CONNECTED TRANSPORTATION SYSTEM

Action 2.6.1 Improve traffic flow and associated fuel economy of vehicles traveling on city streets by synchronizing the remaining estimated 50 percent of the city's eligible traffic signals by 2035.

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020 +	Annual	Ongoing
10,431 $MTCO_2e$/year	✗	✗	✗		

Responsibility: Transportation

Target Indicators: 100 percent of signals synchronized

Supporting Actions:

- Identify major barriers to connectivity throughout the city and prioritize funding for improvements.

All modes of transportation will have networks that are cohesive and continuous, allowing residents to easily navigate the city.

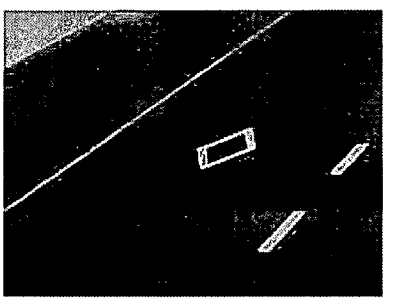
STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.7: TRANSPORTATION DEMAND MANAGEMENT

Transportation Demand Management (TDM) programs are strategies designed to reduce the demand for the automobile as a mode of travel. Cities can provide incentives for transit ridership, carpooling, telecommuting, and alternatives to single-occupant vehicles. Likewise, cities may use disincentives to discourage the use of single-occupant automobiles by reducing parking supply or implementing price controls. By encouraging the use of alternative transportation modes or alternative types of commuting, the vehicle demand on the existing roadway system is reduced and system efficiency is improved. In addition to reducing GHG emissions, TDM strategies can help reduce the need for costly capacity-enhancing improvement projects on roadways.

The City of Sacramento will continue to strive to decrease the dependence on single-occupant use motor vehicles through several TDM measures. The City approved an agreement with Zipcar in March 2011, which currently (August 2011) has 10 Zipcars available downtown and will have two cars available at the California State University of Sacramento (CSUS). The City is also in the process of updating and enhancing the Transportation Systems Management Program to be consistent with policies of the General Plan.

The City will promote commuter clubs and car-sharing programs as an incentive to reduce transportation demand. The Transportation Systems Management Program requires that developers of business projects contribute to the City transportation facility fund in order to expand transit and vanpool programs. The City will limit parking in areas of the city that are readily served by transit and accessible by bicycle, will reduce minimum parking standards, and promote shared parking. The City will also implement market price parking as a deterrent to increased transportation demand.



GHG Reduction Potential by 2020

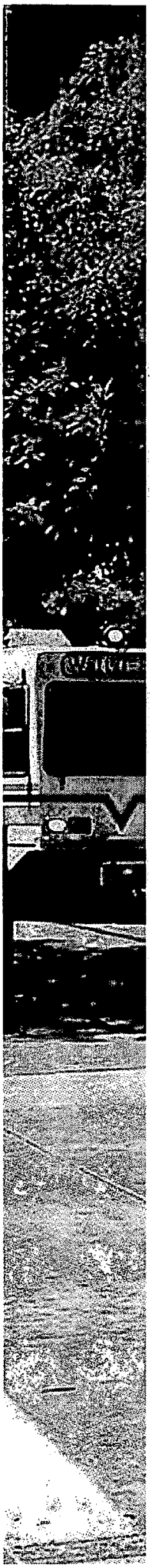
223 $MTCO_2e$/year

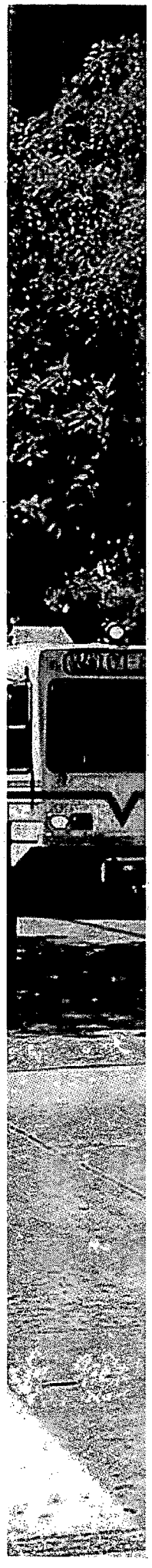
Adaptation/Resiliency

- Adjust to Energy Demand Increases
- Improve Impaired Air Quality
- Reduce the Urban Heat Island Effect

Community/Public Co-Benefits

- Improve Traffic/Air Quality
- Reduce Congestion
- Lower Commute Times
- Lower Energy Demand
- Lower Energy and Fuel Bills
- Create a Healthy Living Environment





STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.7: TRANSPORTATION DEMAND MANAGEMENT

Action 2.7.1 City employee furloughs have resulted in an estimated reduction of 493,072 vehicle miles traveled in the past three years. Continuing this reduction in commuting miles through 2020 by ongoing furloughs, or telecommuting or alternate schedules, would result in an estimated GHG reduction of 223 metric tons/year.

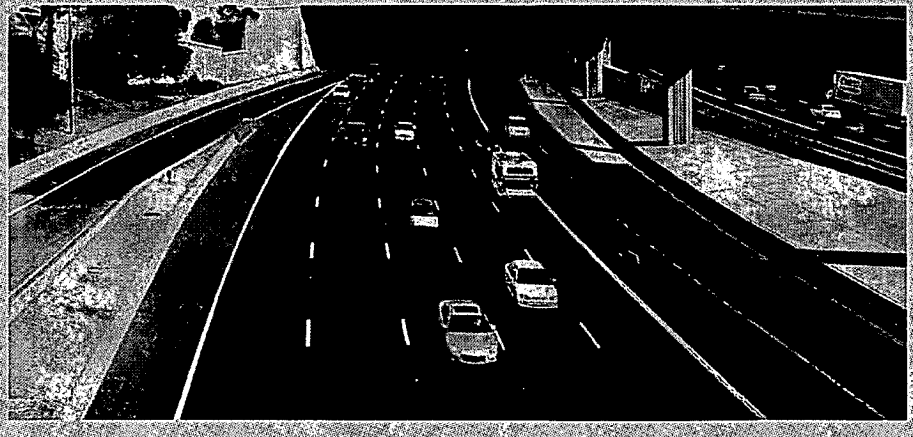
GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020 +	Annual	Ongoing
223 $MTCO_2e$/year					✕

Responsibility: General Services

Target Indicators: VMT reduction of 493,072

Supporting Actions:

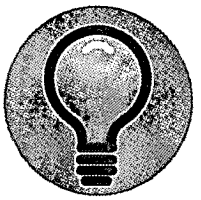
- Support SACOG's Commuter Club, which offers free services to help employers and commuters use carpool, bus, light rail, walking, biking, or telecommuting to get to work or run errands.
- Develop and implement a market price public parking program for on-street parking.
- Update and enhance the Transportation Systems Management Program consistent with the policies of the General Plan.
- Provide incentives for development projects that separate the costs of rented parking from leased building space so that the charges from parking are borne more explicitly by the user.



By encouraging the use of alternative transportation modes or alternative types of commuting, the vehicle demand on the existing roadway system will be reduced and system efficiency will improve.

STRATEGY 3

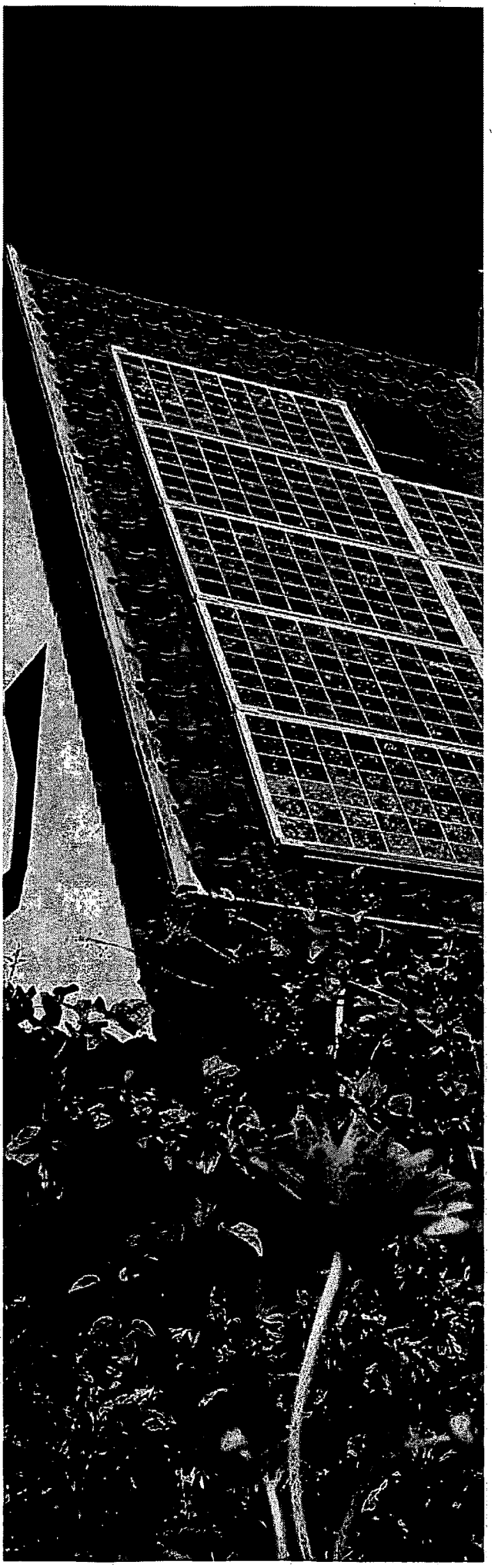
ENERGY EFFICIENCY AND RENEWABLE ENERGY

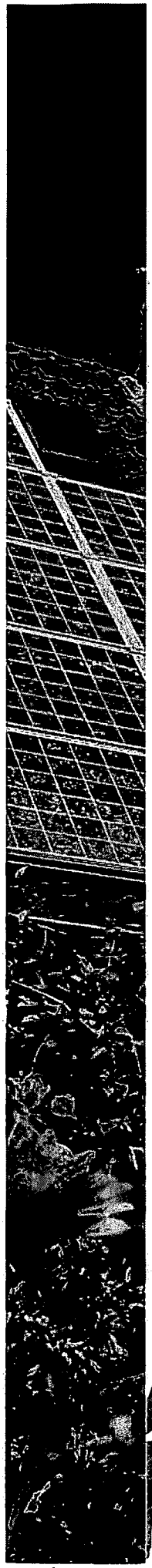


CO-BENEFITS

- Increase Energy Independence
- Lower Energy and Fuel Bills
- Lower Energy Demand
- Create Jobs
- Lower Operating Costs for Businesses
- Increase Home and Building Equity and Resale Value
- Conserve Water
- Reduce Waste
- Increase Public Awareness of Climate Change
- Create Climate Action and Sustainability Leaders

Increasing the energy efficiency of existing and new buildings and maximizing the use and generation of renewable energy.





STRATEGY 3

ENERGY EFFICIENCY AND RENEWABLE ENERGY

of total 2020 GHG reductions = 445,590 $MTCO_2e$/year

MEASURES

1. Energy Demand Management and Conservation
2. Increase Existing Building Energy Efficiency
3. Increase Energy Efficiency in New Buildings
4. Increase Renewable Energy Generation and Use

Goals:

Achieve zero net energy in all new construction by 2030. Achieve an overall 15 percent reduction in energy usage in all existing residential and commercial buildings by 2020.

Energy is an essential part of our everyday lives, from the lights that illuminate our homes to the machines and computers that operate our businesses. The energy used in buildings is a significant contributor to GHG emissions in Sacramento, accounting for more than 39 percent of total emissions (17 percent from residential and 22 percent commercial/industrial); however, we have substantial opportunities to reduce GHG emissions associated with energy use. Sacramento included a goal in the 2030 General Plan to reduce energy demand 25 percent by 2030 compared to 2005 levels. Increasing energy efficiency and conservation can considerably reduce homeowner and business energy bills.

The two key performance goals for the Energy Efficiency and Renewable Energy Strategy include: achieving zero net energy in all new construction by 2030; and achieving an overall 15 percent reduction in energy usage in all existing residential & commercial buildings by 2020.

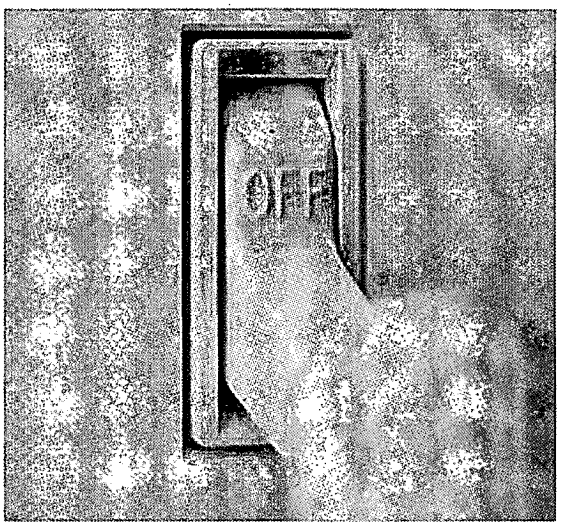
Energy-related measures are intended to increase energy efficiency and renewable energy generation in existing buildings and new developments, and motivate individuals to make choices that conserve energy. Significant reductions in energy demand can be achieved using construction techniques that make our homes and commercial and industrial buildings more efficient. Further emissions reductions can be achieved by using less gas and electricity (i.e., conservation) in our daily lifestyle choices and business practices, and by improving the energy efficiency of our household appliances and industrial processes. Finally, we can favor clean energy sources and generate our own energy by increasing the generation and use of renewable sources of electricity, such as hydro, wind, geothermal, and solar power.

STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.1: ENERGY DEMAND MANAGEMENT AND CONSERVATION

Our daily choices and habits have a significant impact on the amount of energy we consume. We live in an increasingly electronic world where nearly everything we do involves using energy. Energy demand management by energy suppliers and energy conservation by users can reduce the total amount of electricity and natural gas consumed. Energy demand management is typically a top-down approach to conserving energy where financial incentives and education are used by energy providers to modify energy consumption and encourage consumers to use less energy. Energy conservation, on the other hand, is a bottom-up approach that relies on consumers making choices and changing habits that result in decreased energy consumption. In addition to saving energy and associated costs, demand management and conservation help to prevent blackouts, reduce the need to rely on older, higher-emission power plants, and reduce the need for additional power supplies.

The City intends for this measure to work with energy providers (e.g., SMUD, PG&E) to provide incentives and encourage and educate residents and businesses to use less energy, such as: unplugging electronics and other equipment when not in use, setting air conditioners five degrees higher and heaters five degrees lower, turning off lights when not in use, enabling "power management" on computers, and turning them off at night.



GHG Reduction Potential by 2020

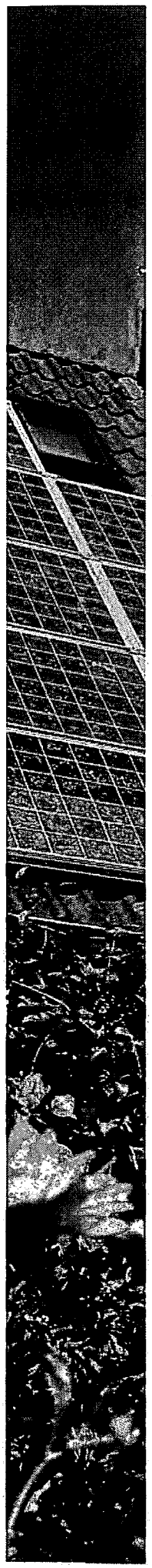
155,700 $MTCO_2e$/year

Adaptation/Resiliency

- Adjust to Energy Demand Increases
- Prepare for Energy Supply Variability
- Improve Impaired Air Quality

Community/Public Co-Benefits

- Lower Energy Demand
- Increase Energy Independence
- Lower Energy and Fuel Bills
- Increase Public Awareness of Climate Change
- Create Climate Action and Sustainability Leaders



STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.1: ENERGY DEMAND MANAGEMENT AND CONSERVATION

Action 3.1.1

Work with City partners (e.g., Sacramento County) and energy providers (e.g., SMUD, PG&E) to launch a comprehensive social marketing campaign that leverages available tools from the social sciences to influence behaviors that reduce energy demand and promote conservation. The campaign could include the following elements:

- **Continuous messaging and frequent prompts from a trusted messenger through media campaigns and branding of communications.**
- **Encouraging residents to set goals for reductions. Provide tools (e.g., online calculators) to track their progress toward meeting the goals.**
- **Providing normative comparisons showing carbon footprints or energy and water use of households compared to the average in the community.**
- **Providing public education on the need for energy efficiency, emissions reduction programs, utility incentives and cost savings associated with energy-efficient buildings.**
- **Launching an "energy efficiency challenge" campaign for city residents that challenges communities and neighborhoods to achieve the highest energy efficiency in return for pooled resources that could be applied to improvements or amenities.**
- **Launching energy efficiency campaigns targeted at businesses that provide business and property-owner education on the need for energy efficiency and emissions reduction programs and incentives.**

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020+	Annual	Ongoing
5,594 $MTCO_2e$/year	X				X

Responsibility: SMUD and PG&E supported by Community Development and General Services

Target Indicators: 25 percent participation rate with 1 percent reduction in energy consumption

Action 3.1.2

Support SMUD's Smart Grid program, which is estimated to result in 4 percent energy savings and 2 percent transmission savings by 2030.

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020+	Annual	Ongoing
69,215 $MTCO_2e$/year					X

Responsibility: SMUD in coordination with General Services and Community Development

Target Indicators: 4 percent energy savings and 2 percent transmission savings by 2030

Action 3.1.3

Support the SMUD and Tree Foundation Shade Trees programs, which reduce the urban heat island effect and associated energy consumption.

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020+	Annual	Ongoing
1,507 $MTCO_2e$/year					X

Responsibility: SMUD in coordination with General Services, Community Development, Transportation, Utilities, Parks and Recreation

Target Indicators: 3.84 million kWh/year reduction in energy consumption

STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.1: ENERGY DEMAND MANAGEMENT AND CONSERVATION

Action 3.1.4

Support SMUD's energy efficiency rebate and incentive programs:

- **Appliance Rebate: SMUD buys down the cost of energy-efficient electric appliances and products, offers rebates and incentives to customers, and affordable financing to purchase energy-efficient appliances.**
- **Lighting Rebates. SMUD offers standard rebates to residential and commercial customers for the installation of energy-efficient lighting, such as LED lamps, fixtures, and other forms of highly-efficient lighting.**
- **Electronic Incentives. SMUD provides incentives to retailers in the Sacramento region to stock the most energy-efficient major electronics, such as televisions and computer monitors.**
- **Custom and Prescriptive Lighting Incentives. SMUD encourages and offers incentives to qualifying systems for the successful installation of LED lighting in local commercial applications.**
- **Multi-family Retrofits. SMUD offers multi-family prescriptive rebates for multi-family residential customers seeking to retrofit units and common spaces to increase energy efficiency. This program offers rebates specific to the type of appliance, lighting, or improvement used, and encourages comprehensive analysis of the energy performance of each building.**

GHG Reduction Potential
79,384 $MTCO_2e$/year

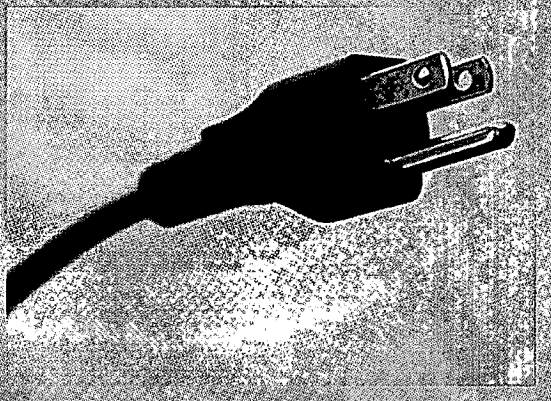
Implementation Time Frame				
2012-2015	2015-2020	2020 +	Annual	Ongoing
				✕

Responsibility: SMUD in coordination with General Services and Community Development

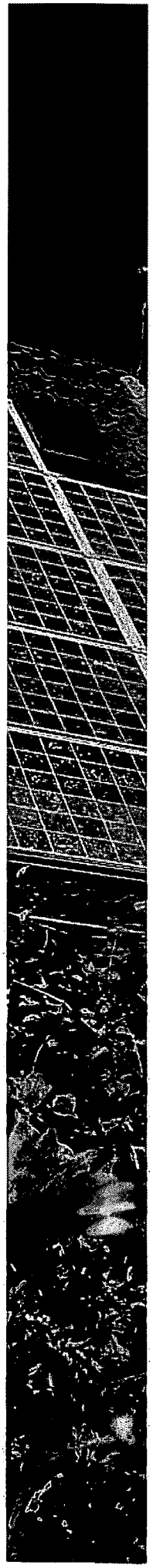
Target Indicators: Constant participation in the programs. No net decrease in participation.

Supporting Actions:

- Continue building on the City's existing partnerships, such as with Sacramento County's Business Environmental Resource Center (BERC) and Sacramento Municipal Utility District (SMUD), to promote energy efficiency and conservation for the business community and for individuals.



Energy-efficient choices and habits will significantly reduce the amount of energy we consume.



STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.2: INCREASE EXISTING BUILDING ENERGY EFFICIENCY

Many factors influence energy use, including: the type, age, and size of a building; level of insulation, size and type of windows, efficiency of lighting and appliances. Generally, the older a building is, the less energy-efficient it is. Of Sacramento's existing 195,000 housing units (2010), about 45 percent were built before 1970, 76 percent before 1990, and 83 before 2000 (US Census). Because existing buildings will continue to be used in the future, increasing the energy efficiency of existing homes and buildings can have a substantial impact on overall energy consumption, much more than the implementation of green building practices for new construction.

Recent changes in California's Title 24 building standards (i.e., CalGreen) will ensure that new buildings are much more energy efficient. However, buildings last for decades and efforts to reduce GHG emissions from buildings will also need to address the City's existing structures. A significant amount of the city's existing housing stock and commercial buildings will exist in 2020 and beyond. Retrofitting homes and commercial and industrial buildings to improve energy efficiency offers an opportunity to achieve considerable emissions reductions. Improving energy efficiency in existing buildings and facilities provides one of the most cost-effective strategies for reducing GHGs, because the energy savings can pay for the cost of the upgrades and retrofits over time.

The City intends for this measure to incorporate energy-efficient technologies and construction methods into existing building remodels and other improvements to existing structures, including:

- Replacing older lighting, appliances, and equipment with higher quality, energy-efficient products (e.g., LEDs; Energy Star-rated).
- Insulating attics and walls; weatherizing windows, doors, and the building envelope to reduce heating and cooling losses.
- Installing cool-roofing (i.e., highly reflective coating) and roof-top gardens to reduce heat absorption.
- Using smart meters and smart grid systems that use wireless technology to monitor and optimize energy use in real time.

For larger or more complex buildings, a professional commissioning study can fully assess the operational performance of buildings.

GHG Reduction Potential by 2020

107,559 $MTCO_2e$/year

Adaptation/Resiliency

- Adjust to Energy Demand Increases
- Prepare for Energy Supply Variability
- Adjust to Temperature Increases
- Reduce the Urban Heat Island Effect
- Reduce Home and Building Maintenance Costs
- Improve Impaired Air Quality

Community/Public Co-Benefits

- Increase Home and Building Equity and Resale Value
- Lower Operating Costs for Businesses
- Lower Energy and Fuel Bills
- Lower Energy Demand

STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.2: INCREASE EXISTING BUILDING ENERGY EFFICIENCY

Action 3.2.1 Develop and adopt a Commercial Property Assessed Clean Energy Financing Program (Commercial PACE program) to create a voluntary special assessment district to help finance energy efficiency retrofits of commercial establishments.

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020+	Annual	Ongoing
18,225 $MTCO_2e$/year	X	X			

Responsibility: Department of General Services

Target Indicators: Minimum of 90 PACE projects per year over 5 years, for a total of 450 projects

Action 3.2.2 Update and enforce Chapter 15.76 of the Sacramento City Code, also known as the Residential Energy Conservation Ordinance (RECO), which requires the implementation of mandatory energy and water conservation standards for existing residential properties when building permits are required for major remodels or additions. This measure was assumed to reduce residential energy consumption by 15 percent on average per project for which a building permit is pulled.

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020+	Annual	Ongoing
3,193 $MTCO_2e$/year	X	X	X		

Responsibility: Community Development

Target Indicators: 15 percent improvement in energy efficiency performance of 4,981 existing units

Action 3.2.3 Work with community partners to develop and implement a voluntary rental housing energy efficiency program to improve the energy and water efficiency of existing rental units (both single-family and multi-family). If the voluntary program does not achieve an average energy savings of 15% per unit in at least 10,000 units/year by the end of 2014, the program may switch to mandatory energy efficiency improvements for rental housing.

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020+	Annual	Ongoing
32,887 $MTCO_2e$/year	X				

Responsibility: Community Development

Target Indicators: 10,000 rental housing (both single-family and multi-family) inspections per year with 15 percent energy savings

Action 3.2.4 Develop and adopt a Commercial Energy Conservation Ordinance (CECO) that requires the implementation of mandatory energy and water conservation standards for all commercial and industrial properties. CECO would involve retrofitting existing commercial and industrial buildings for which a building permit is pulled for renovation or addition above a specified project size threshold.

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020+	Annual	Ongoing
50,071 $MTCO_2e$/year	X	X	X		

Responsibility: Community Development

Target Indicators: 15 percent reduction in energy consumption from affected existing building stock

STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.2: INCREASE EXISTING BUILDING ENERGY EFFICIENCY

Action 3.2.5 Continue to partner with SMUD to implement the Small Commercial Energy Efficiency Pilot Program, which provides incentives to small commercial customers to improve energy efficiency.

GHG Reduction Potential
1,219 $MTCO_2e$/year

Implementation Time Frame				
2012-2015	2015-2020	2020 +	Annual	Ongoing
X				

Responsibility: SMUD in coordination with General Services

Target Indicators: 3.1 million kWh/year reduction in energy consumption

Action 3.2.6 Support SMUD's Home Performance Program, which offers low-cost energy audits and rebates for energy efficiency upgrades to existing residential customers.

GHG Reduction Potential
1,964 $MTCO_2e$/year

Implementation Time Frame				
2012-2015	2015-2020	2020 +	Annual	Ongoing
X				

Responsibility: SMUD

Target Indicators: 207 single-family home retrofits with 30 percent improvement in energy efficiency
11 single-family home retrofits with 15 percent improvement in energy efficiency
2,205 multi-family unit retrofits with 20 percent improvement in energy efficiency

Supporting Actions:

- Support SMUD's low-income weatherization programs and Energy Efficient Remodel Program.
- Collaborate with SMUD, PG&E, and other partners to provide information at the public counter and on the City's website about energy efficiency, green building, passive solar design, rebates, and financing for energy efficiency retrofits.
- Continue to evaluate other voluntary programs and strategies for improving the energy efficiency of existing buildings and work with organizations including the Sacramento Association of REALTORS®, the Air Quality Management District, SMUD, and others that have an interest in this area.
- Identify funding to develop planning and design documents to assist property owners with appropriate retrofit options for historic and potentially-eligible properties that will comply with the Secretary of the Interior's Standards for the Treatment of Historic Properties.
- Explore the feasibility of incorporating residential into the City's forthcoming property assessed clean energy financing (PACE) program.
- Continue to explore and advocate for low-cost financing program options, such as the CHF Energy Upgrade Loan program, to assist homeowners and others in funding energy efficiency retrofits.

STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.3: INCREASE ENERGY EFFICIENCY IN NEW BUILDINGS

Sacramento will continue to experience population and job growth, which will result in the construction of new homes for residents and new buildings for businesses. According to development projections, by 2020 it is expected that there will be an additional 58,495 dwelling units and 80,229 jobs in the city, compared to 2005. Optimizing energy efficiency and incorporating passive heating and cooling approaches into structures that use natural ventilation to regulate interior temperatures is a critical element to achieve future GHG reductions and accommodate population and job growth. By using energy efficiency strategies and concepts in the planning, siting, and design of buildings, they can more effectively maximize the use of natural sun and air, and reduce energy bills for heating, cooling, and lighting.

In January 2011 the California Green Building Code (CalGreen) became effective, updating Title 24 of the California Code of Regulations for building standards. The CalGreen Code requires that new buildings reduce water consumption, increase energy efficiency, divert construction waste from landfills, and install low-pollutant-emitting finish materials. CalGreen standards also include two optional energy efficiency standards that the City may adopt to surpass minimum State requirements. Tier 1 option requires a building's energy performance to exceed basic requirements by 15 percent, while Tier 2 increases the standard to 30 percent.

The City intends for this measure to enforce local standards for energy efficiency that are 15 percent above CalGreen, remove barriers to achieving higher energy efficiency in buildings, and develop incentives to encourage high performance.

GHG Reduction Potential by 2020

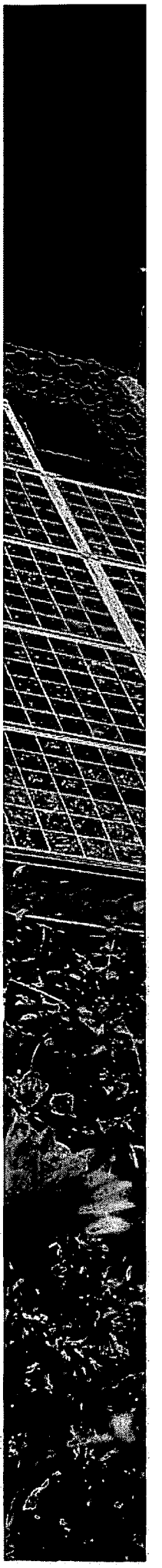
39,009 $MTCO_2e$/year

Adaptation/Resiliency

- Adjust to Energy Demand Increases
- Prepare for Energy Supply Variability
- Adjust to Temperature Increases
- Reduce the Urban Heat Island Effect
- Prepare for Variable Water Supplies
- Reduce Home and Building Maintenance Costs
- Improve Impaired Air Quality

Community/Public Co-Benefits

- Increase Home and Building Equity and Resale Value
- Lower Operating Costs for Businesses
- Lower Energy and Fuel Bills
- Lower Energy Demand
- Conserve Water



STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.3: INCREASE ENERGY EFFICIENCY IN NEW BUILDINGS

Action 3.3.1 **Achieve energy efficiency through increased residential density. Greenhouse gas emission reductions will be achieved through greater energy efficiency as new housing types shift from single-family to attached/multi-family, consistent with the General Plan.**

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020 +	Annual	Ongoing
8,474 $MTCO_2e$/year					✕

Responsibility: Community Development

Target Indicators: 39 percent of the city's housing stock as multi-family by 2020.

Action 3.3.2 **Require Tier 1 CalGreen Building Code standards for all new development starting in 2014.**

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020 +	Annual	Ongoing
30,535 $MTCO_2e$/year	✕				✕

Responsibility: Community Development

Target Indicators: 15 percent higher energy efficiency performance compared with basic mandatory CalGreen requirements

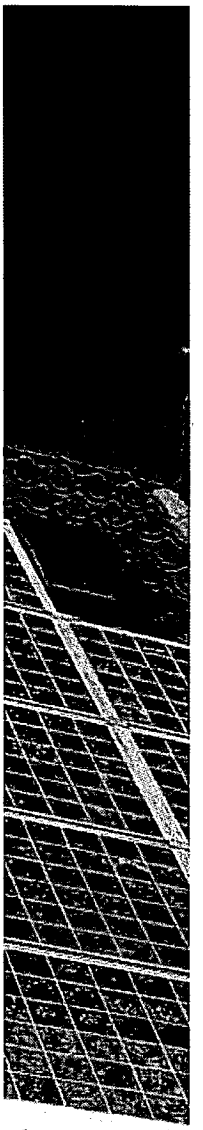
Supporting Actions:

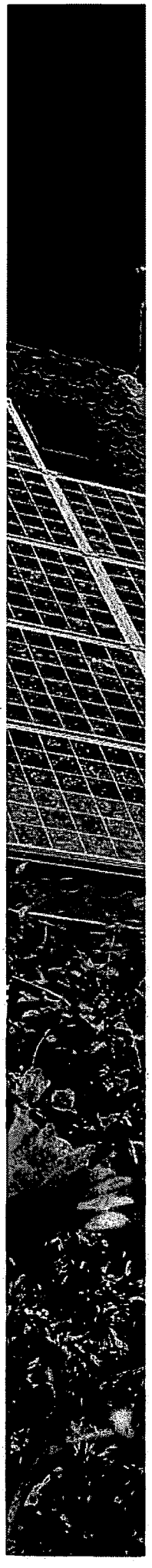
- Prepare passive solar design guidelines for new development, customized for Sacramento's latitude and solar angle.
- As part of the Green Development Code Update process, conduct a comprehensive review and update of existing codes and policies to remove barriers related to the implementation of green building strategies and to include incentives that are not currently in the City Code (i.e., Green Development Code).
- Work with City partners (e.g., Sacramento County) and energy providers (e.g., SMUD, PG&E) to prepare a Contractor and Developer "Did You Know?" checklist that identifies how to incorporate low- or no-cost energy efficiency designs, features, and materials into a project.
- Develop and maintain Impact Fee Reduction schedules for sewer, water, parks, and other services that are based on a building's performance and its impacts on public infrastructure and services.
- Work with City partners (e.g., Sacramento County) and energy providers (e.g., SMUD, PG&E) to develop a database that maintains Alternative Means Requests (AMRs) and associated research and findings that can be accessed by local building staff within the region. This database would allow easy access to AMRs and applications, allowing staff to quickly assess what additional information/testing is needed to monitor local green building projects. It could also eventually be linked to a best practices green building forum.

STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

Supporting Actions:

- Develop a Green Building Incentive Program that encourages and rewards projects that voluntarily achieve high performance green building standards (i.e. LEED or GreenPoint Rated certification) beyond mandatory CalGreen requirements.
- Continue to partner with SMUD to promote energy efficiency incentive programs for new construction, such as Savings by Design and SolarSmart Homes.
- Adopt energy-efficient outdoor lighting standards for new development. The following provisions should be taken into consideration to reduce energy consumption by future outdoor lighting:
  - Consider leveraging existing grant money to help fund this initiative. For example, both the City of Sacramento and the County have obtained funding from the Department of Energy Efficiency and Conservation Block Grant to convert existing high pressure sodium and mercury vapor streetlights to induction and LED streetlights.
  - Encourage lighting along the urban-rural edge not to exceed one-half the current maximum lighting standard.
  - Balance public safety with limits on continuous all night outdoor lighting in parks, sport facilities, construction sites, and other relevant areas.
  - Explore options for the use of bi-level/sensor-activated outdoor lighting or low-level security lighting with photo sensors.
- Update the City project selection process for publicly-subsidized buildings to include sustainability as a priority in both the bidding process and as an evaluation criterion.
- Encourage builders to supply ENERGY STAR appliances and HVAC systems for all new residential developments.
- Require that all new non-residential developments install high-efficiency boilers, where applicable, with a minimum of 85 percent efficiency.
- Develop and adopt building design guidelines that require conveniently located exterior electrical outlets to improve the ease of using electrical landscaping equipment and vehicles rather than gas-powered equipment.
- Work with energy providers (e.g., SMUD, PG&E) to promote the installation of solar thermal swimming pool heaters and solar water and space heating systems in existing and new developments.
- Work with energy providers (e.g., SMUD, PG&E) to encourage the industrial sector to participate in co-generation programs, where feasible.





STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.4: INCREASE RENEWABLE ENERGY GENERATION AND USE

Renewable energy is energy derived from naturally replenishing resources, such as sunlight, wind, geothermal heat, water flows, and biomass. The use of renewable energy sources in place of fossil fuels substantially reduces GHG emissions. The California Renewable Energy Resources Act (SB 1-2) obligates California electricity providers to provide at least 33 percent of their power from qualified renewable resources by the year 2020. As Sacramento's electricity provider, SMUD will be responsible for meeting this requirement. Residents and businesses can choose to buy energy from renewable sources through SMUD's Greenergy® program, which matches up to 100 percent of electric needs with purchases of renewable resources.

Solar and wind are potential renewable energy sources that Sacramento residents and businesses can generate on their own. Technologies that use these sources to generate renewable energy (e.g., solar panels or small-scale wind energy systems) can be added to existing homes and businesses or included in the construction of new buildings. However, increasing renewable energy generation in buildings is not without its challenges. The ability of residents and businesses to implement this measure will require local policies and regulations that support and allow them; coordination with SMUD and third party agencies and organizations to incorporate them into the electricity grid; and access to a variety of funding mechanisms to fund construction and maintenance.

The methods used to generate energy, primarily electricity, also influences the generation of GHG emissions. The cost and accessibility of fossil fuels (e.g., coal, oil, natural gas) to generate energy have resulted in the production of significant amounts of GHGs. Renewable energy sources, on the other hand, generally produce nominal GHG emissions. Energy providers offer direct opportunities for residents and businesses to use renewable sources of energy through programs and their choice of energy sources. But, residents and businesses also play a role in increasing renewable energy generation.

The City can also help to accelerate the increase of renewable energy by requiring new construction to be as efficient as possible, while also phasing in the incorporation of renewable energy onsite for larger projects. This will help move the community closer to achieving zero net energy in all new construction by the year 2030.

GHG Reduction Potential by 2020

143,322 $MTCO_2e$/year

Adaptation/Resiliency

- Prepare for Energy Supply Variability
- Improve Efficiency of Infrastructure
- Reduce the Urban Heat Island Effect
- Improve Impaired Air Quality

Community/Public Co-Benefits

- Increase Energy Independence
- Lower Energy and Fuel Bills
- Create Jobs
- Increased Competitive Advantage
- Increase Home and Building Equity and Resale Value

STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.4: INCREASE RENEWABLE ENERGY GENERATION AND USE

Action 3.4.1 **Update the Development Code to require that new single-family and multi-family residential projects of ten units or more install photovoltaic systems and participate in SMUD's SolarSmart Homes program.**

GHG Reduction Potential
71,134 $MTCO_2e$/year

Implementation Time Frame				
2012-2015	2015-2020	2020 +	Annual	Ongoing
	X			

Responsibility: Community Development

Target Indicators: 84 percent of new eligible units creating 40,108 systems

Action 3.4.2 **Update the Development Code to require that new commercial developments greater than 25,000 square feet and industrial developments greater than 100,000 square feet install renewable energy systems (including photovoltaic systems) that generate 15 percent of the project's energy demand onsite.**

GHG Reduction Potential
1,717 $MTCO_2e$/year

Implementation Time Frame				
2012-2015	2015-2020	2020 +	Annual	Ongoing
	X			

Responsibility: Community Development

Target Indicators: 15 percent of eligible projects, energy generated through on-site renewable energy generation

Action 3.4.3 **Support SMUD's Greenergy Program, which allows customers to opt in to pay an additional fee on their utility bill each month to promote local renewable energy projects and expanded use of renewable power supply.**

GHG Reduction Potential
70,471 $MTCO_2e$/year

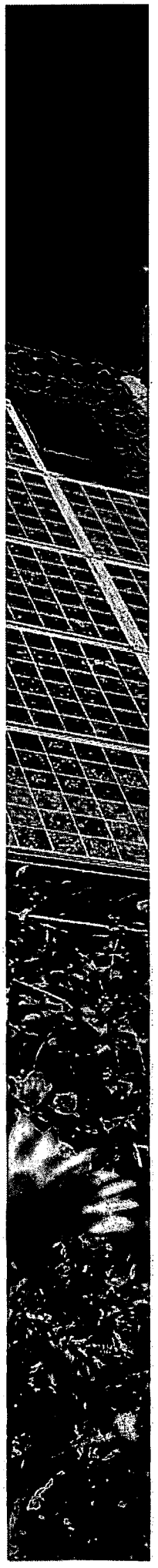
Implementation Time Frame				
2012-2015	2015-2020	2020 +	Annual	Ongoing
				X

Responsibility: SMUD

Target Indicators: Constant or increased participation in the program

Supporting Actions:

- Adopt a solar building permit fee schedule based on cost recovery of staff time, rather than valuation, to help reduce the permitting costs of solar PV and water heating systems.
- Work with SMUD and other regional partners to streamline the permitting and interconnection process for solar photovoltaic systems.
- Amend the Development Code to address how photovoltaic arrays may be used to meet parking lot shading requirements. If appropriate, expand the conditions under which shading credit can be given for photovoltaic arrays. If feasible, work with SMUD to identify priority areas and track progress.

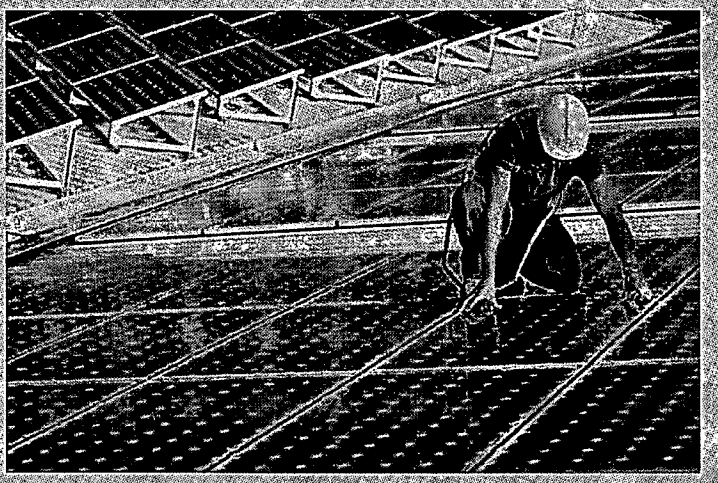


STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.4: INCREASE RENEWABLE ENERGY GENERATION AND USE

Supporting Actions:

- Continue to explore the feasibility of an advanced waste-to-energy conversion program, focusing on organics or other non-recyclable, problematic portions of the waste stream. Consider a "demonstration energy park," and identify future opportunities for a waste-to-energy program on a regional, cooperative basis with SMUD, Sacramento County, and others.
- Work with City partners (e.g., Sacramento County) and energy providers (e.g., SMUD and PG&E) to develop and maintain a "shovel ready" program for renewable energy development. Considerations should include:
  - Collaborating with SMUD in identifying possible sites for production of renewable energy using local renewable resources such as solar, wind, small hydro, and biomass.
  - Evaluating potential land use, environmental, economic, and other constraints affecting the development of renewable resources within city limits.
  - Establishing a protocol for reviewing a proposed alternative energy project against existing City policies and ordinances. The protocol should identify optimal locations and best means to avoid noise, aesthetic, and other potential land use compatibility conflicts.
- Promote the City's existing "Clean-Tech" zone to help draw clean, renewable energy plants and other industries to locations within the city.



Technologies that use renewable sources to generate energy will be added to existing homes and businesses, thereby lowering gas and electricity bills and increasing energy independence.

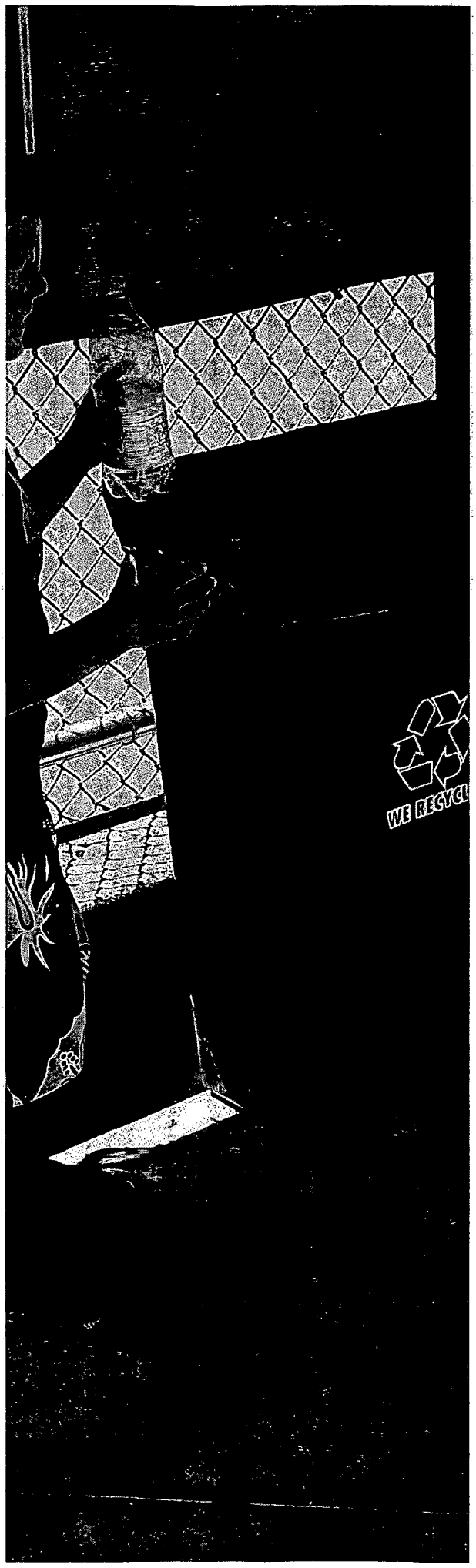
STRATEGY 4

WASTE REDUCTION AND RECYCLING

CO-BENEFITS

- Reduce Waste
- Lower Grocery and Merchandise Bills
- Improve Access to Local Food
- Support Local Economy
- Lower Energy Demand
- Create a Healthy Living Environment
- Improve Public Health
- Increase Social Interaction
- Create Climate Action and Sustainability Leaders
- Improve Quality of Life

Reducing the production, consumption, and disposal of waste materials, while encouraging reuse, recycling, and composting.



STRATEGY 4

WASTE REDUCTION AND RECYCLING

of total GHG reductions

= 79,404 MMTC0_2e/year

MEASURES

1. Sustainable Production and Consumption
2. Source Reduction, Diversion, Recycling, and Reuse
3. Greenwaste and Composting

GOALS:

Achieve 75 percent diversion of solid waste by 2020, and work towards becoming a "zero waste" community by 2040.

Greenhouse gas emissions may result at several stages in the life of a product, including pre-consumer commercial or industrial production and post-consumer disposal. In Sacramento, 5.3 percent of GHG emissions area associated with solid waste generation and disposal. Our decisions about the goods we consume and how we dispose of them can greatly impact the amount of GHG emissions we produce. Extracting and processing raw materials for consumer products and food and distributing them to consumers creates GHG emissions on a global scale. Disposing of packaging, used products, and organic wastes (e.g., food scraps, yard clippings, paper, wood) creates GHG emission when it is buried in landfills and emits GHGs during decomposition.

The City of Sacramento is committed to helping its residents and businesses reduce waste at the source and increase recycling of materials that would otherwise end up in a landfill. The measures in this section support the City's goal to achieve 75 percent waste diversion by 2020, and zero waste to landfills by 2040. By engaging in more sustainable production, the commercial and industrial sectors can reduce the emissions related to manufacturing new products. Residents can also reduce emissions by consuming less, therefore, reducing the amount of waste produced. Finally, reusing and recycling materials can reduce GHG emissions by saving energy required for production and disposal and reducing the amount of solid waste-related GHGs in landfills. Residents, developers, and businesses can all engage in recycling practice and use recycled products to take advantage of these savings.

STRATEGY 4: WASTE REDUCTION AND RECYCLING

MEASURE 4.1: SUSTAINABLE PRODUCTION AND CONSUMPTION

From the extraction and processing of raw materials to the manufacture, distribution, storage, and disposal of goods, GHG emissions are produced at various stages over the life of a product. Similar goods may differ dramatically in their lifecycle emissions. For example, food shipped from foreign countries, packaged, and sold in supermarkets requires more energy inputs than food grown and consumed locally. To reduce waste at the pre-consumer commercial level, Sacramento residents, businesses, and developers can purchase and use goods and materials that are made using minimal energy and packaging, transported short distances, and meant for extended use. Residents can also grow their own food at home or in their communities, eliminating the need to purchase some goods and saving money.

The City of Sacramento intends for this measure to foster better consumption choices among local residents and businesses. The City has several actions already underway to encourage residents to participate in sustainable consumption including the City's community garden program, in which the City operates several permanent community gardens; updating codes to allow front yard vegetable gardens and backyard chicken raising; and working with local utilities to promote paperless billing. The City will continue to promote local businesses and farmer's markets so residents have more opportunities to buy products produced locally. The City will also promote junk mail prevention programs to ensure that businesses produce less waste.

Adaptation/Resiliency

- Reduce the Urban Heat Island Effect
- Adjust to Energy Demand Increases
- Create a Climate-Resilient Economy

Community/Public Co-Benefits

- Reduce Waste
- Lower Grocery and Merchandise Bills
- Lower Energy Demand
- Support Local Economy
- Improve Access to Local Food
- Improve Public Health
- Improve Quality of Life

STRATEGY 4: WASTE REDUCTION AND RECYCLING

MEASURE 4.1: SUSTAINABLE PRODUCTION AND CONSUMPTION

Supporting Actions:

- Work with the Rental Housing Association of Sacramento to inform and advise rental property owners and managers of the recycling requirements contained in the Multi-family Recycling Ordinance (SWA Ordinance 21).
- Develop a junk-mail prevention outreach program that helps residents to voluntarily opt out of receiving junk mail.
- Work with utilities and other public service providers (e.g., SMUD, PG&E, Comcast) to promote and encourage paperless billing and payment options.
- Continue to work with community partners and local neighborhood groups to promote and support access to fresh, locally-grown food, encourage the purchase of locally-produced food, and sponsor public education events related to gardening and locally-produced food.
- Continue to seek funding to develop and maintain demonstration gardens in each Council District.
- Work with regional partners to identify funding to develop and maintain a regional demonstration garden and training center for public education on community gardens and rooftop gardens.
- Continue to provide incentives (e.g., Development Impact Fee Deferral Program; Economic Development Treatment Capacity Bank; Recycling Pledge; reduced size/cost garbage containers) to encourage the development of a local market for recycled materials.
- Develop and maintain a sidewalk grinding option for sidewalk maintenance rather than demolishing and re-paving sidewalks.

City programs will support permanent community gardens for residents to grow their own food.

STRATEGY 4: WASTE REDUCTION AND RECYCLING

MEASURE 4.2: SOURCE REDUCTION, DIVERSION, RECYCLING, AND REUSE

The average Californian throws away six pounds of trash daily.[2] As a result, the City of Sacramento emits 241,862 MTCO2e in associated GHG emissions each year. The City of Sacramento has adopted a target to achieve zero waste to landfills by 2040. Zero waste means that no discarded material is sent to landfills. The most effective ways to reduce the amount of waste sent to landfills is to reduce, reuse, and recycle. Solid waste diversion can be achieved by composting and separating waste to effectively dispose of organic material. Durable goods can be reused in traditional or creative new ways. Recycling creates a cycle where certain products may never have to enter a landfill, because old materials are used to create new ones.

The City has already made progress toward increasing waste diversion and recycling. In 2009 the City adopted a Construction and Demolition Ordinance and amended it in 2010 per CalGreen diversion requirements, which became effective on January 1, 2011, and requires a minimum 50 percent of construction wastes generated by the demolition and remodeling of buildings to be recycled or reused. The Solid Waste Authority (SWA), of which the City of Sacramento is a member, adopted a Business and Multi-Family Complex Recycling Ordinance. As part of this program, educational materials explaining recycling requirements are provided to owners and managers of businesses.

The City also offers door-to-door pick-up services and drop-off locations for household batteries and fluorescent lamps, and participates in the California Take-it-Back Partnership, a collaboration effort among businesses and State and local agencies to provide convenient locations for consumers to take back certain types of waste, including batteries, fluorescent lamps, and electronic waste.

By implementing a system of incentives and mandates, the City of Sacramento will encourage residents, businesses, and collection providers to recycle more and reduce waste. The SWA will also begin waste reduction consultations with businesses and multi-family complexes that tend to be major waste generators, and require commercial businesses to increase the amount of waste diverted from landfills.

The City will increase route efficiency for solid waste pickup trucks and transport waste to a closer landfill, thereby reducing the energy used to transport and dispose of waste.

GHG Reduction Potential by 2020

79,404 $MTCO_2e$/year

Adaptation/Resiliency

- Adjust to Energy Demand Increases

Community/Public Co-Benefits

- Reduce Waste
- Lower Grocery and Merchandise Bills
- Lower Energy Demand
- Increase Public Awareness of Climate Change

STRATEGY 4: WASTE REDUCTION AND RECYCLING

MEASURE 4.2: SOURCE REDUCTION, DIVERSION, RECYCLING, AND REUSE

Action 4.2.1 **In order to meet the long-term waste diversion target (i.e., zero waste by 2040), achieve interim waste reduction goals of 75 percent diversion from the waste stream by 2020 and 90 percent diversion from the waste stream by 2030.**

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020 +	Annual	Ongoing
79,404 $MTCO_2e$/year		X	X		

Responsibility: Department of Utilities

Target Indicators: 3.45 lb of waste/capita per day by 2020; 1.38 lb of waste per capita per day by 2030

Supporting Actions:

- Conduct waste-reduction consultations with major waste generators (e.g., businesses and multi-family complexes) and recommend strategies to reduce waste and increase recycling while reducing costs.
- Work with commercial solid waste customers and franchise haulers to increase diversion rates to 30 percent (Business Recycling Ordinance).
- Continue to participate in the California Take-It-Back Partnership, a collaborative effort among businesses and State and local agencies to provide convenient locations for consumers to take back certain types of waste, including batteries, fluorescent lamps, compact-fluorescent light (CFL) bulbs, and other electronic devices.
- Continue to offer alternatives for e-Waste recycling and drop-off locations for household batteries and fluorescent lamps, including:
  - Promoting businesses that take back universal waste and e-waste.
  - Encouraging and supporting extended producer responsibility.
- Support efforts to implement the Solid Waste Authorities Multi-family Recycling Ordinance, which requires apartments and multi-family dwellings of 5 or more units to have a recycling program.
- Support the development and implementation of model recycling lease language for residential and commercial building managers.
- As funding becomes available, expand availability of public recycling containers in public parks, along commercial corridors and public right-of-ways, and reduce the waste generated from public events.
- Develop and implement residential and commercial waste audit programs that educate residents and businesses on what materials can and cannot be recycled and when and where to recycle.

STRATEGY 4: WASTE REDUCTION AND RECYCLING

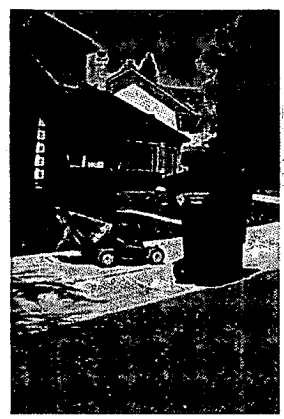
MEASURE 4.3: GREENWASTE AND COMPOSTING

Compostable organics make up 30 percent of California's overall waste stream, contributing over 12 million tons annually to landfills (California Integrated Waste Management Board). Landfills are one of the largest sources of methane, which is produced when organic waste decomposes in an environment without oxygen (EPA). Methane is a potent GHG with 21 times the warming potential of carbon dioxide.

Composting is a natural way of recycling organic material and nutrients back into the earth. When food and greenwaste decompose in a controlled setting, the result is a deep, rich soil material that retains moisture, prevents erosion, and promotes soil fertility for healthy plants. Traditional composting is usually done using only organic material and water to facilitate the efforts of decomposing organisms (e.g., bacteria) or vermicomposting (i.e., worms). Either type of composting may be done on a large-scale in a centralized facility or on a small scale, such as a resident's backyard.

Composting reduces GHG emissions by diverting organic waste from landfills where anaerobic digestion produces methane. Well-managed compost facilities decompose organic materials through a primarily aerobic process, which does not produce methane.

The City has several existing programs to promote composting. Through the Containerized Yard Waste Program, the City collects residential greenwaste. The City also currently promotes backyard composting through free backyard composting seminars and information on vermicomposting on the City website. The City of Sacramento plans to increase home composting of food and yard waste through educational programs and resources. The City will also implement a food waste recycling program and a garden refuse processing plant for residents and businesses to participate in composting at the community level.

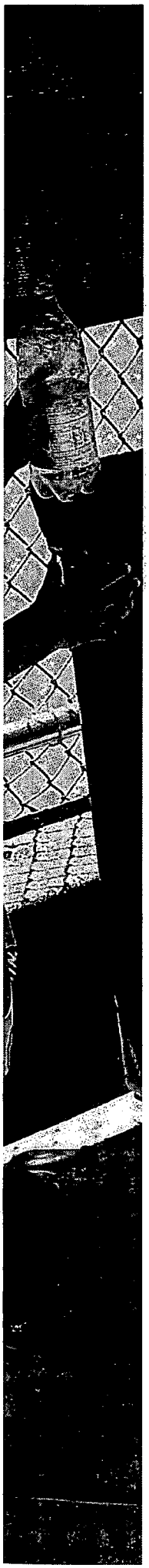


Adaptation/Resiliency

- Improve Impaired Air Quality
- Adjust to Energy Demand Increases

Community/Public Co-Benefits

- Reduce Waste
- Lower Energy Demand
- Improve Traffic/Air Quality
- Create a Healthy Living Environment
- Increase Social Interaction
- Create Climate Action and Sustainability Leaders

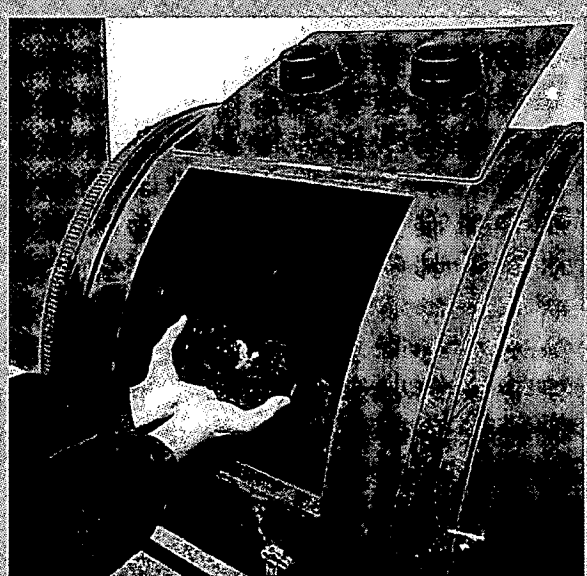


STRATEGY 4: WASTE REDUCTION AND RECYCLING

MEASURE 4.3: GREENWASTE AND COMPOSTING

Supporting Actions:

- Continue to support area wood grinding facilities that recycle greenwaste material for mulch and other groundcover applications.
- Develop a food waste recycling program that diverts food from landfills into composting processes.
- Promote home composting and vermiculture to reduce GHG emissions by reducing the amount of organic waste (e.g., cellulose-based waste, paper, food waste), that is sent to landfills.
- Increase participation in and use of the Containerized Yard Waste Program by enhancing education and outreach to residents on the topic of composting leaves, grass trimmings, tree and shrub prunings, Christmas trees, and sod (with dirt removed).
- Support the Solid Waste Authority's Sacramento Greencycle effort (i.e., regional garden refuse processing plant).
- Support efforts to remove organics from landfills and produce renewable energy from organic waste, using technology such as gasification anaerobic digestion, as planned for Sacramento County's South Area Transfer Station Energy Park.



The City will promote backyard composting through free backyard composting seminars and information on vermicomposting on the City website.

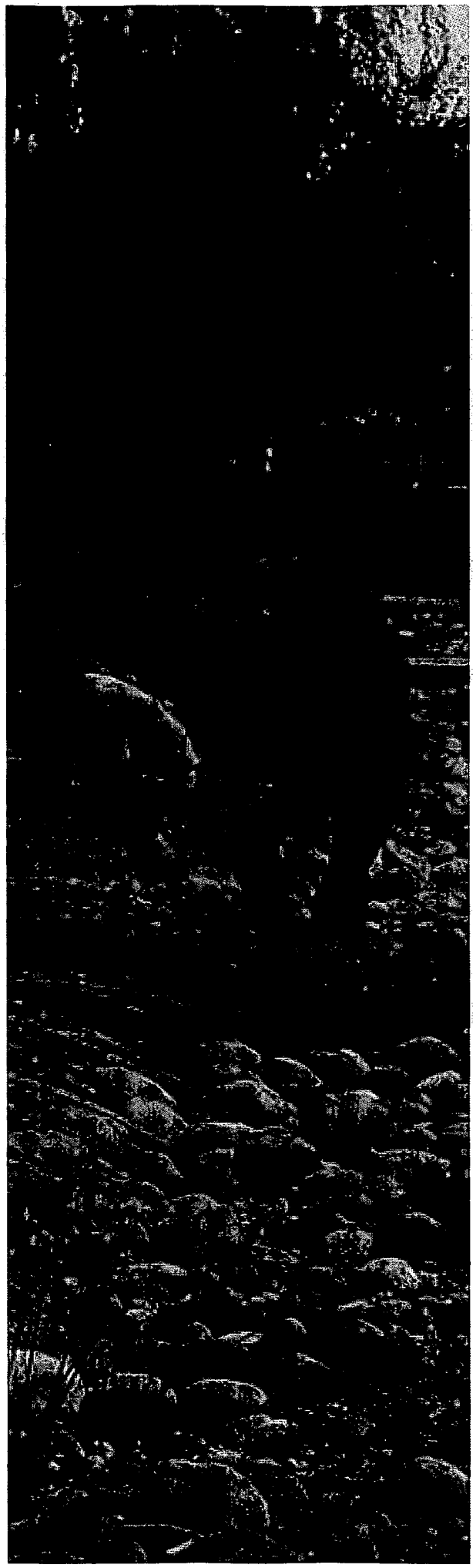
STRATEGY 5

WATER CONSERVATION AND WATER EFFICIENCY

CO-BENEFITS

- Conserve Water
- Protect Water Quality
- Lower Water and Sewer Bills
- Increase Home and Building Equity and Resale Value
- Increase Energy Independence
- Increase Public Awareness of Climate Change
- Create Climate Action and Sustainability Leaders

Increasing water conservation and management and wastewater treatment practices that reduce energy demand and promote efficient use of this limited resource.



STRATEGY 5

WATER CONSERVATION AND WATER EFFICIENCY

of total GHG reductions
= 17,267 $MTCO_2e$/ year

MEASURES

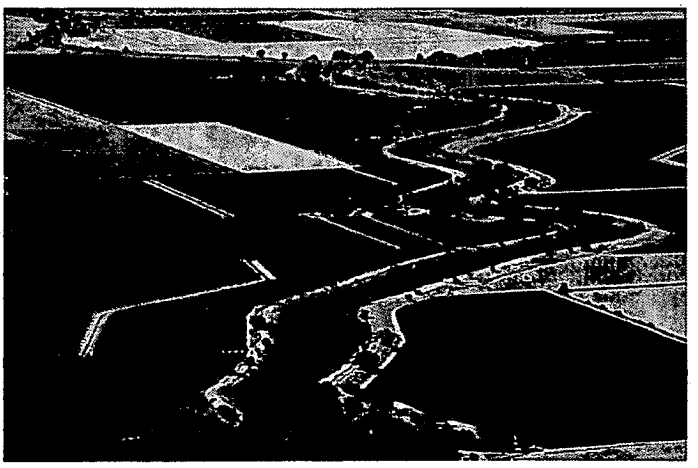
1. Water Conservation
2. Wastewater Treatment

GOAL:
Achieve a 20 percent reduction in per capita water consumption by the year 2020.

Greenhouse gas emissions are produced through the energy used to pump, transport, and treat water and wastewater. The City of Sacramento recognizes the importance of water conservation and efficient management and treatment of wastewater. The City's goal is the achieve a 20 percent reduction in per capita water consumption by the year 2020. Water is a precious and limited resource that must be conserved through water-efficient appliances, landscaping, and practice. Water should also be managed to ensure that the resource is stored and distributed efficiently.

Increasing the efficiency of water distribution and reducing consumption will have multiple benefits beyond the reduction of water-related GHG emissions. It can make more water available to improve American River flow conditions; it can improve water quality in the American and Sacramento Rivers and the Delta; it can improve the long-term reliability of the region's water supply; it can lower the cost of water service and associated energy costs to the City's water and wastewater customers; and it can produce energy.

Increasing the efficiency of water distribution and reducing consumption will have multiple benefits beyond the reduction of water-related GHG emissions.



STRATEGY 5: WATER CONSERVATION AND WATER EFFICIENCY

MEASURE 5.1: WATER CONSERVATION

While GHG emissions from the energy needed to pump, transport, and treat water and wastewater make up only 1.7 percent of Sacramento's total GHG emissions, climate change has important implications for the limited resource. Water demand is expected to rise as population growth occurs and average temperatures and extreme heat events increase. At the same time water supplies are expected to decrease due to less Sierra snowpack and variable precipitation.

Sacramento's water sources include the Sacramento and American Rivers and groundwater wells. Increasing the efficiency of water distribution and reducing consumption will have the dual benefit of reducing GHG emissions and helping the City adapt to future impacts of climate change. To maintain existing water supplies Sacramento will need to use conservation measures that reduce demand for and consumption of water.

One of the City's projects with the largest potential for water conservation is the installation of water meters. The City began installing water meters in 2005 to transition customers to a metered water pricing structure. The City transitioned customers to a metered rate in 2010 by expanding the use of water meters and AMI technologies. Residents and businesses can now monitor their water consumption and change their behaviors to use less water.

The City has already completed or initiated several actions to conserve water. The City has an Outdoor Water Conservation Ordinance, last updated in 2009, that limits outdoor water use and establishes penalties for violations. Additionally, in 2009 the City adopted the State Model Water Efficient Landscape Ordinance to ensure efficient landscapes in new developments and reduce water waste in existing landscapes. The City maintains a Water Wise Demonstration Garden and a Residential Assistance Ambassador Program to educate about water conservation. The City also provides "Water Wise House Calls" in which customers can request a trained Water Conservation Specialist to visit their home or business to identify potential water savings.

The City of Sacramento will further conserve water through several actions. Waterwise audits for the top water users, Blue Thumb conservation programs, and energy-efficient appliance rebates will educate the public on the importance of conservation, while providing residents opportunities to be more water-conscious. Developer checklists for graywater piping and Low Impact Development (LID) standards will increase the efficient use of water in new buildings. Finally, the City of Sacramento will prepare and update plans addressing urban water management, water conservation, water supply, and urban drought.

GHG Reduction Potential by 2020

17,267 $MTCO_2e$/year

Adaptation and Resiliency

- Prepare for Variable Water Supplies
- Prepare for Impaired Water Quality
- Adjust to Energy Demand Increases
- Prepare for Energy Supply Variability
- Improve Efficiency of Infrastructure
- Reduce Damage to Infrastructure
- Adjust to Energy Demand Increases
- Prepare for Increased Safety Hazards

Community/Public Co-Benefits

- Conserve Water
- Protect Water Quality
- Lower Water and Sewer Bills
- Lower Energy Demand
- Lower Energy and Fuel Bills
- Increase Home and Building Equity and Resale Value

STRATEGY 5: WATER CONSERVATION AND WATER EFFICIENCY

MEASURE 5.1: WATER CONSERVATION

Action 5.1.1

Achieve a 20 percent reduction in per-capita water use by 2020 consistent with the State's 20x2020 Water Conservation Plan (California Water Resources Control Board, 2010) using the following programs:

- **Installing water meters in residential units constructed prior to 1992 and in new developments, both commercial and residential, automated meter infrastructure (AMI) in all residential water metering. Water meters will result in all residents paying for water according to their usage. AMI will give residents information about inefficient water use.**
- **Require CalGreen Tier 1 Water Efficiency measures in all new construction.**
- **Require CalGreen Tier 1 Water Efficiency measures as part of the Residential Energy Conservation Ordinance (RECO).**
- **Require CalGreen Tier 1 Water Efficiency measures as part of the Rental Housing Energy and Water Efficiency Program.**

GHG Reduction Potential	Implementation Time Frame				
	2012-2015	2015-2020	2020 +	Annual	Ongoing
17,267 $MTCO_2e$/year	X	X	X		

Responsibility: General Services, Community Development, Department of Utilities

Target Indicators: Water metering and AMI: 20 percent reduction in water use
Residential CalGreen Tier 1 Water Efficiency: 20 percent indoor 60 percent outdoor increase in water use efficiency
Non-residential CalGreen Tier 1 Water Efficiency: 30 percent indoor, 60 percent outdoor increase in water use efficiency
RECO: 20 percent reduction in water use
Rental Housing Energy and Water Efficiency Program: 20 percent reduction in water use

Supporting Actions:

- Develop a water conservation program to be coordinated with the Rental Housing Energy and Water Efficiency Program.
- Develop and implement a voluntary landscaping water efficiency certification training program for irrigation designers, installers, and property managers.
- In conjunction with other water conservation measures and programs, continue conducting voluntary Water Wise House Calls (i.e., water audits) for city residents and businesses.
- Administer Water Wise Surveys (audits) to the top commercial, institutional, and industrial (CII) water users and homeowner associations (HOAs) with high water use.
- Continue administering the Residential Assistance Ambassadors Program that trains volunteers to provide door-to-door residential assistance (surveys) to targeted areas of the city.
- Continue to offer the Water Conservation Rebate Program, which provides Toilet Rebates and Washer Machine Rebates to city residents and businesses who install High Efficiency Toilets and Tier 3 Washer Machines.
- Use water conservation gardens like the one at the Glen Ellen water conservation office, to demonstrate and promote water conserving landscapes.

STRATEGY 5: WATER CONSERVATION AND WATER EFFICIENCY

Supporting Actions:

- Promote "River Friendly Landscaping" techniques which include the use of native and climate appropriate plants; sustainable design and maintenance; underground (water-efficient) irrigation; and yard waste reduction practices.

- Develop and adopt a Water Conservation Strategy as part of the Urban Water Management Plan to implement the best management practices (BMP) listed in the California Urban Water Conservation Council MOU.

- Develop and implement a Conjunctive Use Program that transitions the city from a passive water pumping scheme to an active management program that plans and varies the amount of groundwater pumped based on surface water availability.

- Develop an automated operating system for the distribution of water throughout the city to increase efficiency and reduce energy demand.

- Update and/or establish criteria and standards to require water efficiency upgrades as a condition of issuing permits for renovations or additions of existing buildings that involve plumbing fixtures consistent with SB 407, which requires single-family homes and multi-family and commercial properties built before January 1, 1994, to upgrade noncompliant plumbing fixtures to water-efficient models at transfer of property.

- Continue providing public education (e.g., Bluethumb Program) and conducting outreach campaigns to promote water conservation efforts. Programs should highlight specific water-wasting activities to discourage, such as the watering of non-vegetated surfaces and using water to clean sidewalks and driveways, and educate the community about the importance of water conserving techniques. Water efficiency training and certification for irrigation designers, installers, and property managers should also be offered.

- Develop and implement a water conservation program in coordination with the Rental Housing Energy and Water Efficiency Program to audit plumbing fixtures in rental properties.

- Develop and adopt regional Low Impact Development (LID) standards, policies, and update codes and ordinances to require LID for new development and redevelopment priority projects to reduce stormwater. Promoting use of native plants with low water requirements for the landscape-type of LID facility can help conserve water.

- Develop guidelines and building standards for installation and use of composting toilets.

STRATEGY 5: WATER CONSERVATION AND WATER EFFICIENCY

MEASURE 5.2: WASTEWATER TREATMENT

Wastewater includes sewage materials produced by residents, wastewater from industrial processes, and stormwater runoff captured during rain storms. Wastewater treatment processes produce GHG emissions from energy used to pump, treat, and dispose of wastewater and gases produced from decomposing and treated waste. The Sacramento Regional County Sanitation District (SRCSD) and Sacramento Area Sewer District (SASD) provide regional wastewater conveyance and treatment services to residential, industrial, and commercial customers in Sacramento and surrounding areas. Most of Sacramento's wastewater travels to and is treated at the Sacramento Regional Wastewater Treatment Plant before being discharged into the Sacramento River.

Because the City of Sacramento has a limited role in the treatment and disposal of wastewater, most of the City's efforts to address this area will be through coordination and support. However, several of the water conservation actions described in the Climate Action Plan will also aid efforts to reduce GHG emissions produced during the wastewater treatment process. Low-flow plumbing, water metering, and reduced outdoor water use through best management practice measures will result in less wastewater produced and less energy needed to transport and treat wastewater. Likewise, water efficient landscaping will result in less runoff and less energy needed to transport and treat water. Use of Low Impact Development practices for stormwater management will help improve runoff quality and reduce runoff volume.

Beyond water conservation measures, the City will support regional efforts to reduce the amount of GHGs (e.g., methane) produced and/or released into the atmosphere at wastewater treatment facilities. Captured methane can be reused as an efficient energy resource for creating electricity. SRCSD is in the process of enhancing its existing digestion and gas collection systems with a co-digestion facility which will enable direct digestion of energy rich materials that may otherwise be landfilled. The City intends to support these regional efforts to make wastewater treatment process more efficient and produce fewer GHG emissions.

Adaptation and Resiliency

- Prepare for Impaired Water Quality
- Improve Efficiency of Infrastructure
- Reduce Damage to Infrastructure
- Adjust to Energy Demand Increases

Community/Public Co-Benefits

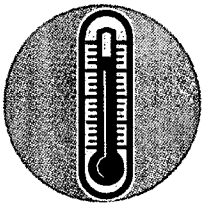
- Protect Water Quality
- Conserve Water
- Lower Water and Sewer Bills
- Increase Energy Independence

Supporting Actions:

- Support SCRSD efforts to develop and maintain methane recovery and energy production facilities by 2020 by:
  - Evaluating methane emissions and potential capture at primary and secondary clarifiers and force system mains.
  - Maintaining methane recovery systems and digester gas combustion systems at wastewater treatment plants.
  - Developing waste-to-energy projects at 50 percent of wastewater treatment plants.
  - Evaluating potential for biofuel production at the Sacramento Regional Wastewater Treatment Plant.

STRATEGY 6

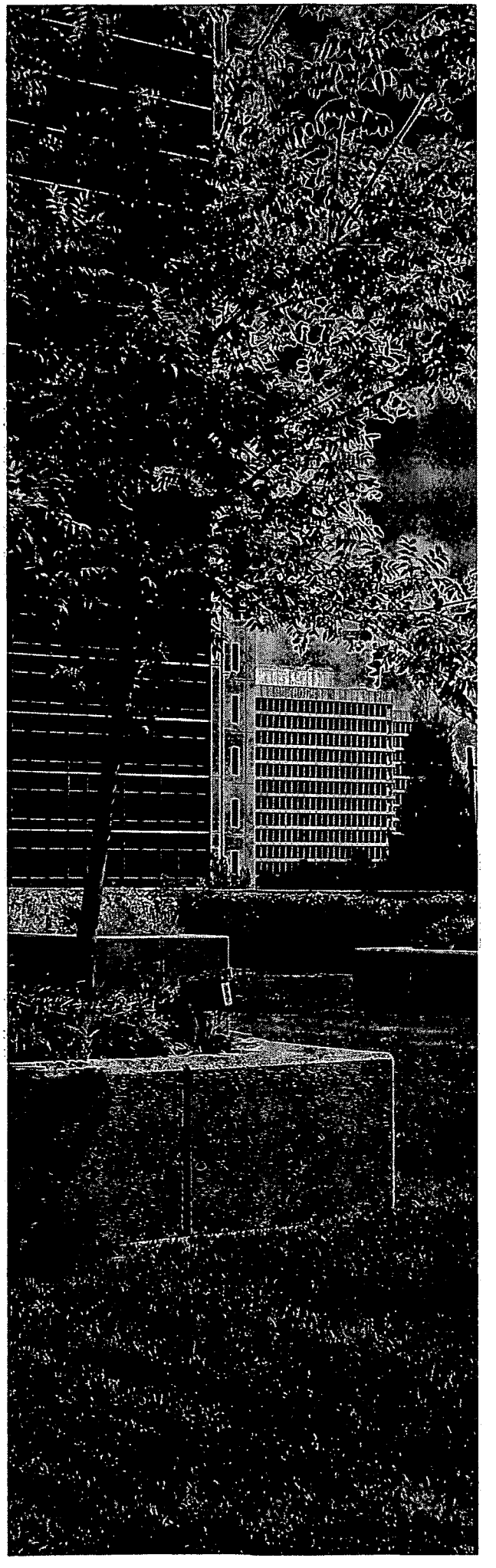
CLIMATE CHANGE ADAPTATION



CO-BENEFITS

- Improved Traffic/Air Quality
- Increase Home and Building Equity and Resale Value
- Lower Operating Costs for Businesses
- Lower Energy Demand
- Lower Energy and Fuel Bills
- Increase Energy Independence
- Conserve Water
- Protect Water Quality
- Lower Water and Sewer Bills
- Support Local Economy
- Increase Competitive Advantage
- Create Jobs
- Prevent Destruction of Natural Habitats
- Improve Access to Local Food
- Increase Access to Open Space
- Increase Recreation Choices
- Create a Healthy Living Environment
- Improve Public Health
- Improve Quality of Life
- Create Climate Action and Sustainability Leaders

Planning for and adapting to future climate change risks and creating resilient communities, economies, and environments.



STRATEGY 6

CLIMATE CHANGE ADAPTATION

MEASURES

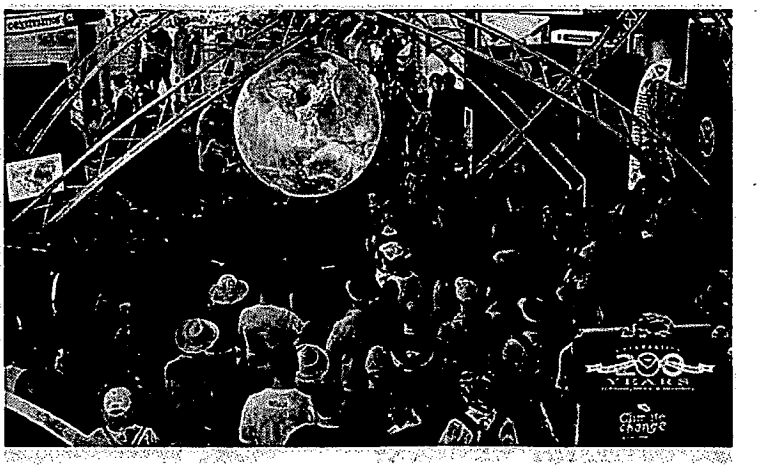
1. Prepare for Increases in Average Temperatures
2. Preserve and Expand Water Sources and Respond to Variable Water Supplies
3. Respond to Increases in Energy Demands and Variable Supplies
4. Protect Public from Increased Health Risks and Safety Hazards
5. Promote a Climate-Resilient Economy
6. Respond to Potential Impacts on Public Infrastructure
7. Protect Natural Ecosystems and Migration Routes

GOAL:

A community that is resilient to the effects and impacts of climate change.

While many of the other strategies address GHG emissions reductions to prevent further climate change, the climate change adaptation strategy prepares Sacramento for dealing with the future impacts of climate change and creating climate-resilient communities. As described in Chapter 3 of the Climate Action Plan, Sacramento must prepare for warmer and more extreme temperatures, decreased water supply, drought, flooding, increasing energy and water demand, and public health risks. The City of Sacramento has identified the goal of creating a climate change-resilient community. In addition to the measures included in this Strategy, many GHG reduction measures included in the other Strategy sections also provide adaptation benefits. For example, water conservation and management, energy efficiency, natural resource conservation, and urban forests are all strategies with adaptive co-benefits, which will help the city prepare for and cope with the impacts of climate change.

By monitoring climate change impacts, staying up-to-date on climate change science, and incorporating climate change thinking into normal planning and other activities, the City will be better prepared for likely future effects and impacts. For example, better planned and constructed infrastructure improvements will allow the City to better manage extreme weather events, flooding, and increasing energy demand. Revised economic and governance strategies that take into account a changing climate will allow the city to grow and thrive despite climate change impacts.

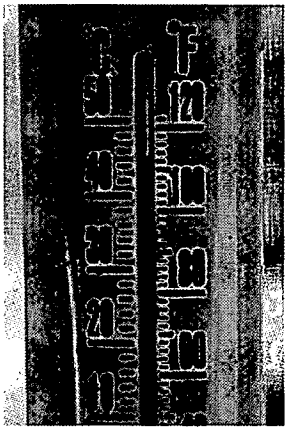


STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.1: PREPARE FOR INCREASES IN AVERAGE TEMPERATURES

In California average temperatures are projected to rise as much as 9 degrees Fahrenheit by 2100.[3] This is especially pertinent for Sacramento where extreme heat events are likely to increase and urban heat islands may intensify already high temperatures. Characterized by asphalt roads, concrete roofs, and energy use, urban developments modify the natural landscape using materials that create and/or retain heat. "Green" infrastructure, such as urban forests and rooftop gardens, absorb less heat than urban infrastructure and reflective or light-colored pavement absorb less of the sun's heating rays. By reducing heat retention in urban heat islands today, the City will be better-prepared for rising temperatures in the future.

The City of Sacramento has already begun an initiative to prepare for higher temperatures and combat the urban heat island effect. The City plans to continue the Parks and Recreation tree planting program with the goal of adding 1,000 new trees annually. Through demonstration gardens and an updated Development Code, the City will promote the use of community gardens on vacant property and rooftops. The City will also develop ordinances to require inclusion of shade trees and reflective pavement in parking lots and reflective or "green" roofs on new buildings. In addition, the City will conduct outreach to businesses and residents in order to promote the benefits of cool roofs in reducing the negative effects of rising temperatures. Finally, by promoting "Leading Edge" sustainable design for energy efficiency (e.g., shade and renewables), Sacramento will be better prepared to deal with temperature increases in the future.



Adaptation/Resiliency

- Adjust to Temperature Increases
- Reduce the Urban Heat Island Effect
- Improve Impaired Air Quality
- Adjust to Energy Demand Increases
- Reduce Home and Building Maintenance Costs

Community/Public Co-Benefits

- Improved Traffic/Air Quality
- Lower Energy Demand
- Lower Energy and Fuel Bills
- Increase Building Rent/Lease Rates
- Lower Operating Costs for Businesses
- Increase Access to Open Space
- Create a Healthy Living Environment

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.1: PREPARE FOR INCREASES IN AVERAGE TEMPERATURES

Supporting Actions:

- Continue tree planting and tree replacement programs with a goal of adding 1,000 new trees annually.
- Update park development standards to implement "Leading Edge" sustainable design. Coordinating with Urban Forest Services and Sacramento Tree Foundation to pursue grant funding to add trees to parks.
- Identify funding for the development and implementation of a street tree master plan for the Central City area as part of the next phase of the Downtown Urban Design Plan.
- Continue to work with local and regional tree experts and the Tree Foundation to keep an up-to-date list of preferred tree species that will thrive in Sacramento's current climate, and continue to survive in hotter, drier future climate conditions.
- Work with labor organizations, the business community, and county and State health and safety agencies to publicize programs and standards for preventing heat-related illness in employees who work outdoors. Continue to operate cooling centers, and publicize precautions for preventing heat-related illness during heat waves.
- Develop informational materials for the public counter to encourage residents to install cool roof technologies and rooftop gardens and provide guidance to contractors and staff.
- Explore options in the Green Development Code Update process to improve parking lot shading requirements to improve the health and vigor of the trees. Allow additional trees and landscaping to be installed in existing parking lots without requiring replacement of lost parking spaces (when increase in building area or change in use is not being proposed).
- Explore options in the Green Development Code Update process to require paving for new development to meet minimum Solar Reflectance Index (SRI) values, and incorporate cool pavement technology into the regular maintenance of existing streets, sidewalks, parking areas, and bike lanes.

Green infrastructure, such as urban forests and rooftop gardens, will absorb less heat and increase reflection, thereby lowering urban temperatures.

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.2: PRESERVE WATER SOURCES AND RESPOND TO VARIABLE SUPPLIES

With reduced snowpack, variable precipitation levels, rising temperatures, and drought on the horizon, Sacramento will be left with an unpredictable water supply. Preparing for variable water supply involves the preservation and expansion of existing water sources by retaining water quality, increasing storage and distribution capacity and efficiency, promoting conservation, and locating new resources.

Water resources are usually considered in three categories: potable water, gray water, and wastewater. Potable water is freshwater that can be used for drinking. Wastewater includes any used water or stormwater that is not suitable for reuse until it has been treated. However, gray water is an underutilized resource produced from activities such as laundry, dishwashing, and bathing. The most sustainable way to prepare for variable water supply in the future is to recycle water, reduce water use, and prevent water waste in order to practice conservation and conserve existing supply.

The City of Sacramento has several actions underway to encourage residents to conserve water resources and the City will continue to update and promote these programs. The proposed changes to the Residential Energy Conservation Ordinance (RECO) will address water efficiency improvements in plumbing, landscaping, and irrigation in existing buildings. Water Wise House Calls provide information and assistance to homeowners who are interested in conservation methods. Top Water User Surveys (AUDIT) educate the top 25 percent of commercial water users on sustainable habits. The Water Conservation Rebate Program provides rebates to residents and businesses for installing high efficiency toilets and washing machines. The City will also continue efforts to retrofit commercial and residential developments with water meters and Automated Meter Infrastructure (AMI) to monitor customer water use.

The City of Sacramento plans to expand these programs by developing a water pricing structure to encourage conservation, creating a web-based monitoring tool to inform customers about water consumption, and offering additional rebates for dual plumbing systems that allow for gray water systems in new and existing development. Additionally, the City will require CalGreen Tier 1 standards by 2014 that require all new development to demonstrate a 30 percent reduction in use of potable water. A Conjunctive Use Program will allow the City to vary the amount of groundwater pumped based on surface water availability.

Adaptation/Resiliency

- Prepare for Variable Water Supplies
- Prepare for Impaired Water Quality
- Improve Efficiency of Infrastructure
- Reduce Home and Building Maintenance Costs
- Limit Conversion of Habitat and Loss of Native Species

Community/Public Co-Benefits

- Conserve Water
- Protect Water Quality
- Lower Water and Sewer Bills
- Create Jobs
- Increase Public Awareness of Climate Change
- Create Climate Action and Sustainability Leaders

STRATEGY 6: CLIMATE CHANGE ADAPTATION

Supporting Actions:

- Seek grant funding to enhance the cost-feasibility of reclaimed water for certain parks and industrial sites.
- Convene and maintain a multi-stakeholder Sacramento Water Conservation Advisory Group (SWCAG) to serve in an advisory capacity to the City regarding water conservation programs and policies, and strategic planning. The SWCAG will (1) encourage effective water conservation policy and water use efficiency, (2) advance public education and awareness, and (3) build collaborative partnerships.
- Continue to pursue grant opportunities for projects and programs that reduce water use in the City's parks and open spaces.
- Update the Development Code to establish a limit on area of impervious surface allowable and require the use of pervious surface materials in new developments to improve groundwater recharge and limit saltwater intrusion.
- Protect open space areas that are currently used for recharging groundwater basins or have the potential to be used for recharge.
- Pursue grant funding to provide resources to incorporate the use of reclaimed water in appropriate parks and industrial sites/processes.
- Promote the use of rain barrels and rain gardens to conserve water, while not increasing the occurrence of disease vectors.
- Continue ongoing Sacramento and American River source water protection efforts, based on follow-up to watershed sanitary survey recommendations, including support of watershed protection efforts such as Keep Our Waters Clean.
- As part of updates to the Water Supply Master Plan, explore the economic costs and benefits associated with recycled water, and identify areas appropriate for additional piping infrastructure.
- Develop a rebate program to provide incentives for the installation of:
  - Complete gray water systems in new and existing buildings.
  - Dual plumbing in new buildings to allow gray water systems to be installed cost-effectively in the future.

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.3: RESPOND TO ENERGY DEMANDS AND VARIABLE SUPPLIES

A study by the California Energy Commission predicts that energy rates in the SMUD planning area will rise 30 percent by 2020 and energy demand will more than double by 2050 (California Energy Demand 2010-2020 Staff Draft Forecast June 2009). Energy demand will rise due to increased average temperatures, more frequent extreme heat events, supply loss due to variable water resource impacts on hydroelectric power, and normal population increase. However, if population increase slows, household size and density increases, technology improves, and the city increases energy efficiency and reduces energy waste, Sacramento can reduce energy demand to 20 percent below 2005 levels (California Energy Demand 2010-2020 Staff Draft Forecast June 2009). By reducing existing energy demand, Sacramento can slow future demand increases.

The City of Sacramento intends for this measure to encourage residents and businesses to consume 25 percent less energy by 2030 compared to a baseline year of 2005. The City will increase the amount of available solar energy by amending the City Subdivision regulations and Zoning Code to orient site design in a way that accommodates solar access. The City will increase energy efficiency by developing and implementing a green neighborhood design checklist that includes principles supporting healthy sustainable neighborhoods. The City will implement CalGreen codes requiring Tier 1 energy efficiency standards.

The City will also launch an "energy efficiency challenge" campaign that challenges communities to achieve the highest energy efficiency in return for pooled resources that could be applied to improvements or amenities and a Small Business Energy Efficiency Pilot Program targeting small businesses for energy efficiency upgrades. Finally, the City will explore the feasibility of a waste-to-energy program that will use waste products such as methane as an additional energy source.

Adaptation/Resiliency

- Adjust to Energy Demand Increases
- Prepare for Energy Supply Variability
- Improve Efficiency of Infrastructure
- Reduce Home and Building Maintenance Costs

Community/Public Co-Benefits

- Lower Energy Demand
- Lower Energy and Fuel Bills
- Increase Energy Independence
- Increase Home and Building Equity and Resale Value
- Create Jobs
- Increase Public Awareness of Climate Change

Supporting Actions:

- Work with SMUD to encourage greater enrollment of residents and businesses in energy Demand Response Programs to avoid higher costs of peak energy use and lower energy bills.

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.4: PROTECT THE PUBLIC FROM HEALTH RISKS AND SAFETY HAZARDS

Disasters such as floods and extreme weather events pose safety risks that threaten city residents and increase the risk of vector-borne disease. Similarly, rising and extreme temperatures increase health risks associated with reduced air quality and heat-related illness. Education and emergency preparedness are important resources in preventing future health risks and safety hazards. By monitoring existing conditions, the City can keep residents informed on how to best protect themselves against the changing elements.

The City of Sacramento takes the safety of its residents very seriously. The City will work with SMUD and others to expand the low-income and Rental Housing Inspection weatherization programs to minimize leakage or damage from extreme weather events. The City will also partner with SMAQMD and the Sacramento-Yolo Mosquito and Vector Management District to enhance awareness of air quality and vector control alerts in order to better protect the health of residents. Finally, the City will coordinate with agencies and universities to continually disseminate information on developments in climate change-related health risks and adaptation strategies.

Adaptation/Resiliency

- Improve Impaired Air Quality
- Prepare for Increased Safety Hazards
- Prepare for Increased Health Risks
- Adjust to Temperature Increases
- Improve Efficiency of Infrastructure
- Reduce Damage to Infrastructure

Community/Public Co-Benefits

- Improve Traffic/Air Quality
- Improve Public Health
- Improve Quality of Life

STRATEGY 6: CLIMATE CHANGE ADAPTATION

Supporting Actions:

- As part of the implementation of the Sacramento County Multi-Hazard Mitigation Plan, participate in the development of a seasonal multi-hazard public education campaign to enhance public awareness about the risk of natural hazards, disaster preparedness, climate change impacts, and how citizens can reduce exposure to hazard-related losses.
- Update emergency response plans to account for increased potential for black-outs in summertime.
- Continue to participate in and partner with Sacramento Metropolitan Air Quality Management District on programs such as Sacramento Emergency Clean Air & Transportation (SECAT) Program, Spare the Air Program, and the implementation of the 2030 General Plan.
- Support efforts of the Sacramento Office of Emergency Services to continue to operate "cooling centers" during heat events to ensure adequate space is available for residents at all times of the week (including nights), with backup generators.
- Continue to partner with SMAQMD to enhance awareness of air quality index alerts and related outreach and education to protect the health of residents.
- Support the efforts of the Sacramento-Yolo Mosquito and Vector Management District to:
  - Enhance awareness of vector control to protect the health of residents.
  - Require drainage of untreated pools and other water features in home and businesses that are in sale proceedings.
- Continue development and implementation of the City's Integrated Pest Management (IPM) program for City facilities.
- Incorporate climate change effects and impacts into public emergency preparedness education programs, with special consideration given to effective methods to communicate the issue to a general audience.
- Continue to partner with relevant organizations and agencies when updating FEMA and DWR flood hazard maps and the City's Comprehensive Flood Management Plan to consider of the impacts of urbanization and climate change on long-term flood safety and long-term flood event probabilities.
- Implement the City's Comprehensive Flood Management Plan, which addresses emergency preparedness, evacuation, hazardous materials, protection of critical facilities, and development guidelines, and flood insurance outreach to better protect citizens in the event of a major flood event. In conjunction with annual updates of the Plan, provide a report to the City Council on the status of Sacramento's flood protection and related issues.
- Partner with community organizations to perform an analysis of social equity issues related to climate change effects/impacts to assess resilience of low-income communities and guide relevant future policy/program development. Create a heat response plan, focusing on vulnerable populations.

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.5: PROMOTE A CLIMATE-RESILIENT ECONOMY

Given the expected impacts of climate change, residents and businesses face a future that may be more economically unstable and more costly. The most effective ways to prepare the economy for the effects of climate change is to improve technology, develop new skills, and keep residents and businesses informed of what can be expected. Sustainability strategies also help to strengthen the economy for climate change by improving efficiency, encouraging businesses to conduct ventures more sustainably, and creating new jobs through training and research programs.

The City plans to educate and provide information resources for businesses and community groups about the impacts of climate change, crisis management, and adaptation strategies. In order to increase public awareness, the City will collect more information on specific impacts and work with community partners to develop support services including job retraining for specific sectors and for the economy as a whole. Finally, the City will identify opportunities to diversify the local economy to reduce the detrimental effects of climate change.

Adaptation/Resiliency

- Create a Climate-Resilient Economy
- Reduce Home and Building Maintenance Costs

Community/Public Co-Benefits

- Support Local Economy
- Increase Competitive Advantage
- Lower Operating Costs for Businesses
- Create Jobs
- Increase Public Awareness of Climate Change
- Create Climate Action and Sustainability Leaders

Supporting Actions:

- Work with the Business Environmental Resource Center (BERC) to incorporate information into BERC programs about actions that businesses can take to reduce their vulnerability to climate change.
- Continue to analyze information on potential impacts of climate change on government operations and the local economy, and actively share results to foster public awareness and support for adaptation policy.
- Identify and seek opportunities to diversify local economy in response to global supply chain pressures, in order to reduce effects on the local economy from climate change impacts in other regions.

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.6: RESPOND TO POTENTIAL IMPACTS ON PUBLIC INFRASTRUCTURE

Extreme weather events and temperature increase can damage and stress public infrastructure. Some of this infrastructure is under the City's direct control, and some is not. The City and partner agencies can prepare for adverse climate change impacts by improving the resiliency of infrastructure systems, including: strengthening existing infrastructure, increasing infrastructure capacity, and creating backup plans as insurance for unforeseen disruptions.

The City can also take an active leadership role in regional cooperation on interconnected water resource issues, including those that impact Sacramento's level of flood protection, such as the management of upstream reservoirs. During the next five to seven years, the City will partner with SAFCA to negotiate for the development of reservoir management practices and improvements that will increase Sacramento's level of flood protection. The City will consider climate change impacts in design, construction, operations, and maintenance of infrastructure, including implementing CalGreen standards for stormwater design where at least 20 percent of paved surfaces are required to be permeable (where feasible) and retrofitting all levees for 200 year flood protection. To reduce peak demand, energy costs, and outages, the City will create demand response programs for municipal facilities. Finally, the City will prioritize funding and draft policies based on infrastructure vulnerability assessments to better-target systems at risk of damage.

Adaptation/Resiliency

- Improve Efficiency of Infrastructure
- Reduce Damage to Infrastructure
- Prepare for Increased Safety Hazards
- Adjust to Energy Demand Increases
- Prepare for Impaired Water Quality
- Reduce Home and Building Maintenance Costs

Community/Public Co-Benefits

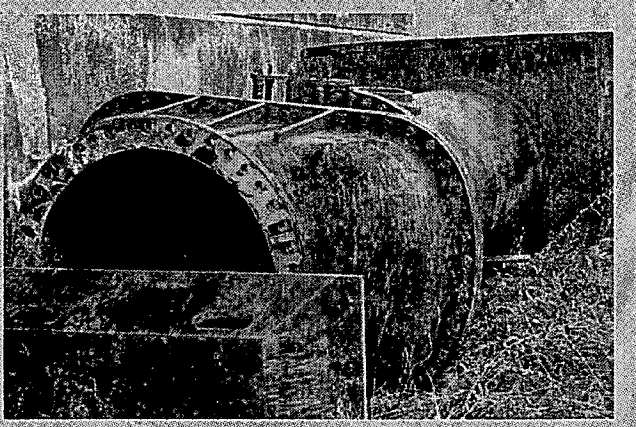
- Lower Energy Demand
- Lower Energy and Fuel Bills
- Conserve Water
- Protect Water Quality
- Lower Water and Sewer Bills
- Create Jobs

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.6: RESPOND TO POTENTIAL IMPACTS ON PUBLIC INFRASTRUCTURE

Supporting Actions:

- Develop an Interagency Adaptation Team to work with appropriate agencies (e.g., California Natural Resources Agency, State Lands Commission, California Energy Commission, Sacramento Area Flood Control Agency [SAFCA], UC Davis) and neighboring jurisdictions (e.g., Sacramento County) to:
  - Ensure that current information and data on climate change effects and impacts are considered and addressed as part of updates to infrastructure and utility plans, manuals, and specifications.
  - Review existing infrastructure plans, policies, standards, and investments to ensure information about projected climate change impacts is included.
  - Assess impacts of climate change effects when siting new infrastructure and maintaining or renovating existing infrastructure.
  - Incorporate climate change impact information into the design, construction, operation, and maintenance of infrastructure.
- Actively collaborate with regional agencies and neighboring jurisdictions to ensure that planning for future development and redevelopment incorporates risks from climate change effects/impacts.
- Support SAFCA's efforts to achieve 200 year flood protection, and take a strong leadership role in the evolving process of readjusting flood protection to accommodate for climate change. Partner with SAFCA to negotiate for the development of reservoir management practices and improvements that will increase Sacramento's level of flood protection.
- Enroll all applicable municipal facilities in Demand Response Programs and promote onsite energy generation and/or storage to help reduce peak energy demands and offset energy costs.



The City and partner agencies will prepare for adverse climate change impacts by improving the resiliency of infrastructure systems.

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.7: PROTECT NATURAL ECOSYSTEMS AND MIGRATION ROUTES

Even though climate change is a result of human activity, it does not only adversely impact humans. Temperature change, variable precipitation, and sea level rise also disrupt natural ecosystems and migration routes. Currently, California is one of the 25 biodiversity "hotspots" on earth. But if plants and animals are unable to adapt to changing conditions, they will shift habitats, giving invasive species the opportunity to take over and risking species extinction. In order to prepare for future ecosystem stressors, it is important to preserve and restore fragile habitats already at risk.

The City of Sacramento will partner with wildlife agencies to better understand climate change impacts on local habitats and species. To ensure that species have connected, diverse, open spaces, the City will review habitat management plans. The City will also begin active habitat restoration projects to remove invasive species and improve the resiliency of fragile habitats. Finally, the City will require that new developments maintain the integrity of any ecosystem to ensure the habitat is resilient over time.

Adaptation/Resiliency

- Limit Conversion of Habitat and Loss of Native Species
- Reduce the Urban Heat Island Effect
- Preserve Sacramento River Basin Watersheds

Community/Public Co-Benefits

- Prevent Destruction of Natural Habitats
- Increase Access to Open Space
- Increase Recreation Choices
- Create a Healthy Living Environment
- Improve Quality of Life
- Protect Water Quality

Supporting Actions:

- Support the efforts of The Natomas Basin Conservancy and other habitat preserve managers to adaptively manage wildlife preserves to ensure adequate connectivity, habitat range, and diversity of topographic and climatic conditions are provided for species to move as climate shifts.

- The new or amended HCPs should provide a robust adaptive management component sufficient to ensure that habitat preserves are resilient to climate change effects/impacts and to ensure their mitigation value over time. Provisions should include, but are not limited to: greater habitat ranges and diversity; corridors and transition zones to accommodate retreat or spatial shifts in natural areas; redundant water supply; elevated topography to accommodate extreme flooding; and flexible management and fee structure.

- As funding becomes available, implement active habitat restoration and enhancement to reduce impact of climate change stressors and improve overall resilience of habitat within existing parks and open space in the city. Support the efforts of Sacramento County to improve the resilience of habitat areas in the American River Parkway.

- Recognize the value of trees on levees for habitat and as carbon sinks. Support SAFCA's efforts to protect the existing trees on levees.

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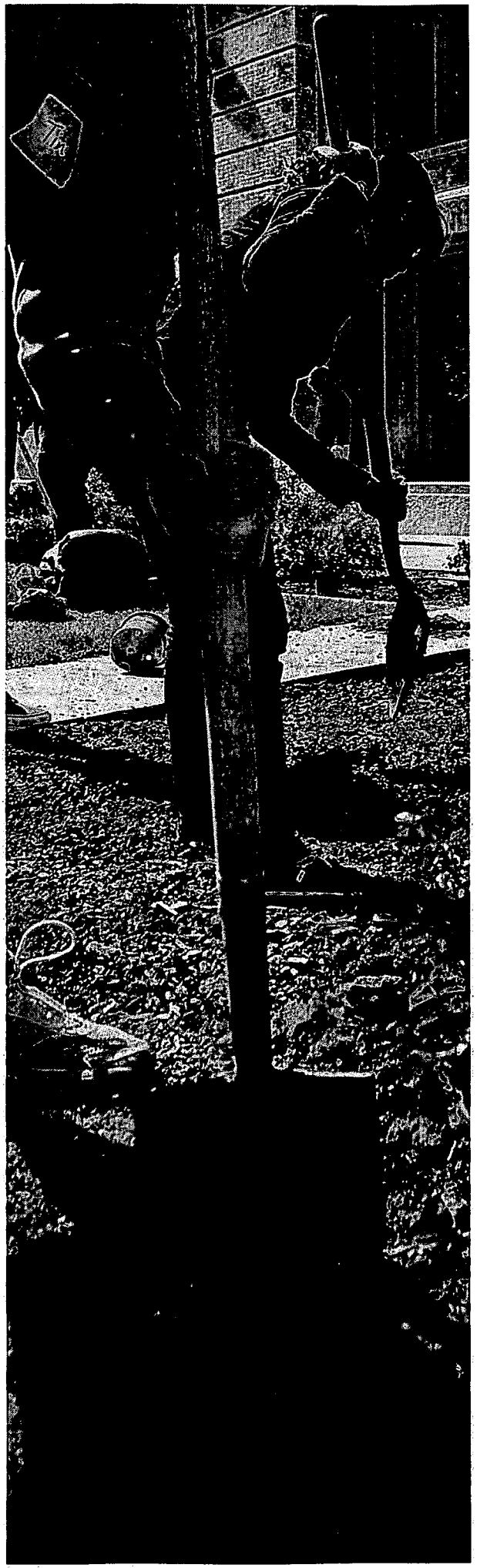
STRATEGY 7

COMMUNITY INVOLVEMENT AND EMPOWERMENT

CO-BENEFITS

- Increase Social Interaction
- Increase Public Awareness of Climate Change
- Improve Participation in City Governance
- Create Climate Action and Sustainability Leaders
- Increased Competitive Advantage
- Support Local Economy

Enlisting the ideas and energy of residents and businesses to help achieve climate action objectives and maximize co-benefits.



STRATEGY 7
COMMUNITY INVOLVEMENT AND EMPOWERMENT

Most of the GHG reductions for the measures and actions in this strategy could not be measured at this time, but are still expected to help reduce emissions.

MEASURES

1. Education and Community Involvement
2. Recognize Community Accomplishments
3. Build Businesses and Community Organization Partnerships

GOAL:
Involve the community in climate action efforts.

Everyone in the community has a role to play in addressing climate change. Effective climate action will require new behaviors and ways of thinking, which can only be sustained in the long term by communitywide efforts to reduce waste and use resources more sustainably. Participation by residents and businesses in the ongoing implementation of the CAP will increase the likelihood that the GHG reduction measures are achieved. To do this, the City will engage the public and encourage them to actively participate in planning a more sustainable future. The City of Sacramento has identified the goal of involving the community in climate action efforts.

Residents and businesses have the opportunity to work with the government as an equal partner in facilitating a climate action movement. The City's role is to inspire others by leading by example and to give residents and businesses the means to take action and influence their neighbors. To engage the community in the implementation of the CAP, the City will conduct outreach programs that involve residents and businesses in various GHG-reducing activities and acknowledge the accomplishments of individuals, businesses, and neighborhoods to reduce GHG emissions. The City will also continue to serve as a climate action leader by reducing its own GHG emissions.

greenwise SACRAMENTO

The City will lead residents and businesses in sustainability activities and acknowledge the accomplishments of individuals, businesses, and neighborhoods that reduce GHG emissions.

STRATEGY 7: COMMUNITY INVOLVEMENT AND EMPOWERMENT

MEASURE 7.1: EDUCATION AND COMMUNITY INVOLVEMENT

The City can encourage behavioral change through increased public awareness of the challenge and the potential solutions for addressing climate change. While the City can educate the community about climate action, residents can also educate the City. Community workshops provide a forum for citizens to share new ideas for ways that Sacramento can reduce GHG emissions and adapt to climate change.

The City already hosts several educational programs on specific topics related to GHG emissions reductions. For example, the City hosts free backyard composting seminars, provides free Water Wise House Calls and a water conservation demonstration garden, and educates the public on what can and cannot go into the blue recycling can. The City will tie together existing efforts with new public outreach initiatives to connect with residents and businesses in the community. The City will support communitywide public engagement campaigns to educate, inspire, and offer some of the most cost-effective and easy solutions for reducing GHG emissions. Finally, the City will conduct educational workshops on different ways to reduce GHG emissions. Workshop topics may include energy efficiency, water conservation, backyard composting, and bicycle commuting.

Adaptation Resiliency

- Adjust to Energy Demand Increases
- Prepare for Increased Safety Hazards

Community/Public Co-Benefits

- Increase Social Interaction
- Increase Public Awareness of Climate Change
- Improve Participation in City Governance
- Create Climate Action and Sustainability Leaders

Supporting Actions:

- Work with community partners to initiate a Green Building Professionals Guild in Sacramento to provide professional development and training opportunities for contractors and others in the green building industry.
- Work with community partners to design and implement a program educating the public about the cost and benefits associated with green buildings.

STRATEGY 7: COMMUNITY INVOLVEMENT AND EMPOWERMENT

MEASURE 7.1: EDUCATION AND COMMUNITY INVOLVEMENT

Supporting Actions:

- Develop a pilot project to educate the public on how to garden and grow their own food.
- Work with community partners to develop a Green Lease Toolkit that promotes partnership between building owners and tenants to contribute to efficient building operations.
- Improve the City's sustainability website to incorporate all the City's sustainability program information in one location.
- Continue to collaborate with city agencies, nonprofit organizations, neighborhoods groups and other community organizations to promote the issues of air quality, food availability, renewable energy systems, sustainable land use and the reduction of GHGs.
- Identify and work with existing groups, such as schools, neighborhood associations, and non profits, to identify issues and opportunities for engaging them in sustainability efforts. Work with community partners to ensure that all possible segments of the community are included in the City's sustainability efforts and outreach.
- Develop and implement a campaign to Make Green Routine program to achieve "green" practices in residential households.
- Establish community working groups to lead individuals or other groups of the community to promote climate protection programs.
- Continue to implement and expand educational programs and media campaigns to promote and educate the public about the 3R's (i.e., reduce, reuse, recycle) and the benefits of resource conservation, recycling, composting, and responsible purchasing.

The City will support communitywide public engagement campaigns to educate, inspire, and offer some of the most cost-effective and easy solutions for reducing GHG emissions.

STRATEGY 7: COMMUNITY INVOLVEMENT AND EMPOWERMENT

MEASURE 7.2: RECOGNIZE COMMUNITY ACCOMPLISHMENTS

Many residents and businesses have already shown a commitment to addressing climate change by consuming less energy and producing less waste by recycling, composting, conserving water, using public transit, shopping locally, and making homes and businesses more energy efficient. These small steps by individuals can make a difference for the future of our city and our planet. Recognition can also serve as a motivator for action. The City will recognize these efforts by creating an awards program to recognize outstanding achievements for green building practices, waste diversion and reduction, and energy and water conservation.

The City will also adopt a neighborhood climate metrics program to publicize energy use, consumption patterns, vehicle miles traveled, bicycle commute rates, and other efforts to reduce GHG emissions by neighborhood. By creating friendly competition between neighborhoods in the city, the City can motivate residents to make changes to further the goals of the Climate Action Plan.

Adaptation Resiliency

- Create a Climate-resilient Economy

Community/Public Co-Benefits

- Increase Social Interaction
- Increase Public Awareness of Climate Change
- Improve Participation in City Governance
- Create Climate Action and Sustainability Leaders

Supporting Actions:

- Develop and implement a program celebrating local developers that achieve third party green building certification to both raise community awareness and reward high performance.
- Support the ongoing efforts of the Business Environmental Resource Center (BERC) to implement the Sacramento Area Sustainable Business Certification Program, which recognizes and rewards business practices that achieve a high standard of sustainability and environmental performance and reduce GHG emissions.
- Work with local groups and organizations to develop programs (e.g., home tours) to celebrate and raise awareness about innovative green building projects in both new and existing buildings.

STRATEGY 7: COMMUNITY INVOLVEMENT AND EMPOWERMENT

MEASURE 7.3: BUILD BUSINESSES AND COMMUNITY ORGANIZATION PARTNERSHIPS

Climate change is an avenue that offers a unique opportunity to partner for collective action, while fostering individual empowerment. The City of Sacramento has been a leader in our region in moving towards sustainability and livability. Through the adoption of a Sustainability Master Plan in 2007, the 2030 General Plan in 2009, and by implementing important programs and projects which are already carrying out these plans, the City has demonstrated a clear commitment to sustainability.

A key to effectively addressing climate change will also be to build ongoing partnerships between residents, businesses, and city government. The City has already supported efforts to build partnerships. The Mayor's Greenwise Sacramento initiative convened over 275 experts and community leaders to identify goals for the Sacramento region's efforts to grow a green economy and improve the environment.

The City will expand on current efforts by striving to increase participation in the Sacramento Area Sustainable Business program sponsored by the Business Environmental Resource Center (BERC). This program certifies local businesses as a "Sustainable Business" for implementing energy and water conservation, pollution prevention, solid waste reduction, green building, and transportation and air quality measures. The BERC also provides business assistance resources to help with permitting and regulatory requirements.

Community organizations can be important instruments for behavioral change. The City can seek funding to support neighborhood and community groups implement projects and programs that engage their constituents in climate action. The City's role will be to inspire others in leading by example and to give communities the means to take action and influence their peers.

Adaptation Resiliency

- Create a Climate-resilient Economy

Community/Public Co-Benefits

- Increase Competitive Advantage
- Increase Social Interaction
- Increase Public Awareness of Climate Change
- Improve Participation in City Governance
- Create Climate Action and Sustainability Leaders

Supporting Actions:

- Expand existing partnerships with City agencies, educational institutions, neighborhood groups, businesses, and community organizations to continue efforts to maintain the City's status as an environmental "green" leader.

ENDNOTES

CHAPTER 2

[1] Assuming one $MTCO_2e$ is equal to driving 2,500 miles; Source: Chicago Climate Action Plan

[2] Source: http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results

CHAPTER 3

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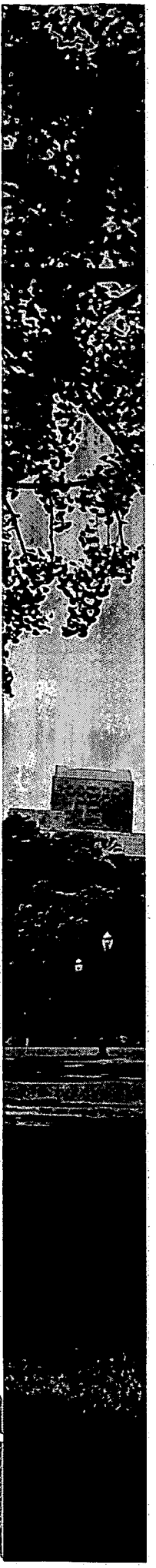

[19] California Energy Commission. Climate Change Impacts and Adaptation in California. June 2005.

[20] Source: Impact of Climate Change on Residential Electricity Consumption.

[21] Luers, Amy L. et al. (2006). Our Changing Climate: Assessing the Risks to California. The 2006 Summary Report from the California Climate Change Center. CEC-PIER Report, CEC-500-2006-077, Sacramento, CA.

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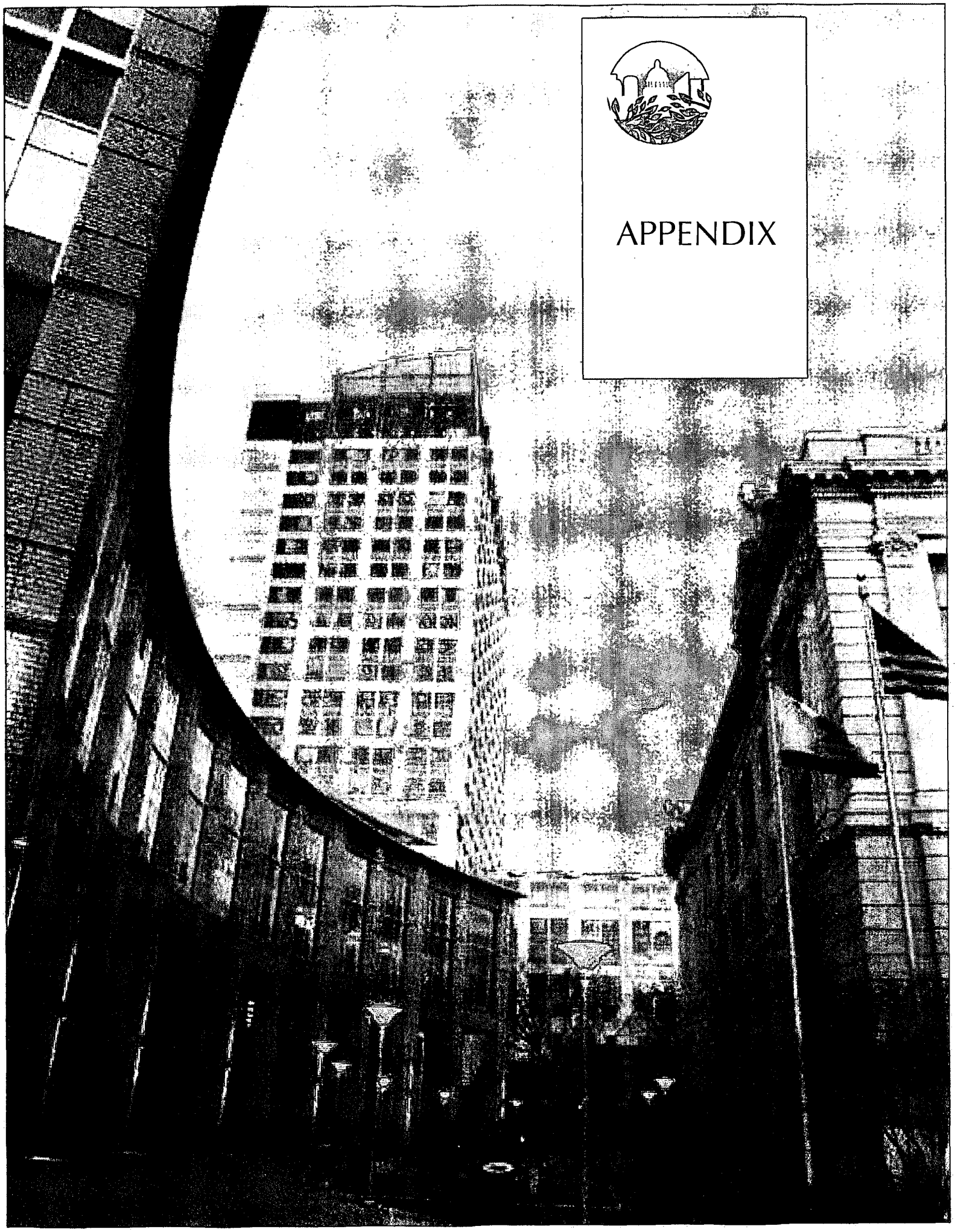

APPENDIX

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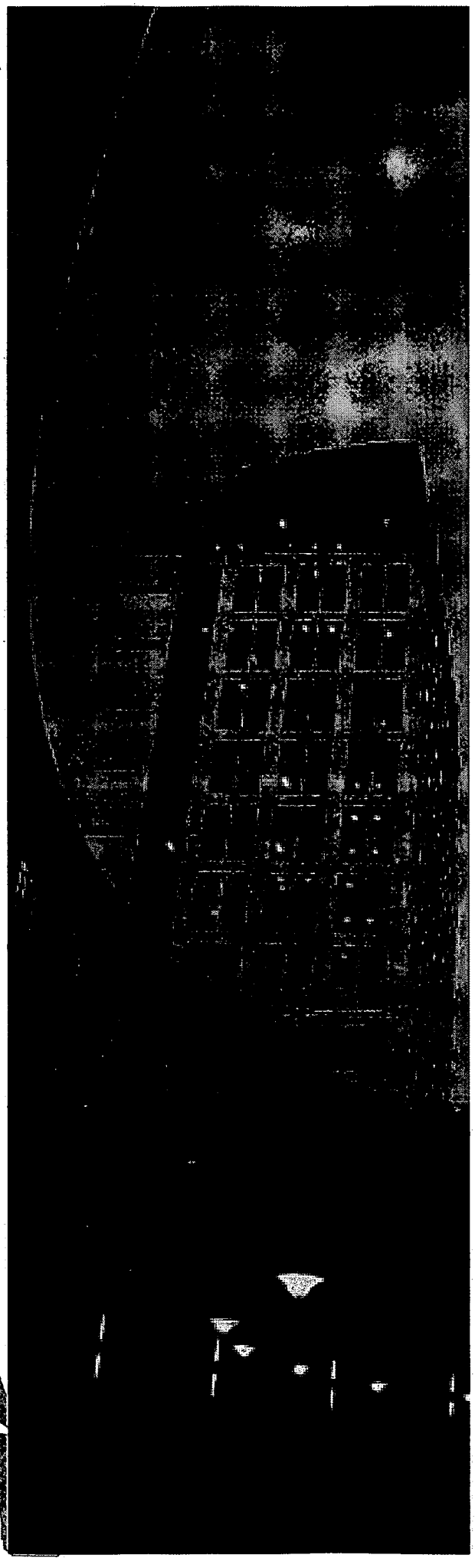


APPENDIX A

COST-BENEFIT ANALYSIS OF GHG REDUCTION MEASURES

COST-BENEFIT ANALYSIS OF GHG REDUCTION MEASURES

The costs and benefits associated with implementing GHG reduction measures can vary in multiple ways. In some cases the cost of implementing measures may be borne by public agencies, in other cases by the homeowner or business owner, or both parties. Many measures are cost-effective over the long-term because the initial costs are recouped by savings in energy bills or water bills. Some measures also have other community co-benefits such as the potential to generate new jobs in public agencies or in the private sector.

A generalized cost-benefit analysis was conducted for a limited set of the Primary Actions in this Climate Action Plan. The selected actions were primarily those that would have quantifiable or substantial contributions to job creation, would result in substantial energy savings, are mandatory or regulatory in nature, and where data was available based on prior studies or similar projects in the past. The results are intended to demonstrate general, order-of-magnitude financial costs and benefits, as well as job generation potential, for this limited set of measures. In some instances, key data were not available in order to estimate costs, savings, or job generation. Detailed, life-cycle assessment, while desirable in some instances, is outside the current scope of this planning effort.

The following provides some highlights of the results. The following pages of Appendix A provide detailed data and assumptions used in the analysis.

Action 3.2.2. Residential Energy Conservation Ordinance (RECO): A Residential Energy Conservation Ordinance (RECO) is an ordinance that requires energy assessments and certain energy- and water-efficiency upgrades to be installed into existing residential buildings upon a variety of "trigger" events such as at the time of building permits for major remodel or additions, the sale or renovation of a property, or by a certain date. This analysis examined the proposed version of a RECO program in which the City would require energy efficiency upgrades to existing housing stock when a building permit is issued for additions or major remodels exceeding $50,000 in value. There would be no public cost to implementing a RECO if the funds needed to enforce the ordinance would come from building permit fees paid by the homeowner, seller, or buyer. Initial private costs were estimated to be approximately $1,500-$1,800 per remodel or renovation that exceeds $50,000. Homeowners would experience an average annual cost savings of $330-420, assuming 15% average energy efficiency improvement per project. The expenses for administering such a program could come from a public fund or from permit fees paid by the building owner and/or seller. This type of program could also support additional employment at the City, as well as additional jobs in the private sector to complete audits and energy efficiency upgrades.

Action 3.2.4. Commercial Energy Conservation Ordinance (CECO): A Commercial Energy Conservation Ordinance (CECO) is an ordinance that requires certain energy-efficiency upgrades to be installed into existing industrial and commercial buildings upon a variety of transactions or events such as the sale or renovation of a property. According to the U.S. Green Building Council, the

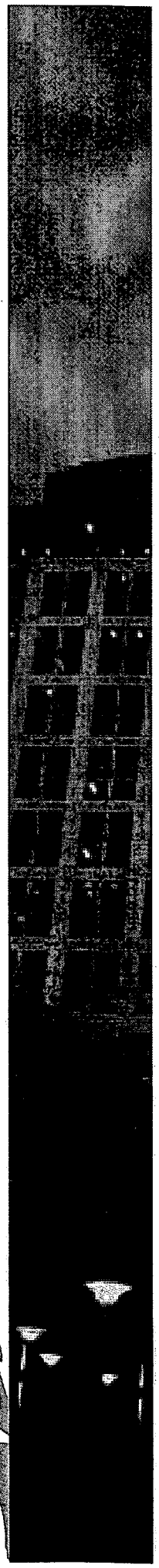
average energy efficiency retrofit of an existing commercial building costs $1.61 per square foot and results in an average annual utility savings of $0.33 per square foot. This means the upfront renovation costs would be recouped in approximately 4.8 years. The expenses for administering such a program could come from a public fund or from permit fees paid by the building owner and/or seller. This type of program could also support additional employment at the City, as well as additional jobs in the private sector to complete audits and energy efficiency upgrades.

Action 3.2.1. Commercial Property Assessed Clean Energy (PACE) Program: Commercial Property Assessed Clean Energy (PACE) Programs can be used by property owners to finance energy efficiency improvements and renewable energy installations. In brief, the City would set up a voluntary special assessment district which commercial property owners could opt into to help finance the upfront costs of these improvements. The property owners repay the costs as part of their property tax bills. One advantage of a PACE program is that building owners do not risk fronting the initial capital costs and then not owning the building long enough to receive the positive returns from energy savings. The program would leverage between $12.3 million and $30.9 million in construction revenue and equipment sales and expected to result in increased tax revenue of $0.6-1.6 million during over a 5 year period. The program would generate approximately 42-106 additional jobs in the private sector for the first five years until the program is complete. An estimated 1-6 permanent FTE jobs would be expected to continue after program completion. Ongoing annual energy cost savings could be $320,664 - $923,615 as a result of approximately 90 projects completed in the first 5 year period.

Action 3.2.3. Rental Housing Water and Energy Efficiency Program: The Rental Housing Water and Energy Efficiency Program would require energy efficiency upgrades to be installed in the City's rental housing stock. Mandatory weatherization requirements, which result in improved energy efficiency, would be enforced as part of the City's existing Rental Housing Water and Energy Efficiency Program. This type of program would have an annual cost to the City of $1.2 million to support up to 13 new City FTE positions. The one-time cost to the homeowner was estimated at$1,500-1,800 per unit, and rental units would save approximately $330-$420 annually in utility bill savings after upgrades are completed. This program would also support 207 FTE jobs in the private sector, associated with the installation of the required weatherization upgrades.

Action 3.4.1. Solar Power Installations in New Residential Development: The upfront costs of incorporating solar power facilities into new residential developments with 10 units or more would cost an average of $17,745 per unit (after incentives) and would save an average of $630 per unit annually. This means the payback time would be approximately 28.2 years. This type of requirement would generate more than 2,000 FTE jobs by 2020.

Action 3.4.2. Solar Power Installations in New Commercial Development: Requiring solar power facilities on new commercial buildings over 50,000 square



feet would cost approximately $328,550 annually (after incentives) and would save an average of approximately $10,806 per year in electric bills for those commercial buildings. The payback period would be approximately 25.5 years and this program would support 69 new jobs in the private sector by 2020.

Action 3.1.2. SMUD Smart Grid: The City could also achieve GHG reductions by supporting SMUD's installation of a comprehensive regional Smart Grid system. The Smart Grid would improve the reliability and efficiency of utility operations, facilitate integration of distributed and intermittent forms of clean and renewable energy, and optimize the use of electricity by the end consumer. For the SMUD region, development of the Smart Grid system would cost $180 million in addition to the $127 million in grants that has been awarded to the project. This investment would result in an annual savings of $11.5 million by SMUD's residential customers and $25.6 million annually by non-residential customers. This means the infrastructure costs would be recouped in approximately 4.8 years. This would support 4.3-8.9 direct and indirect FTE jobs per $1 million in investment in Smart Grid.

Action 3.3.2. Tier 1 CalGreen in New Development: Requiring Tier 1 CalGreen in new development refers to the exceedance of existing Title 24 energy efficiency standards for new buildings by 15%. The initial costs and payback period for implementing Tier 1 CalGreen energy efficiency standards would vary according to building type and size. Future single-family homeowners would experience energy cost savings of $111 to $214 per year. Multi-family building energy savings would add up to anywhere from $478 to $4,379 per year per building. Commercial energy savings would be in the range of $1,383 to $9,233 per year.

Action 3.2.6. SMUD Home Performance Program: As part of its Home Performance Program, SMUD offers low-cost energy audits to existing residential customers and offers performance-based incentives for energy upgrade projects that achieve 20% or more energy efficiency improvement. Remedies could cost in the range of $1,500-$1,800 per unit and result in an annual savings in energy costs of $330-$420 annually. Three to eight FTE jobs in the private sector would also be supported by this program.

Actions 2.1.1, 2.2.1, 2.3.1: Pedestrian and Bicycle Infrastructure Improvements: Small-scale retrofits to local roadway infrastructure could also result in GHG reductions, particularly retrofits that result in more evenly-paced automobile traffic and that improves safety and enjoyment of bicycling and pedestrian uses. Such retrofits could include traffic calming measures, such as marked crosswalks, roundabouts, curb extensions, speed tables, expanded sidewalks, Class I facilities (bike paths), and Class II facilities (bike ways). These types of projects generally require relatively small amounts of public funds and result in relatively small GHG reductions; however, the reductions achieved by multiple, complimentary retrofits in the same neighborhood or area may result in a GHG reduction that is greater than the sum of individual retrofit projects. Costs of pedestrian and bicycle infrastructure vary widely depending on the need to acquire

public right-of-way. For example, construction of class I facilities (bike paths) can range from $375,000-$5 million/mile; class II facilities (bike ways) can range from $75,000-$4 million/mile. The lower end of the range occurs when public right-of-way is already dedicated.

				Notes:
				Source: City of San Francisco Department of Building Inspection. 2007. RECO;
				Source: The Potential for Energy Retrofits within the City of Sacramento's Rental Housing Program. US DOE. April 2011. Table 2.1. Pg 3; assumes same household savings as basic weatherization in Rental Housing Program study
				Source: Research Report on City of Hayward RECO. 2010 (August). Prepared by Gabel Associates.
				City job generation derived from assumptions in The Potential for Energy Retrofits within the City of Sacramento's Rental Housing Program. US DOE. April 2011. Table 2.1. pg 3; Assumes $92,000/yr per public employee (based on Sacramento County EECBG Grant Applications)
				Source: Research Report on City of Hayward RECO. 2010 (August). Prepared by Gabel Associates.
				Source: City of Berkeley CECO program. http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=19664
				Source: San Francisco Planning and Urban Research Association (SPUR). Reinstate the Commercial Energy Conservation Ordinance. http://www.spur.org/publications/library/report/critical_cooling/option4
				Source: "The Economics of LEED for Existing Buildings for Individual Buildings," 2008 edition, a white paper by Leonardo Academy, April 21, 2008, rev. Oct. 14, 2008, available from http://www.leonardoacademy.org/Resources/reports/index.htm.
				Source: Potential Economic Impacts of a Commercial PACE Program. May 2011. Prepared for City of Sacramento by Center for Strategic Economic Research
				90 Projects per year scenario
				Source: Yvette Rincon
				Values would occur over 5 years until projects are complete. 1-6 permanent jobs would be created after project completion
				Source: The Potential for Energy Retrofits within the City of Sacramento's Rental Housing Program. US DOE. April 2011.
				Assumes $92,000/yr per public employee (based on Sacramento County EECBG Grant Applications)
				Source: The Potential for Energy Retrofits within the City of Sacramento's Rental Housing Program. US DOE. April 2011. Table 2.1. pg 3
				Same assumption for private cost as for RECO for Basic Weatherization. Source: Research Report on City of Hayward RECO. 2010 (August). Prepared by Gabel Associates.
				Source: The Potential for Energy Retrofits within the City of Sacramento's Rental Housing Program. US DOE. April 2011. Table 2.1. pg 3
				Same assumption for private cost as for RECO for Basic Weatherization. Source: Research Report on City of Hayward RECO. 2010 (August). Prepared by Gabel Associates.

				Source: The Potential for Energy Retrofits within the City of Sacramento's Rental Housing Program. US DOE. April 2011. Table 2.1. pg 3
				Source: The Potential for Energy Retrofits within the City of Sacramento's Rental Housing Program. US DOE. April 2011. Table 2.1. pg 3

neration (FTE)	MW installed by 2020 (assumes 8 hrs/day of solar generation)	Total Jobs in 2020		Source: SMUD Clean Power Estimator. http://smud.cleanpowerestimator.com/default.aspx
W installed	62	2,048		Source: Job Creation Studies in California for Votesolar. 2004. Prepared by UC Berkeley. http://www.votesolar.org/linked-docs/MSR_Job_Creation.pdf
/IW				Source: Environment California Research and Policy Center, 2003. Renewable Energy and Jobs. Available: http://www.localcleanenergy.org/files/The_21st_Century_Energy_Greenprint_Full_Report.pdf

neration (FTE)	MW installed by 2020 (assumes 8 hrs/day of solar generation)	Total Jobs in 2020		Source: SMUD Clean Power Estimator. http://smud.cleanpowerestimator.com/default.aspx
W installed	2	69		Source: Job Creation Studies in California for Votesolar. 2004. Prepared by UC Berkeley. http://www.votesolar.org/linked-docs/MSR_Job_Creation.pdf
/IW				Source: Environment California Research and Policy Center, 2003. Renewable Energy and Jobs. Available: http://www.localcleanenergy.org/files/The_21st_Century_Energy_Greenprint_Full_Report.pdf

				Source: Marcy Lowe, Hua Fanand Gary Gereffi. 2011 (April). U.S. Smart Grid. http://www.scribd.com/doc/53577326/Duke-University-Smart-Grid-Study
				Source: SMUD Smart Grid Activities Presentation. January 2010, CEE Program Meeting.
				Source: SMUD rates: http://www.smud.org/en/residential/rates/Pages/rates.aspx. Assumes average $0.15/KWh for SMUD customers

				Source: Climate Zone 12 Energy Cost-Effectiveness Study (SMUD and PG&E rates). February 2011. Prepared by Gabel Associates. Prepared for PG&E.

				Source: Applied assumptions from voluntary Rental Housing Program. The Potential for Energy Retrofits within the City of Sacramento's Rental Housing Program. US DOE. April 2011. Table 2.1. pg 3
				Same assumption for private cost as for RECO for Basic Weatherization. Source: Research Report on City of Hayward RECO. 2010 (August). Prepared by Gabel Associates.
				Source: http://www.sacbee.com/2011/04/29/3587600/smud-gets-efficiency-stimulus.html?storylink=lingospot

				Source: FHWA. 2000. Roundabout: an Informational Guide. http://www.fhwa.dot.gov/publications/research/safety/00067/000672.pdf

Source: ITE 1999. Traffic Calming: State of the Practice.
http://www.ite.org/traffic/tcsop/Chapter3f.pdf

Source: Regional Bicycle Pedestrian Master Plan. 2009.
http://www.sacog.org/bikeinfo/pdf/masterplan/2009-08-19/Formatted%20Amend%20Regional%20Bike%20Ped%20Plan%202009%208-19-09.pdf

Source: http://www.bicyclinginfo.org/engineering/parking.cfm

Source: Regional Bicycle Pedestrian Master Plan. 2009.
http://www.sacog.org/bikeinfo/pdf/masterplan/2009-08-19/Formatted%20Amend%20Regional%20Bike%20Ped%20Plan%202009%208-19-09.pdf

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Source: City of Sacramento Draft Interim Water Conservation Plan. Pg 30.

Source: August 23, 2011 email from Michelle Carrey, Senior Engineer, Dept of Utilities, to Helen Selph.

Source: August 23, 2011 email from Michelle Carrey, Senior Engineer, Dept of Utilities, to Helen Selph.

would be spent over one year. The number of City FTEs would be approximately 990.

Source: August 23, 2011 email from Michelle Carrey, Senior Engineer, Dept of Utilities, to Helen Selph.

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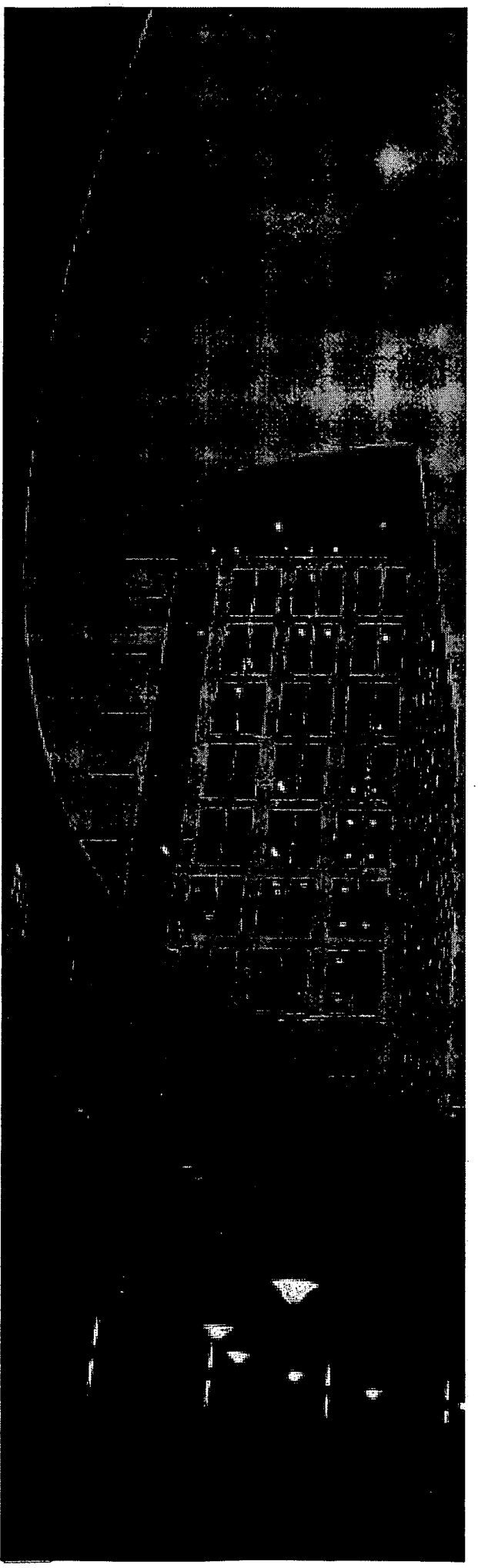

APPENDIX B

PHASE 1: MUNICIPAL CLIMATE ACTION PLAN

The Phase 1 Municipal Climate Action Plan can be found on the following website: www.sacgp.org/documents/Phase-1-CAP_2-11-10.pdf (November 2011). If not available, please contact the City of Sacramento Community Development Department at (916) 264-5011.

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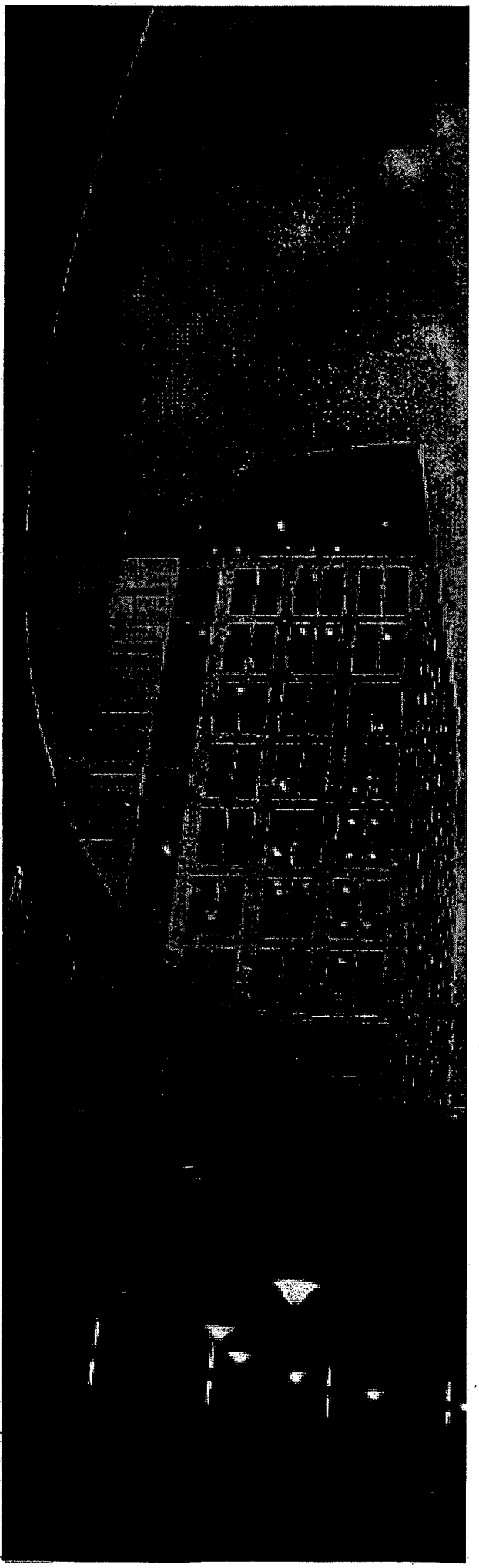

APPENDIX C

CONNECTION OF ACTIONS TO GENERAL PLAN POLICIES

The Sacramento 2030 General Plan can be found on the following website: www.sacgp.org (October 2011). If not available, please contact the City of Sacramento Community Development Department at (916) 264-5011.

STRATEGY 1: SUSTAINABLE LAND USE

MEASURE 1.1: PROMOTE SUSTAINABLE GROWTH PATTERNS AND INFILL DEVELOPMENT

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Action 1.1.1: Require new development within the city to demonstrate that it would reduce vehicle miles traveled (VMT)/capita by 35 percent compared to the statewide average VMT/capita based on project density, diversity, design, destination accessibility, and distance to transit. ☑ *Applicable to New Development* ☐ *Applicable to Existing Development*			
Supporting Actions: • Continue to analyze potential for building-energy savings from the transition to more compact urban form, which tends to increase densities and multi-family housing, and decrease the average area of residential units.	LU 1.1.1 LU 1.1.4 LU 1.1.5	Regional Leadership Leading Infill Growth Infill Development	
• Continue pursuing local, State, and Federal grants to fund a comprehensive update of the City's Zoning, Subdivision, and other development-related sections of the City Code in order to create designations that support more sustainable development patterns and streamline infill development.	LU 1.1.9 LU 1.2	Balancing Infill and New Growth Sustainable Sacramento Strategy	Table 4-2 #3 Table 4-2 #2
• Implement the destination and accessibility (i.e., centers) policies of the General Plan to achieve an increase in the number of jobs and other attractions that can be reached within reasonable amounts of time by walking, biking, or transit.	LU 2.1.5 LU 1.2.1	Neighborhood Centers Regional Coordination	Table 4-2 #4 Table 4-2 #5
• Implement the transit center policies of the General Plan to locate appropriate projects near transit and achieve an increase in the use of transit by people traveling to and from the projects.	LU 2.5 LU 1.2.3	City Connected and Accessible Streamlined Development	Table 4-4 #6 Table 4-2 #8
• Implement the affordable housing and transit-oriented development policies of the General Plan to integrate affordable and below market-rate housing near transit.	LU 2.5.1	Connected Neighborhoods, Corridors, and Centers	Table 4-2 #13 Table 4-2 #10
• Provide CEQA streamlining benefits for residential mixed-use projects and Transit Priority Projects pursuant to State Law (SB375), consistent with 2030 General Plan.	LU 2.5.2	Overcoming Barriers to Accessibility	Table 4-2 #4
• Work with regional partners to adopt and implement guidelines that will protect and preserve open space, prime farmland and key habitat, including wildlife and riparian corridors.	LU 2.6 LU 4.1.1	City Sustained and Renewed Mixed-Use Neighborhoods	
• Recognize the value of agricultural, habitat, and open space lands as carbon sinks, and establish easements and other mechanisms to preserve them.	LU 2.6.1	Sustainable Development Patterns	
• Support the implementation of the SACOG Sustainable Communities Strategy through implementation of the 2030 General Plan and encouraging infill development in Transit Priority Project areas.			

STRATEGY 1: SUSTAINABLE LAND USE

MEASURE 1.2: CREATE MORE COMPLETE NEIGHBORHOODS

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Supporting Actions: • Proactively plan residential neighborhood centers for existing neighborhoods (rather than waiting for development plans to be submitted), either as Community Plan Updates or City-initiated Community Plan Amendments.	LU 2.1.3 LU 4.1.2	Complete and Well-Structured Neighborhoods Neighborhood Amenities	Table 4-2 #9

STRATEGY 1: SUSTAINABLE LAND USE

MEASURE 1.3: MIXED-USE DEVELOPMENT PRACTICES

Climate Action Plan	2030 General Plan	
Actions	Policies	Implementation Programs
Supporting Actions: • Implement the mixed-use policies of the General Plan to achieve an increase in the diversity of uses in urban and suburban developments. • Improve the job-housing balance by revising the Sacramento City Zoning Code to allow for a greater mix of uses in neighborhoods, corridors and centers.	LU 5.5.1 Diverse Centers LU 5.1.2 Centers Served By Transit LU 7.1.2 Housing in Employment Centers	

STRATEGY 1: SUSTAINABLE LAND USE

MEASURE 1.4: REQUIRE SUSTAINABLE DEVELOPMENT PRACTICES

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Supporting Actions: • Amend the Subdivision Ordinance to include standards for street and lot configuration to accommodate solar access. Amend City Zoning Code to provide standards for site design and building orientation to optimize potential for passive solar design. • Reduce Impact Fees to more accurately reflect the impacts associated with all types of building, including Green Building, such that those building practices that result in lower impacts have lower fees. • Encourage development projects to use local and sustainable building materials that are sourced and processed locally. • Review and revise the City Code for consistency with the 2030 General Plan, including but not limited to: Zoning Code, subdivision regulations, street design standards, parking regulations, annexation regulations, and design guidelines. • Develop and adopt development standards for bicycle support facilities (e.g., bicycle racks, personal lockers, showers, other support facilities) which meet or exceed CalGreen Tier 1 requirements. • Develop standards that require developments of a certain size to include dedicated parking for electric cars and NEVs. • Develop a fast-track permit process for electric vehicle charging stations on private property. • Encourage development projects to use sustainable building materials that are sourced and processed locally and/or contain recycled materials.	LU 2.1.2 LU 2.4.2 LU 2.6.2 LU 2.6.3 LU 2.6.4 LU 2.6.5 LU 2.7.6 LU 4.1.3 LU 4.3.5 LU 4.3.6 LU 5.3.1 M 2.1.8 M 5.1.6 M 5.1.8 M 5.1.11 M 6.1.2 ER 6.1.2 ER 6.1.3 HCR 2.1.13	Protect Established Neighborhoods Responsiveness to Context Redevelopment and Revitalization Strategies Sustainable Building Practices Existing Structure Reuse Green Building Retrofit Walkable Blocks Walkable Neighborhoods Density Regulations for Mixed Density Development Projects Exceeding Floor Area Ratio Development Standards Housing and Destination Connections Connections between New Development and Bicycle Facilities Connections between New Development and Bikeways. Bike Facilities in New Developments Reduce Minimum Parking Standards New Development Emissions Reduction Adaptive Reuse	Table 4-2 #7 Table 4-2 #9 Table 4-2 #10 Table 4-2 #11 Table 4-2 #16 Table 4-2 #23 Table 4-3 #13 Table 4-10 #9 Table 4-10 #10

STRATEGY 1: SUSTAINABLE LAND USE

MEASURE 1.5: ENSURE QUALITY DEVELOPMENT AND PROJECT DESIGN

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Supporting Actions: • Implement the urban design policies of the 2030 General Plan to enhance walkability and connectivity and improve street network characteristics within a neighborhood. • Provide incentives for development projects that separate the costs of rented parking from leased building space so that the charges from parking are borne more explicitly by the user. • Incorporate a parking cash-out program option into the TSM ordinance. • Limit parking in areas of the City that are readily served by transit and are accessible by bicycle by limiting on-street parking, and reduce minimum parking requirements standards over time, and promote shared parking programs. • Provide accessible public park or recreational open space within one-half mile of all residences and restore public access along all waterways and riparian corridors (Sacramento and American Rivers, urban creeks).	LU 2.7.7 LU 9.1.1 LU 9.1.4 ER 1.1.1 ER 2.1 ER 2.1.1 ER 2.1.6 ER 2.1.7 ER 2.1.8 ER 2.1.9 ER 4.2 ER 4.2.1 ER 4.2.3	Buildings that Engage the Street Open Space Preservation Open Space Buffers Conservation of Open Space Areas Natural and Open Space Protection Resource Preservation Wetland Protection Annual Grasslands Oak Woodlands Wildlife Corridors Growth and Agriculture Protect Agricultural Lands Coordinate to Protect Farmland	Table 4-7 #27 Table 4-8 #3 Table 4-10 #2 Table 4-10 #8

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STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.1: MULTI-MODAL TRAVEL OPTIONS

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Action 2.1.1: Continue to increase the use of traffic calming measures within the City to reduce motor vehicle speeds and encourage pedestrian and bicycle trips. Traffic calming features may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others. ☑ *Applicable to New Development* ☐ *Applicable to Existing Development*			
Supporting Actions: • Conduct a study to analyze bike and pedestrian facilities on existing bridges to identify deficiencies and feasible improvements. • Prepare and adopt a citywide Transportation Development Impact Fee Program to support the development of all travel modes needed for new development. • Green Infrastructure Master Plan: Consider preparing a long-term planning document for integrating the City's green infrastructure – parkways, waterways, parks, open space, shaded bicycle parkways and pedestrianways. • Conduct a study to identify underused rights-of-way, such as street lanes, drainage canals, and railroad corridors to convert to bikeways and/or pedestrian ways. • Continue to consider additional one-way streets for two-way conversion to make them more transit-, bicycle-, and pedestrian-friendly. • Conduct a study of the existing street network to identify streets that can be more complete based on adopted design standards and the policies in the 2030 General Plan.	M 1.1.1 M 1.2.1 M 1.2.2 M 4.2 M 4.2.1 M 4.2.4 M 4.2.5 M 4.2.6	Right-of-Ways Multimodal Choices LOS Standard Complete Streets Adequate Rights-of-Way Pedestrian and Bicycle Facilities on Bridges Multi-Modal Corridors Identify Gaps in Complete Streets	Table 4-6 #1 Table 4-6 #2 Table 4-6 #4 Table 4-6 #5 Table 4-6 #6 Table 4-6 #10 Table 4-6 #17 Table 4-6 #23 Table 4-6 #24

STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.2: IMPROVED PEDESTRIAN ENVIRONMENT

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Action 2.2.1: Implement Pedestrian Master Plan facilities to achieve an annual expansion of 1 percent of the existing (2011) system. ☑ *Applicable to New Development* ☑ *Applicable to Existing Development*	M 2.1	Integrated Pedestrian System	
Supporting Actions: • Initiate a pedestrian safety outreach program and continue outreach to the public through DOT's website. • Continue to identify and prioritize pedestrian improvement projects as part of the Transportation Programming Guide. • Improve connections to transit, thereby extending a pedestrian's/ cyclist's potential trip length.	M 2.1.1	Pedestrian Master Plan	
	M 2.1.2	Sidewalk Design	
	M 2.1.3	Streetscape Design	Table 4-6 #14
	M 2.1.4	Cohesive Network	Table 4-6 #15
	M 2.1.7	Parking Facility Design	Table 4-6 #16
	M 2.1.9	Pedestrian Awareness Education	
	M 2.1.10	Safe Pedestrian Crossings	
	M 2.1.11	Speed Management Policies	
	M 2.1.12	Safe Sidewalks	

STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.3: INCREASED BICYCLE MODE SHARE

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Action 2.3.1: Implement Bikeway Master Plan facilities to achieve an annual expansion of 5 percent of the existing system. ☑ *Applicable to New Development* ☑ *Applicable to Existing Development*	M 5.1	Integrated Bicycle System	
Supporting Actions: • Increase the amount of secure bicycle parking within the City by 50 locations annually for the next 5 years, funded in part by the Sacramento Metropolitan Air Quality Management District bike parking program. • Work with community partners to establish a bicycle mode share goal and methodology. • Continue to work with community partners to locate bicycle racks, lockers, and bike-share programs in or near transit stops to help cyclists lengthen their trip potential as well as facilitate the start and completion of the transit-rider's trip. • Establish a bicycle mode share goal and establish a methodology for monitoring progress to achieve that goal.	M 5.1.1	Bikeway Master Plan	
	M 5.1.2	Appropriate Bikeway Facilities	
	M 5.1.4	Motorists, Bicyclists, and Pedestrian Conflicts	
	M 5.1.7	Class II Bike Lane Requirements	Table 4-6 #18
	M 5.1.9	Conversion of Underused Facilities	Table 4-6 #19
	M 5.1.10	Bike Safely for Children	Table 4-6 #27
	M 5.1.11	Bike Facilities in New Developments	
	M 5.1.12	Bicycle Parking at Transit Facilities	
	M 5.1.13	Public Information and Education	
	M 5.1.14	Encourage Bicycle Use	

STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.4: INCREASED TRANSIT MODE SHARE

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Action 2.4.1: Work with community and transit partners to increase public transit service (i.e. frequency, number of lines and stops) above and beyond what is already planned in the Metropolitan Transportation Plan by 5 percent in 2020 and 10 percent in 2030. ☐ *Applicable to New Development* ☐ *Applicable to Existing Development*	M 1.3.5	Connections to Transit Stations	
	M 3.1	Safe, Comprehensive, and Integrated Transit System	
Supporting Actions: • Work with community partners to develop and implement a policy that expands affordable public transportation coverage to within one-quarter of a mile of all city residents. • Expand transit and mode options to fill transit gaps, including streetcars, car-sharing, and bike-sharing by establishing a car-sharing program, bike-sharing facilities near car-sharing locations, and conducting a study on potential for streetcars. • Work with community partners to identify funding to expand affordable transit coverage.	M 3.1.1	Transit for All	
	M 3.1.2	Maintain Services	
	M 3.1.3	Variety of Transit Types	
	M 3.1.4	Reduced Transit Fares	
	M 3.1.5	Unified Traveler Information System	
	M 3.1.6	Safe System	
	M 3.1.7	Transit Amenities	
	M 3.1.8	Transit Service	
	M 3.1.9	Demand-Responsive Service	
	M 3.1.10	New Facilities	
	M 3.1.11	Right-of-Way Preservation	Table 4-6 #12
	M 3.1.12	Direct Access to Stations	Table 4-6 #20
	M 3.1.13	Light Rail Extensions and Enhancements	Table 4-6 #21
	M 3.1.14	Streetcar Facilities	
	M 3.1.15	Dedicated Bus Facilities	
	M 3.1.16	Developer Contributions	
	M 3.1.17	Transit Extension Studies	
	M 3.2.1	Passenger Rail Service	
	M 3.2.2	Sacramento Intermodal Transportation Facility	
	M 3.2.3	Transcontinental Passenger Rail Service	
	M 3.2.4	Capitol Corridor	
	M 3.2.5	High Speed Rail Service	
	M 3.3.1	Inter-City Bus Service	
	M 3.3.3	Private Water Transportation Services	

STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.5: LOW EMISSION VEHICLES/EFFICIENT GOODS MOVEMENT

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Action 2.5.1: Transport waste generated by residents and businesses to landfill facilities within the region rather than out of state, which will result in a reduction of over 1.2 million vehicle miles traveled per year. ☐ *Applicable to New Development* ☐ *Applicable to Existing Development*	M 1.5.1	Facilities for Emerging Technologies	Table 4-6 #13
Supporting Actions: • Participate in planning efforts for public charging infrastructure to support plug-in electric vehicles (PEVs). Provide public charging stations according to plan. • Develop and implement Route Smart software for solid waste trucks to decrease VMT and increase fuel efficiency.	M 1.5.4	High Emission Vehicle Buyback	
	M 1.5.5	Neighborhood Electric Vehicles	
	M 7.1.1	Efficient Goods Movement	
	M 7.1.2	Goods Movement by Rail	
	M 7.1.7	Port of Sacramento	

STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.6: CONNECTED TRANSPORTATION SYSTEM

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Action 2.6.1: Improve traffic flow and associated fuel economy of vehicles traveling on city streets by synchronizing the remaining estimated 50 percent of the city's eligible traffic signals by 2035. ☐ *Applicable to New Development* ☐ *Applicable to Existing Development*	LU 2.5.2	Overcoming Barriers to Accessibility	
Supporting Actions: • Identify major barriers to connectivity throughout the city and prioritize funding for improvements.	M 1.3.1	Grid Network	Table 4-6 #7
	M 1.3.3	Eliminate Gaps	Table 4-6 #8
	M 2.1.5	Continuous Network	Table 4-6 #9
	M 4.1	Roadway System	Table 4-6 #22
	M 4.1.5	Bridge Crossings	

STRATEGY 2: MOBILITY AND CONNECTIVITY

MEASURE 2.7: TRANSPORTATION DEMAND MANAGEMENT

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Action 2.7.1: City employee furloughs have resulted in an estimated reduction of 493,072 vehicle miles traveled in the past three years. Continuing this reduction in commuting miles through 2020 by ongoing furloughs, or telecommuting or alternate schedules, would result in an estimated GHG reduction of 223 metric tons/year. ☐ *Applicable to New Development* ☐ *Applicable to Existing Development*	M 1.4	Transportation Demand Management	
	M 1.4.1	Increase Vehicle Occupancy	
Supporting Actions: • Support SACOG's Commuter Club, which offers free services to help employers and commuters use carpool, bus, light rail, walking, biking, or telecommuting to get to work or run errands.	M 1.4.2	Automobile Commute Trip Reduction	
	M 1.4.3	Transportation Management Associations	
• Develop and implement a market price public parking program for on-street parking.	M 1.4.4	Off-Peak Deliveries	Table 4-6 #11
• Update and enhance the Transportation Systems Management Program consistent with the policies of the General Plan.	M 1.5.3	Public-Private Transportation Partnerships	Table 4-6 #28
• Provide incentives for development projects that separate the costs of rented parking from leased building space so that the charges from parking are borne more explicitly by the user.	M 3.3.2	Taxi Service	
	M 6.1.1	Appropriate Parking	
	M 6.1.2	Reduce Minimum Parking Standards	
	M 6.1.7	Disincentives for Single-Occupant Vehicle Trips	
	M 6.1.8	Separate Parking Costs	

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STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.1: ENERGY DEMAND MANAGEMENT AND CONSERVATION

Climate Action Plan	2030 General Plan	
Actions	Policies	Implementation Programs
Action 3.1.1: Work with City partners (e.g., Sacramento County) and energy providers (e.g., SMUD, PG&E) to launch a comprehensive social marketing campaign that leverages available tools from the social sciences to influence behaviors that reduce energy demand and promote conservation. The campaign could include the following elements: • Continuous messaging and frequent prompts from a trusted messenger through media campaigns and branding of communications. • Encouraging residents to set goals for reductions. Provide tools (e.g., online calculators) to track their progress toward meeting the goals. • Providing normative comparisons showing carbon footprints or energy and water use of households compared to the average in the community. • Providing public education on the need for energy efficiency, emissions reduction programs, utility incentives and cost savings associated with energy-efficient buildings. • Launching an "energy efficiency challenge" campaign for city residents that challenges communities and neighborhoods to achieve the highest energy efficiency in return for pooled resources that could be applied to improvements or amenities. • Launching energy efficiency campaigns targeted at businesses that provide business and property-owner education on the need for energy efficiency and emissions reduction programs and incentives. ☐ *Applicable to New Development* ☑ *Applicable to Existing Development*		
Action 3.1.2: Support SMUD's Smart Grid program, which is estimated to result in 4 percent energy savings and 2 percent transmission savings by 2030. ☐ *Applicable to New Development* ☑ *Applicable to Existing Development*		
Action 3.1.3: Support the SMUD and Tree Foundation Shade Trees programs, which reduce the urban heat island effect and associated energy consumption. ☑ *Applicable to New Development* ☑ *Applicable to Existing Development*	U 6.1.5	Energy Consumption Per Capita Table 4-7 #14 Table 4-7 #21
Action 3.1.4: Support SMUD's energy efficiency rebate and incentive programs: • Appliance Rebate. SMUD buys down the cost of energy-efficient electric appliances and products, offers rebates and incentives to customers, and affordable financing to purchase energy-efficient appliances. • Lighting Rebates. SMUD offers standard rebates to residential and commercial customers for the installation of energy-efficient lighting, such as LED lamps, fixtures, and other forms of highly-efficient lighting. • Electronic Incentives. SMUD provides incentives to retailers in the Sacramento region to stock the most energy-efficient major electronics, such as televisions and computer monitors. • Custom and Prescriptive Lighting Incentives. SMUD encourages and offers incentives to qualifying systems for the successful installation of LED lighting in local commercial applications. • Multi-family Retrofits. SMUD offers multi-family prescriptive rebates for multi-family residential customers seeking to retrofit units and common spaces to increase energy efficiency. This program offers rebates specific to the type of appliance, lighting, or improvement used, and encourages comprehensive analysis of the energy performance of each building. ☑ *Applicable to New Development* ☑ *Applicable to Existing Development*	U 6.1.13	Energy Efficient Incentives Table 4-7 #22
Supporting Actions: • Continue building on the City's existing partnerships, such as with Sacramento County's Business Environmental Resource Center (BERC) and Sacramento Municipal Utility District (SMUD), to promote energy efficiency and conservation for the business community and for individuals.		

STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.2: INCREASE EXISTING BUILDING ENERGY EFFICIENCY

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Action 3.2.1: Develop and adopt a Commercial Property Assessed Clean Energy Financing Program (Commercial PACE program) to create a voluntary special assessment district to help finance energy efficiency retrofits of commercial establishments. ☐*Applicable to New Development* ☑ *Applicable to Existing Development*			
Action 3.2.2: Update and enforce Chapter 15.76 of the Sacramento City Code, also known as the Residential Energy Conservation Ordinance (RECO), which requires the implementation of mandatory energy and water conservation standards for existing residential properties when building permits are required for major remodels or additions. This measure was assumed to reduce residential energy consumption by 15 percent on average per project for which a building permit is pulled. ☐*Applicable to New Development* ☑ *Applicable to Existing Development*			
Action 3.2.3: Work with community partners to develop and implement a voluntary rental housing energy efficiency program to improve the energy and water efficiency of existing rental units (both single-family and multi-family). If the voluntary program does not achieve an average energy savings of 15% per unit in at least 10,000 units/year by the end of 2014, the program may switch to mandatory energy efficiency improvements for rental housing. ☐*Applicable to New Development* ☑ *Applicable to Existing Development*			
Action 3.2.4: Develop and adopt a Commercial Energy Conservation Ordinance (CECO) that requires the implementation of mandatory energy and water conservation standards for all commercial and industrial properties. CECO would involve retrofitting existing commercial and industrial buildings for which a building permit is pulled for renovation or addition above a specified project size threshold. ☐*Applicable to New Development* ☑ *Applicable to Existing Development*	LU 2.6.5 U 6.1.10 U 6.1.11	Green Building Retrofit Energy Rebate Programs Energy Efficiency Improvements	 Table 4-7 #14 Table 4-7 #26
Action 3.2.5: Continue to partner with SMUD to implement the Small Commercial Energy Efficiency Pilot Program, which provides incentives to small commercial customers to improve energy efficiency. ☐*Applicable to New Development* ☑ *Applicable to Existing Development*	U 6.1.12	Energy Efficiency Audits	
Action 3.2.6: Support SMUD's Home Performance Program, which offers low-cost energy audits and rebates for energy efficiency upgrades to existing residential customers. ☐*Applicable to New Development* ☑ *Applicable to Existing Development*			
Supporting Actions: • Support SMUD's low-income weatherization programs and Energy Efficient Remodel Program. • Collaborate with SMUD, PG&E, and other partners to provide information at the public counter and on the City's website about energy efficiency, green building, passive solar design, rebates, and financing for energy efficiency retrofits. • The City of Sacramento will continue to evaluate other voluntary programs and strategies for improving the energy efficiency of existing buildings and work with other organizations including the Sacramento Association of REALTORS®, the Air Quality Management District, SMUD and others that have an interest in this area.			

STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.2: INCREASE EXISTING BUILDING ENERGY EFFICIENCY

Climate Action Plan	2030 General Plan	
Actions	Policies	Implementation Programs
Supporting Actions: • Identify funding to develop planning and design documents to assist property owners with appropriate retrofit options for historic and potentially-eligible properties that will comply with the Secretary of the Interior's Standards for the Treatment of Historic Properties. • Explore the feasibility of incorporating residential into the City's forthcoming property assessed clean energy financing (PACE) program. • Continue to explore and advocate for low-cost financing program options, such as the CHF Energy Upgrade Loan program, to assist homeowners and others in funding energy efficiency retrofits.		

STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.3: INCREASE ENERGY EFFICIENCY IN NEW BUILDINGS

Climate Action Plan	2030 General Plan	
Actions	Policies	Implementation Programs
Action 3.3.1: Achieve energy efficiency through increased residential density. Greenhouse gas emission reductions will be achieved through greater energy efficiency as new housing types shift from single-family to attached/multi-family, consistent with the General Plan. ☑ *Applicable to New Development* ☐ *Applicable to Existing Development*		
Action 3.3.2: Require Tier 1 CalGreen Building Code standards for all new development starting in 2014. ☑ *Applicable to New Development* ☑ *Applicable to Existing Development*		
Supporting Actions: • Prepare passive solar design guidelines for new development, customized for Sacramento's latitude and solar angle. • As part of the Green Development Code Update process, conduct a comprehensive review and update of existing codes and policies to remove barriers related to the implementation of green building strategies and to include incentives that are not currently in the City Code (i.e., Green Development Code). • Work with City partners (e.g., Sacramento County) and energy providers (e.g., SMUD, PG&E) to prepare a Contractor and Developer "Did You Know?" checklist that identifies how to incorporate low- or no-cost energy efficiency designs, features, and materials into a project. • Develop and maintain Impact Fee Reduction schedules for sewer, water, parks, and other services that are based on a building's performance and its impacts on public infrastructure and services. • Work with City partners (e.g., Sacramento County) and energy providers (e.g., SMUD, PG&E) to develop a database that maintains Alternative Means Requests (AMRs) and associated research and findings that can be accessed by local building staff within the region. This database would allow easy access to AMRs and applications, allowing staff to quickly assess what additional information/testing is needed to monitor local green building projects. It could also eventually be linked to a best practices green building forum. • Develop a Green Building Incentive Program that encourages and rewards projects that voluntarily achieve high performance green building standards (i.e. LEED or GreenPoint Rated certification) beyond mandatory CalGreen requirements. • Continue to partner with SMUD to promote energy efficiency incentive programs for new construction, such as Savings by Design and SolarSmart Homes.	LU 2.6.1 Sustainable Development Patterns LU 2.6.3 Sustainable Building Practices LU 2.6.6 Heat Island Effect LU 4.5.3 Green Neighborhoods U 6.1.7 Solar Access	Table 4-2 #10 Table 4-2 #11 Table 4-2 #16 Table 4-2 #25

STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.3: INCREASE ENERGY EFFICIENCY IN NEW BUILDINGS

Climate Action Plan	2030 General Plan	
Actions	Policies	Implementation Programs

Supporting Actions:
• Adopt energy-efficient outdoor lighting standards for new development. The following provisions should be taken into consideration to reduce energy consumption by future outdoor lighting:
  • Consider leveraging existing grant money to help fund this initiative. For example, both the City of Sacramento and the County have obtained funding from the Department of Energy Efficiency and Conservation Block Grant to convert existing high pressure sodium and mercury vapor streetlights to induction and LED streetlights.
  • Encourage lighting along the urban-rural edge not to exceed one-half the current maximum lighting standard.
  • Balance public safety with limits on continuous all night outdoor lighting in parks, sport facilities, construction sites, and other relevant areas.
  • Explore options for the use of bi-level/sensor-activated outdoor lighting or low-level security lighting with photo sensors.
• Update the City project selection process for publicly-subsidized buildings to include sustainability as a priority in both the bidding process and as an evaluation criterion.
• Encourage builders to supply ENERGY STAR appliances and HVAC systems for all new residential developments.
• Require that all new non-residential developments install high-efficiency boilers, where applicable, with a minimum of 85 percent efficiency.
• Develop and adopt building design guidelines that require conveniently located exterior electrical outlets to improve the ease of using electrical landscaping equipment and vehicles rather than gas-powered equipment.
• Work with energy providers (e.g., SMUD, PG&E) to promote the installation of solar thermal swimming pool heaters and solar water and space heating systems in existing and new developments.
• Work with energy providers (e.g., SMUD, PG&E) to encourage the industrial sector to participate in co-generation programs, where feasible.		

STRATEGY 3: ENERGY EFFICIENCY AND RENEWABLE ENERGY

MEASURE 3.4: INCREASE RENEWABLE ENERGY GENERATION AND USE

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Action 3.4.1: Update the Development Code to require that new single-family and multi-family residential projects of ten units or more install photovoltaic systems and participate in SMUD's SolarSmart Homes program. ☑ *Applicable to New Development* ☐ *Applicable to Existing Development*			
Action 3.4.2: Update the Development Code to require that new commercial developments greater than 25,000 square feet and industrial developments greater than 100,000 square feet install renewable energy systems (including photovoltaic systems) that generate 15 percent of the project's energy demand onsite. ☑ *Applicable to New Development* ☐ *Applicable to Existing Development*			
Action 3.4.3: Support SMUD's Greenergy Program, which allows customers to opt in to pay an additional fee on their utility bill each month to promote local renewable energy projects and expanded use of renewable power supply. ☐ *Applicable to New Development* ☑ *Applicable to Existing Development*			
Supporting Actions: • Adopt a solar building permit fee schedule based on cost recovery of staff time, rather than valuation, to help reduce the permitting costs of solar PV and water heating systems. • Work with SMUD and other regional partners to streamline the permitting and interconnection process for solar photovoltaic systems. • Amend the Development Code to address how photovoltaic arrays may be used to meet parking lot shading requirements. If appropriate, expand the conditions under which shading credit can be given for photovoltaic arrays. If feasible, work with SMUD to identify priority areas and track progress. • Continue to explore the feasibility of an advanced waste-to-energy conversion program, focusing on organics or other non-recyclable, problematic portions of the waste stream. Consider a "demonstration energy park," and identify future opportunities for a waste-to-energy program on a regional, cooperative basis with SMUD, Sacramento County, and others. • Work with City partners (e.g., Sacramento County) and energy providers (e.g., SMUD and PG&E) to develop and maintain a "shovel ready" program for renewable energy development. Considerations should include: ▪ Collaborating with SMUD in identifying possible sites for production of renewable energy using local renewable resources such as solar, wind, small hydro, and biomass. ▪ Evaluating potential land use, environmental, economic, and other constraints affecting the development of renewable resources within city limits. ▪ Establishing a protocol for reviewing a proposed alternative energy project against existing City policies and ordinances. The protocol should identify optimal locations and best means to avoid noise, aesthetic, and other potential land use compatibility conflicts. • Promote the City's existing "Clean-Tech" zone to help draw clean, renewable energy plants and other industries to locations within the city.	U 5.1.17 U 6.1.6 U 6.1.7	Waste for Energy Generation Renewable Energy Solar Access	Table 4-2 #25 Table 4-7 #23 Table 4-7 #24

STRATEGY 4: WASTE REDUCTION AND RECYCLING

MEASURE 4.1: SUSTAINABLE PRODUCTION AND CONSUMPTION

Climate Action Plan	2030 General Plan	
Actions	Policies	Implementation Programs
Supporting Actions: • Work with the Rental Housing Association of Sacramento to inform and advise rental property owners and managers of the recycling requirements contained in the Multi-family Recycling Ordinance (SWA Ordinance 21). • Develop a junk-mail prevention outreach program that helps residents to voluntarily opt out of receiving junk mail. • Work with utilities and other public service providers (e.g., SMUD, PG&E, Comcast) to promote and encourage paperless billing and payment options. • Continue to work with community partners and local neighborhood groups to promote and support access to fresh, locally-grown food, encourage the purchase of locally-produced food, and sponsor public education events related to gardening and locally-produced food. • Continue to seek funding to develop and maintain demonstration gardens in each Council District. • Work with regional partners to identify funding to develop and maintain a regional demonstration garden and training center for public education on community gardens and rooftop gardens. • Continue to provide incentives (e.g., Development Impact Fee Deferral Program; Economic Development Treatment Capacity Bank; Recycling Pledge; reduced size/cost garbage containers) to encourage the development of a local market for recycled materials. • Develop and maintain a sidewalk grinding option for sidewalk maintenance rather than demolishing and re-paving sidewalks.	LU 8.2.7 Farmers/Public Markets ER 4.1.1 Locally Grown and Organic Foods ER 4.1.2 Community and Rooftop Gardens	

STRATEGY 4: WASTE REDUCTION AND RECYCLING

MEASURE 4.2: SOURCE REDUCTION, DIVERSION, RECYCLING, AND REUSE

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Action 4.2.1: In order to meet the long-term waste diversion target (i.e., zero waste by 2040), achieve interim waste reduction goals of 75 percent diversion from the waste stream by 2020 and 90 percent diversion from the waste stream by 2030. ☐*Applicable to New Development* ☐*Applicable to Existing Development*			

Supporting Actions:
• Conduct waste-reduction consultations with major waste generators (e.g., businesses and multi-family complexes) and recommend strategies to reduce waste and increase recycling while reducing costs.
• Work with commercial solid waste customers and franchise haulers to increase diversion rates to 30 percent (Business Recycling Ordinance).
• Continue to participate in the California Take-It-Back Partnership, a collaborative effort among businesses and State and local agencies to provide convenient locations for consumers to take back certain types of waste, including batteries, fluorescent lamps, compact-fluorescent light (CFL) bulbs, and other electronic devices.
• Continue to offer alternatives for e-Waste recycling and drop-off locations for household batteries and fluorescent lamps, including:
  • Promoting businesses that take back universal waste and e-waste.
  • Encouraging and supporting extended producer responsibility.
• Support efforts to implement the Solid Waste Authorities Multi-family Recycling Ordinance, which requires apartments and multi-family dwellings of 5 or more units to have a recycling program.
• Support the development and implementation of model recycling lease language for residential and commercial building managers.
• As funding becomes available, expand availability of public recycling containers in public parks, along commercial corridors and public right-of-ways, and reduce the waste generated from public events.
• Develop and implement residential and commercial waste audit programs that educate residents and businesses on what materials can and cannot be recycled and when and where to recycle.
	LU 2.6.4
	U 5.1.1
	U 5.1.4
	U 5.1.5
	U 5.1.8
	U 5.1.9
	U 5.1.10
	U 5.1.14
	U 5.1.15
	U 5.1.16
	U 5.1.17
	HCR 2.1.13
	HCR 2.1.14
		Existing Structure Reuse
		Zero Waste
		Equitably Distributed and Compatible Facilities
		Residential and Commercial Waste Disposal
		Neighborhood Cleanup Program
		Diversion of Waste
		Electronic Waste Recycling
		Recycled Materials for Goods Packaging
		Recycled Materials in New Construction
		Recycling and Reuse of Construction Wastes
		Waste for Energy Generation
		Adaptive Reuse
		Demolition
			Table 4-7 #19
			Table 4-7 #20

STRATEGY 4: WASTE REDUCTION AND RECYCLING

MEASURE 4.3: GREENWASTE AND COMPOSTING

Climate Action Plan	2030 General Plan	
Actions	Policies	Implementation Programs
Supporting Actions: • Continue to support area wood grinding facilities that recycle greenwaste material for mulch and other groundcover applications. • Develop a food waste recycling program that diverts food from landfills into composting processes. • Promote home composting and vermiculture to reduce GHG emissions by reducing the amount of organic waste (e.g., cellulose-based waste, paper, food waste) that is sent to landfills. • Increase participation in and use of the Containerized Yard Waste Program by enhancing education and outreach to residents on the topic of composting leaves, grass trimmings, tree and shrub prunings, Christmas trees, and sod (with dirt removed). • Support the Solid Waste Authority's Sacramento Greencycle effort (i.e., regional garden refuse processing plant). • Support efforts to remove organics from landfills and produce renewable energy from organic waste, using technology such as gasification anaerobic digestion, as planned for Sacramento County's South Area Transfer Station Energy Park.	U 5.1.6 Yard Waste and Street Sweeping U 5.1.7 Voluntary Containerized Yard Waste Program U 5.1.11 Composting and Grasscycling Programs U 5.1.13 Food Waste Recycling U 5.1.20 Waste Composting and Recycling for Landscapes	

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STRATEGY 5: WATER CONSERVATION AND WATER EFFICIENCY

MEASURE 5.1: WATER CONSERVATION

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Action 5.1.1: Achieve a 20 percent reduction in per-capita water use by 2020 consistent with the State's 20x2020 Water Conservation Plan (California Water Resources Control Board, 2010) using the following programs: • Installing water meters in residential units constructed prior to 1992 and in new developments, both commercial and residential, automated meter infrastructure (AMI) in all residential water metering. Water meters will result in all residents paying for water according to their usage. AMI will give residents information about inefficient water use. • Require CalGreen Tier 1 Water Efficiency measures in all new construction. • Require CalGreen Tier 1 Water Efficiency measures as part of the Residential Energy Conservation Ordinance (RECO). • Require CalGreen Tier 1 Water Efficiency measures as part of the Rental Housing Energy and Water Efficiency Program. ☑*Applicable to New Development* ☑*Applicable to Existing Development*			
Supporting Actions: • Develop a water conservation program to be coordinated with the Rental Housing Water and Energy Efficiency Program. • Develop and implement a voluntary landscaping water efficiency certification training program for irrigation designers, installers, and property managers. • In conjunction with other water conservation measures and programs, continue conducting voluntary Water Wise House Calls (i.e., water audits) for city residents and businesses. • Administer Water Wise Surveys (audits) to the top commercial, institutional, and industrial (CII) water users and homeowner associations (HOAs) with high water use. • Continue administering the Residential Assistance Ambassadors Program that trains volunteers to provide door-to-door residential assistance (surveys) to targeted areas of the city. • Continue to offer the Water Conservation Rebate Program, which provides Toilet Rebates and Washer Machine Rebates to city residents and businesses who install High Efficiency Toilets and Tier 3 Washer Machines. • Use water conservation gardens like the one at the Glen Ellen water conservation office, to demonstrate and promote water conserving landscapes. • Promote "River Friendly Landscaping" techniques which include the use of native and climate appropriate plants; sustainable design and maintenance; underground (water-efficient) irrigation; and yard waste reduction practices.	U 2.1.2 U 2.1.5 U 2.1.8 U 2.1.10 U 2.1.11 U 2.1.12 U 2.1.13	Optimize Water System Comprehensive Water Supply Plan Emergency Water Conservation Water Conservation Programs Water Conservation Enforcement Recycled Water Landscaping	Table 4-7 #6 Table 4-7 #7 Table 4-7 #9 Table 4-7 #11 Table 4-7 #13 Table 4-7 #14 Table 4-7 #15

STRATEGY 5: WATER CONSERVATION AND WATER EFFICIENCY

MEASURE 5.1: WATER CONSERVATION

Climate Action Plan	2030 General Plan	
Actions	Policies	Implementation Programs
Supporting Actions: • Develop and adopt a Water Conservation Strategy as part of the Urban Water Management Plan to implement the best management practices (BMP) listed in the California Urban Water Conservation Council MOU. • Develop and implement a Conjunctive Use Program that transitions the city from a passive water pumping scheme to an active management program that plans and varies the amount of groundwater pumped based on surface water availability. • Develop an automated operating system for the distribution of water throughout the city to increase efficiency and reduce energy demand. • Update and/or establish criteria and standards to require water efficiency upgrades as a condition of issuing permits for renovations or additions of existing buildings that involve plumbing fixtures consistent with SB 407, which requires single-family homes and multi-family and commercial properties built before January 1, 1994, to upgrade noncompliant plumbing fixtures to water-efficient models at transfer of property. • Continue providing public education (e.g., Bluethumb Program) and conducting outreach campaigns to promote water conservation efforts. Programs should highlight specific water-wasting activities to discourage, such as the watering of non-vegetated surfaces and using water to clean sidewalks and driveways, and educate the community about the importance of water conserving techniques. Water efficiency training and certification for irrigation designers, installers, and property managers should also be offered. • Develop and implement a water conservation program in coordination with the Rental Housing Water and Energy Efficiency Program to audit plumbing fixtures in rental properties. • Develop and adopt regional Low Impact Development (LID) standards, policies, and update codes and ordinances to require LID for new development and redevelopment priority projects to reduce stormwater. Promoting use of native plants with low water requirements for the landscape-type of LID facility can help conserve water. • Develop guidelines and building standards for installation and use of composting toilets.		

STRATEGY 5: WATER CONSERVATION AND WATER EFFICIENCY

MEASURE 5.2: WASTEWATER TREATMENT

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs

Supporting Actions:
• Support SCRSD efforts to develop and maintain methane recovery and energy production facilities by 2020 by:
  • Evaluating methane emissions and potential capture at primary and secondary clarifiers and force system mains.
  • Maintaining methane recovery systems and digester gas combustion systems at wastewater treatment plants.
  • Developing waste-to-energy projects at 50 percent of wastewater treatment plants.
  • Evaluating potential for biofuel production at the Sacramento Regional Wastewater Treatment Plant.
	U 1.1.4
	U 2.1.2
	U 2.1.3
		Special Districts
		Optimize Water System
		Water Treatment Capacity and Infrastructure
			Table 4-7 #3
			Table 4-7 #8
			Table 4-7 #16

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STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.1: PREPARE FOR INCREASES IN AVERAGE TEMPERATURES

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Supporting Actions:			
• Continue tree planting and tree replacement programs with a goal of adding 1,000 new trees annually.			
• Update park development standards to implement "Leading Edge" sustainable design. Coordinating with Urban Forest Services and Sacramento Tree Foundation to pursue grant funding to add trees to parks.			
• Identify funding for the development and implementation of a street tree master plan for the Central City area as part of the next phase of the Downtown Urban Design Plan.	LU 2.3	City of Trees and Open Spaces	
	LU 2.3.1	Multi-functional Green Infrastructure	
• Continue to work with local and regional tree experts and the Tree Foundation to keep an up-to-date list of preferred tree species that will thrive in Sacramento's current climate, and continue to survive in hotter, drier future climate conditions.	LU 2.6.3	Sustainable Building Practices	
	LU 2.6.6	Heat Island Effect	Table 4-2 #16
• Work with labor organizations, the business community, and county and State health and safety agencies to publicize programs and standards for preventing heat-related illness in employees who work outdoors. Continue to operate cooling centers, and publicize precautions for preventing heat-related illness during heat waves.	LU 4.2.2	Enhanced Urban Forest	Table 4-10 #3
	ER 3.1.1	Urban Forest Management Plan	Table 4-10 #7
	ER 3.1.2	Manage and Enhance	
• Develop informational materials for the public counter to encourage residents to install cool roof technologies and rooftop gardens and provide guidance to contractors and staff.	ER 3.1.6	Urban Heat Island Effects	
	ER 3.1.7	Shade Tree Planting Program	
• Explore options in the Green Development Code Update process to improve parking lot shading requirements to improve the health and vigor of the trees. Allow additional trees and landscaping to be installed in existing parking lots without requiring replacement of lost parking spaces (when increase in building area or change in use is not being proposed).	ER 4.1.2	Community and Rooftop Gardens	
• Explore options in the Green Development Code Update process to require paving for new development to meet minimum Solar Reflectance Index (SRI) values; and incorporate cool pavement technology into the regular maintenance of existing streets, sidewalks, parking areas, and bike lanes.			

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.2: PRESERVE WATER SOURCES AND RESPOND TO VARIABLE SUPPLIES

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Supporting Actions:			
• Seek grant funding to enhance the cost-feasibility of reclaimed water for certain parks and industrial sites.			
• Convene and maintain a multi-stakeholder Sacramento Water Conservation Advisory Group (SWCAG) to serve in an advisory capacity to the City regarding water conservation programs and policies, and strategic planning. The SWCAG will (1) encourage effective water conservation policy and water use efficiency, (2) advance public education and awareness, and (3) build collaborative partnerships.	U 2.1.2	Optimize Water System	
	U 2.1.3	Water Treatment Capacity and Infrastructure	
• Continue to pursue grant opportunities for projects and programs that reduce water use in the City's parks and open spaces.	U 2.1	High-Quality and Reliable Water Supply	
• Update the Development Code to establish a limit on area of impervious surface allowable and require the use of pervious surface materials in new developments to improve groundwater recharge and limit saltwater intrusion.	U 2.1.5	Comprehensive Water Supply Plan	Table 4-7 #6 Table 4-7 #7
	U 2.1.8	Emergency Water Conservation	Table 4-7 #9
• Protect open space areas that are currently used for recharging groundwater basins or have the potential to be used for recharge.	U 2.1.10	Water Conservation Programs	Table 4-7 #10
• Pursue grant funding to provide resources to incorporate the use of reclaimed water in appropriate parks and industrial sites/processes.	U 2.1.11	Water Conservation Enforcement	Table 4-7 #11
	U 2.1.12	Recycled Water	Table 4-7 #13
• Promote the use of rain barrels and rain gardens to conserve water, while not increasing the occurrence of disease vectors.	U 2.1.13	Landscaping	Table 4-7 #15
• Continue ongoing Sacramento and American River source water protection efforts, based on follow-up to watershed sanitary survey recommendations, including support of watershed protection efforts such as Keep Our Waters Clean.	ER 1.1.2	Regional Planning	
	ER 1.1.3	Stormwater Quality	
• As part of updates to the Water Supply Master Plan, explore the economic costs and benefits associated with recycled water, and identify areas appropriate for additional piping infrastructure.	ER 1.1.4	New Development	
	ER 1.1.8	Watershed Education	

• Develop a rebate program to provide incentives for the installation of:
  • Complete gray water systems in new and existing buildings.
  • Dual plumbing in new buildings to allow gray water systems to be installed cost-effectively in the future.			

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.3: RESPOND TO ENERGY DEMANDS AND VARIABLE SUPPLIES

Climate Action Plan	2030 General Plan	
Actions	Policies	Implementation Programs
Supporting Actions: • Work with SMUD to encourage greater enrollment of residents and businesses in energy Demand Response Programs to avoid higher costs of peak energy use and lower energy bills.	LU 2.6.4 Existing Structure Reuse LU 2.6.5 Green Building Retrofit LU 4.5.3 Green Neighborhoods LU 5.1.17 Waste for Energy Generation LU 6.1.6 Renewable Energy LU 6.1.7 Solar Access U 6.1.5 Energy Consumption per Capita U 6.1.8 Other Energy Generation Systems U 6.1.9 Green Businesses U 6.1.10 Energy Rebate Programs U 6.1.11 Energy Efficiency Improvements U 6.1.12 Energy Efficiency Audits U 6.1.13 Energy Efficient Incentives ER 3.1.5 Solar Access	Table 4-2 #9 Table 4-2 #11 Table 4-2 #25 Table 4-7 #14 Table 4-7 #22 Table 4-7 #23 Table 4-7 #24 Table 4-7 #25 Table 4-7 #26

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.4: PROTECT PUBLIC FROM HEALTH RISKS AND SAFETY HAZARDS

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Supporting Actions:	ER 1.1.5	No Net Increase	
• As part of the implementation of the Sacramento County Multi-Hazard Mitigation Plan, participate in the development of a seasonal multi-hazard public education campaign to enhance public awareness about the risk of natural hazards, disaster preparedness, climate change impacts, and how citizens can reduce exposure to hazard-related losses.	ER 4.1.1	Locally Grown and Organic Foods	
	ER 4.1.2	Community and Rooftop Gardens	
	ER 6.1	Improved Air Quality	
• Update emergency response plans to account for increased potential for black-outs in summertime.	ER 6.1.1	Maintain Ambient Air Quality Standards	
• Continue to participate in and partner with Sacramento Metropolitan Air Quality Management District on programs such as Sacramento Emergency Clean Air & Transportation (SECAT) Program, Spare the Air Program, and the implementation of the 2030 General Plan.	ER 6.1.19	Air Quality Education	Table 4-7 #5
	EC 2.1	Flood Protection	Table 4-7 #12
	EC 2.1.1	Interagency Flood Management	Table 4-7 #13
• Support efforts of the Sacramento Office of Emergency Services to continue to operate "cooling centers" during heat events to ensure adequate space is available for residents at all times of the week (including nights), with backup generators.	EC 2.1.3	Funding for the 200-year Flood Protection	Table 4-9 #19 Table 4-10 #1
• Continue to partner with SMAQMD to enhance awareness of air quality index alerts and related outreach and education to protect the health of residents.	EC 2.1.4	Floodplain Storage Maintenance	Table 4-10 #9
	EC 2.1.5	Floodplain Requirements	Table 4-11 #3
	EC 2.1.6	New Development	Table 4-11 #4

• Support the efforts of the Sacramento-Yolo Mosquito and Vector Management District to:
  • Enhance awareness of vector control to protect the health of residents.
  • Require drainage of untreated pools and other water features in home and businesses that are in sale proceedings.
	EC 2.1.7	Levee Setbacks for New Development	Table 4-11 #5

	EC 2.1.12	Roadway Systems as Escape Routes	Table 4-11 #6 Table 4-11 #7
• Continue development and implementation of the City's Integrated Pest Management (IPM) program for City facilities.	EC 2.1.14	Comprehensive Flood Management Plan	Table 4-11 #8
	EC 2.1.15	Flooding Evacuation and Rescue Maps	
• Incorporate climate change effects and impacts into public emergency preparedness education programs, with special consideration given to effective methods to communicate the issue to a general audience.	EC 2.1.16	Flood Risk Notification	
	EC 2.1.17	Deed Notification	
	EC 2.1.18	Flood Insurance	
	EC 2.1.19	Dam Failure	

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.4: PROTECT PUBLIC FROM HEALTH RISKS AND SAFETY HAZARDS

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Supporting Actions: • Continue to partner with relevant organizations and agencies when updating FEMA and DWR flood hazard maps and the City's Comprehensive Flood Management Plan to consider of the impacts of urbanization and climate change on long-term flood safety and long-term flood event probabilities. • Implement the City's Comprehensive Flood Management Plan, which addresses emergency preparedness, evacuation, hazardous materials, protection of critical facilities, and development guidelines, and flood insurance outreach to better protect citizens in the event of a major flood event. In conjunction with annual updates of the Plan, provide a report to the City Council on the status of Sacramento's flood protection and related issues. • Partner with community organizations to perform an analysis of social equity issues related to climate change effects/impacts to assess resilience of low-income communities and guide relevant future policy/program development. Create a heat response plan, focusing on vulnerable populations. • Increase community access to fresh fruits and vegetables by providing public community gardens and encouraging urban agriculture and private community gardens with supportive zoning ordinances. • Support local farms through access to Sacramento farmer's markets and co-ops that sell locally-grown food.	M 1.1.3 M 4.1.1 U 2.1.7 U 4.1 U 4.1.1 U 4.1.2 U 4.1.5 PHS 4.1.1 PHS 4.1.3 PHS 4.1.4 PHS 4.1.5 PHS 4.1.6 PHS 5.1.8	Emergency Services Emergency Access Water Supply During Emergencies Adequate Stormwater Drainage Adequate Drainage Facilities Master Planning New Development Multi-Hazard Emergency Plan Emergency Operations Center Emergency and Disaster Preparedness Exercises Mutual Aid Agreements Education Programs Pest/Vector Management	

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.5: PROMOTE A CLIMATE-RESILIENT ECONOMY

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Supporting Actions: • Work with the Business Environmental Resource Center (BERC) to incorporate information into BERC programs about actions that businesses can take to reduce their vulnerability to climate change. • Continue to analyze information on potential impacts of climate change on government operations and the local economy, and actively share results to foster public awareness and support for adaptation policy. • Identify and seek opportunities to diversify local economy in response to global supply chain pressures, in order to reduce effects on the local economy from climate change impacts in other regions.	ED 1.1.2	Economic Development Strategy	
	ED 1.1.3	Market Trends	
	ED 1.1.4	Economic Development Partnerships	
	ED 1.1.6	Tourism and Related Businesses	Table 4-4 #2
	ED 1.1.7	Sustainable Businesses	Table 4-4 #5
	ED 2.1.2	Attraction of Key Technical Institutions	Table 4-4 #10
	ED 3.1.7	Infrastructure and Public Facilities	
	ED 3.1.8	Infrastructure Investments	
	ED 4.1.1	City Role in Economic Initiatives	

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.6: RESPOND TO POTENTIAL IMPACTS ON PUBLIC INFRASTRUCTURE

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Supporting Actions:			
• Develop an Interagency Adaptation Team to work with appropriate agencies (e.g., California Natural Resources Agency, State Lands Commission, California Energy Commission, Sacramento Area Flood Control Agency [SAFCA], UC Davis) and neighboring jurisdictions (e.g., Sacramento County) to:	EC 2.1.2	Interagency Levee Management	
• Ensure that current information and data on climate change effects and impacts are considered and addressed as part of updates to infrastructure and utility plans, manuals, and specifications.	EC 2.1.9	Oversized Levees for Infill Development	
• Review existing infrastructure plans, policies, standards, and investments to ensure information about projected climate change impacts is included.	EC 2.1.10	Siting and Design of Critical Facilities	
• Assess impacts of climate change effects when siting new infrastructure and maintaining or renovating existing infrastructure.	U 1.1.1	Provision of Adequate Utilities	
• Incorporate climate change impact information into the design, construction, operation, and maintenance of infrastructure.	U 1.1.3	Sustainable Facilities and Services	
• Actively collaborate with regional agencies and neighboring jurisdictions to ensure that planning for future development and redevelopment incorporates risks from climate change effects/impacts.	U 1.1.7	Infrastructure Finance	
• Support SAFCA's efforts to achieve 200 year flood protection, and take a strong leadership role in the evolving process of readjusting flood protection to accommodate for climate change. Partner with SAFCA to negotiate for the development of reservoir management practices and improvements that will increase Sacramento's level of flood protection.	U 1.1.9	Joint-Use Facilities	Table 4-7 #2
• Enroll all applicable municipal facilities in Demand Response Programs and promote onsite energy generation and/or storage to help reduce peak energy demands and offset energy costs.	U 1.1.11	Underground Utilities	Table 4-7 #6
	U 2.1.2	Optimize Water System	Table 4-7 #7
	U 2.1.3	Water Treatment Capacity and Infrastructure	
	U 2.1.4	Priority for Water Infrastructure	
	U 4.1.1	Adequate Drainage Facilities	
	U 4.1.2	Master Planning	
	U 4.1.3	Regional Stormwater Facilities	
	U 4.1.5	New Development	

STRATEGY 6: CLIMATE CHANGE ADAPTATION

MEASURE 6.7: PROTECT NATURAL ECOSYSTEMS AND MIGRATION ROUTES

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Supporting Actions: • Support the efforts of The Natomas Basin Conservancy and other habitat preserve managers to adaptively manage wildlife preserves to ensure adequate connectivity, habitat range, and diversity of topographic and climatic conditions are provided for species to move as climate shifts. • The new or amended HCPs should provide a robust adaptive management component sufficient to ensure that habitat preserves are resilient to climate change effects/impacts and to ensure their mitigation value over time. Provisions should include, but are not limited to: greater habitat ranges and diversity; corridors and transition zones to accommodate retreat or spatial shifts in natural areas; redundant water supply; elevated topography to accommodate extreme flooding; and flexible management and fee structure. • As funding becomes available, implement active habitat restoration and enhancement to reduce impact of climate change stressors and improve overall resilience of habitat within existing parks and open space in the city. Support the efforts of Sacramento County to improve the resilience of habitat areas in the American River Parkway. • Recognize the value of trees on levees for habitat and as carbon sinks. Support SAFCA's efforts to protect the existing trees on levees.	LU 9.1.1	Open Space Preservation	Table 4-10 #9
	ER 1.1.1	Conservation of Open Space Areas	
	ER 2.1.1	Resource Preservation	
	ER 2.1.2	Conservation of Open Space	
	ER 2.1.3	Natural Lands Management	
	ER 2.1.4	Retain Habitat Areas	
	ER 2.1.5	Riparian Habitat Integrity	
	ER 2.1.6	Wetland Protection	
	ER 2.1.7	Annual Grasslands	
	ER 2.1.8	Oak Woodlands	
	ER 2.1.9	Wildlife Corridors	
	ER 2.1.10	Habitat Assessments	
	ER 2.1.11	Agency Coordination	
	ER 2.1.12	Natomas Basin Habitat Conservation Plan	
	ER 2.1.13	Support Habitat Conservation Plan Efforts	
	ER 2.1.14	Public Education	

STRATEGY 7: COMMUNITY INVOLVEMENT AND EMPOWERMENT

MEASURE 7.1: EDUCATION AND COMMUNITY INVOLVEMENT

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Supporting Actions:	LU 2.8.6	Community Outreach	
• Work with community partners to initiate a Green Building Professionals Guild in Sacramento to provide professional development and training opportunities for contractors and others in the green building industry.	M 1.4.3	Transportation Management Associations	
	M 1.4.3	Community Outreach	
• Work with community partners to design and implement a program educating the public about the cost and benefits associated with green buildings.	M 5.1.13	Public Information and Education	
	M 5.1.14	Encourage Bicycle Use	
• Develop a pilot project to educate the public on how to garden and grow their own food.	U 5.1.8	Neighborhood Clean-Up Program	
• Work with community partners to develop a Green Lease Toolkit that promotes partnership between building owners and tenants to contribute to efficient building operations.	U 5.1.9	Diversion of Waste	
	U 5.1.21	Educational Programs	
• Improve the City's sustainability website to incorporate all the City's sustainability program information in one location.	U 6.1.5	Energy Consumption per Capita	Table 4-7 #8
	U 6.1.13	Energy Efficient Incentives	Table 4-7 #22
• Continue to collaborate with city agencies, nonprofit organizations, neighborhoods groups and other community organizations to promote the issues of air quality, food availability, renewable energy systems, sustainable land use and the reduction of GHGs.	ED 4.1.3	Public/Private Partnerships	Table 4-7 #27
	ER 1.1.8	Watershed Education	Table 4-9 #12
• Identify and work with existing groups, such as schools, neighborhood associations, and non profits, to identify issues and opportunities for engaging them in sustainability efforts. Work with community partners to ensure that all possible segments of the community are included in the City's sustainability efforts and outreach.	ER 2.1.14	Public Education	Table 4-9 #19
	ER 2.1.15	Community Involvement	Table 4-10 #7
	ER 3.1.8	Public Education	Table 9-2 #16
• Develop and implement a campaign to Make Green Routine program to achieve "green" practices in residential households.	ER 4.1.2	Community and Rooftop Gardens	
• Establish community working groups to lead individuals or other groups of the community to promote climate protection programs.	ER 6.1.14	Zero-Emission and Low-Emission Vehicle Use	
• Continue to implement and expand educational programs and media campaigns to promote and educate the public about the 3R's (i.e., reduce, reuse, recycle) and the benefits of resource conservation, recycling, composting, and responsible purchasing.	ER 6.1.17	Wood Stove/Fireplace Replacement	
	ER 6.1.18	Employer Education Programs	
	ER 6.1.19	Air Quality Education	
	EC 2.1.18	Flood Insurance	
	PHS 4.1.4	Emergency and Disaster Preparedness Exercises	
	PHS 6.1.11	Communication and Education	

STRATEGY 7: COMMUNITY INVOLVEMENT AND EMPOWERMENT

MEASURE 7.2: RECOGNIZE COMMUNITY ACCOMPLISHMENTS

Climate Action Plan	2030 General Plan	
Actions	Policies	Implementation Programs
Supporting Actions: • Develop and implement a program celebrating local developers that achieve third party green building certification to both raise community awareness and reward high performance. • Support the ongoing efforts of the Business Environmental Resource Center (BERC) to implement the Sacramento Area Sustainable Business Certification Program, which recognizes and rewards business practices that achieve a high standard of sustainability and environmental performance and reduce GHG emissions. • Work with local groups and organizations to develop programs (e.g., home tours) to celebrate and raise awareness about innovative green building projects in both new and existing buildings.		

STRATEGY 7: COMMUNITY INVOLVEMENT AND EMPOWERMENT

MEASURE 7.3: BUILD BUSINESSES AND COMMUNITY ORGANIZATION PARTNERSHIPS

Climate Action Plan	2030 General Plan		
Actions	Policies		Implementation Programs
Supporting Actions: • Expand existing partnerships with City agencies, educational institutions, neighborhood groups, businesses, and community organizations to continue efforts to maintain the City's status as an environmental "green" leader.	M 1.4.2	Automobile Commute Trip Reduction	
	M 1.4.4	Off-Peak Deliveries	
	M 1.5.3	Public-Private Transportation Partnerships	
	U 5.1.12	City Recycling	Table 4-7 #22
	U 5.1.15	Recycled Materials in New Construction	Table 9-2 #14
	U 6.1.6	Renewable Energy	
	U 7.1.3	State-of-the-Art Technology	
	PHS 6.1.11	Communication and Education	

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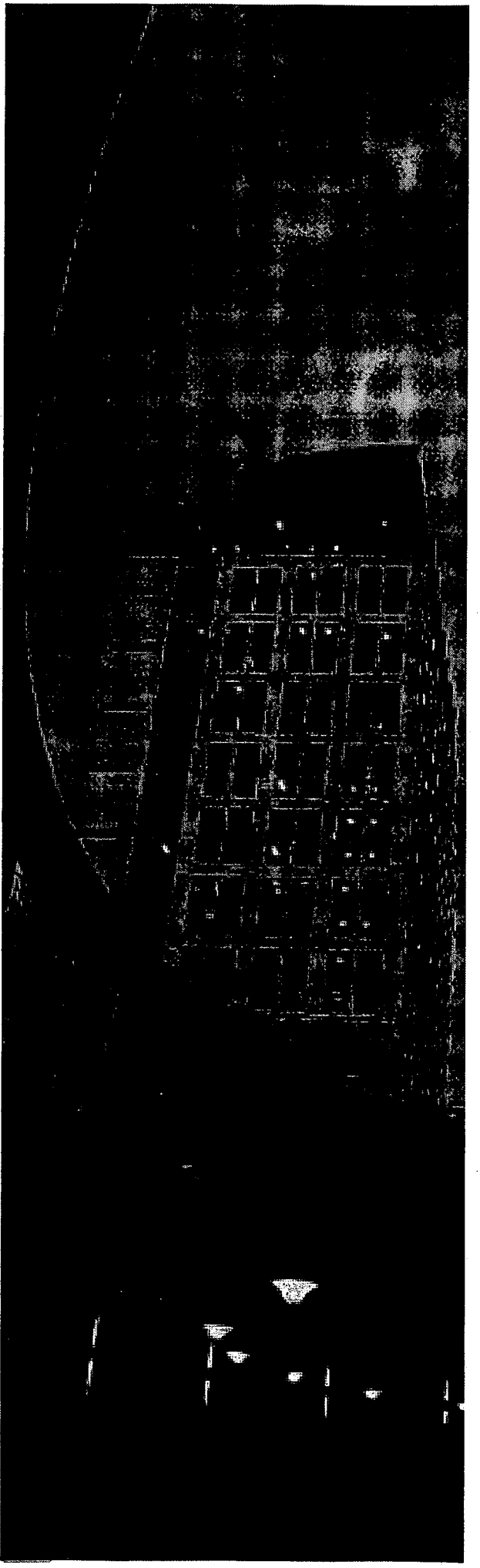
APPENDIX D

GHG EMISSIONS INVENTORY FOR SACRAMENTO COUNTY

The Greenhouse Gas Emissions Inventory for Sacramento County can be found on the following website: www.dera.saccounty.net/Portals/0/docs/Final_SACCTY_GHG_June09_stacked_small.pdf (November 2011). If not available, please contact the City of Sacramento Community Development Department at (916) 264-5011.



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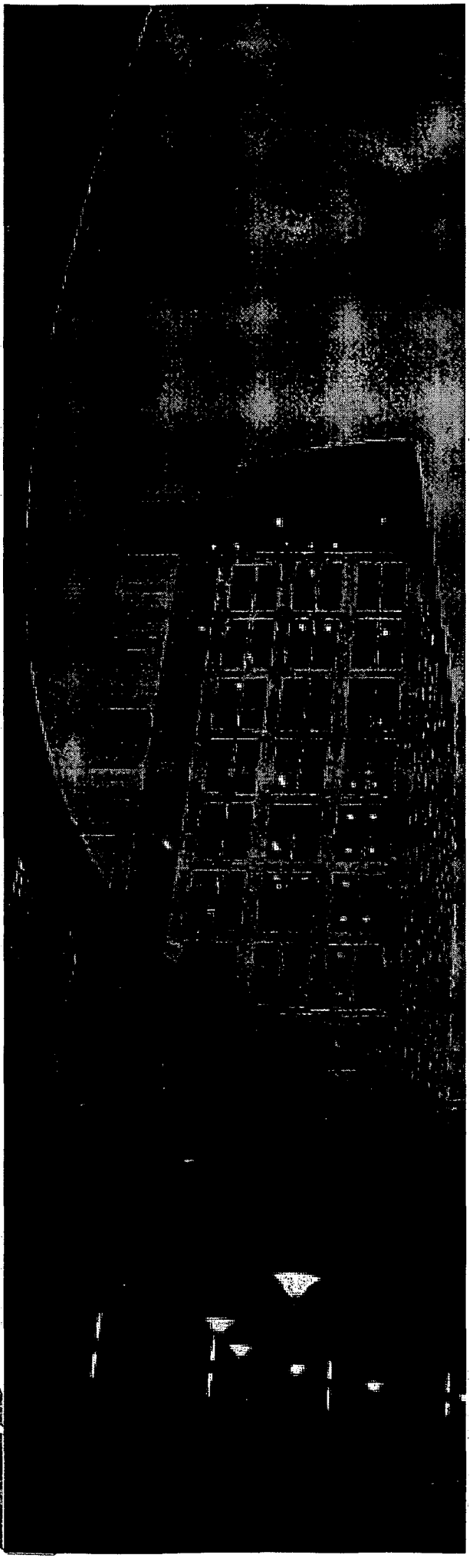

APPENDIX E

TECHNICAL CLIMATE ACTION PLAN ANALYSIS

Memo

455 Capitol Mall, Suite 210
Sacramento, CA 95814
(916) 444-7301

Date: October 25, 2011

To: Helen Selph, Erik de Kok, Tom Pace (City of Sacramento)

From: Curtis Alling, Honey Walters, and Heather Phillips

Subject: **City of Sacramento Greenhouse Gas Emissions Reduction Target and Goals-Final**

cc: Ted Holzem (Mintier Harnish)

Introduction

This memorandum submitted by Ascent Environmental, Inc. (Ascent) presents information regarding the development of the City's greenhouse gas (GHG) reduction target for 2020. This work was based on the 2005 emissions inventory and future-year projections completed by ICF International (ICF) and Ascent. This memorandum also summarizes the development of additional longer-term GHG reduction goals (e.g., 2030 and 2050) for consideration by the City.

The field of emissions inventory development and available tools and methods continues to evolve in the absence of standardized guidance. The 2005 base-year inventory and future projections were compiled for the following emission sectors: energy consumption in residential, commercial, and industrial sectors; on-road transportation; off-road mobile sources; solid waste; wastewater treatment; water consumption-related; agricultural; and high global warming potential (GWP) GHGs.

Future year GHG emission projections shown in Table 2 below were developed under a scenario (business-as usual) that does not account for emission reductions associated with implementation of the Climate Action Plan (CAP) currently in development, advances in technology, or emission reductions programs initiated by the State or federal government.

GHG emission projections were estimated using City-specific demographic data, where available, from the City's 2030 General Plan buildout model. The demographic data summarized in Table 1 were used by ICF to estimate GHG emissions projections for 2020, 2030, and 2050. In addition, Fehr & Peers Transportation Consultants (Fehr & Peers) prepared a revised vehicle miles traveled (VMT) estimate using the latest version of the SACSIM travel demand forecast model for 2035. The results of the VMT forecast prepared by Fehr & Peers are provided as an appendix to this memo. Ascent revised the on-road mobile-source sector of the emissions inventory using the California Air Resources Board's (ARB's) Mobile-Source Emission Factor Model (EMFAC 2007)[1]. Ascent

[1] Since the City's GHG inventory was conducted in May 2011, ARB released an updated version of the EMFAC model, EMFAC 2011, released on September 30, 2011. The primary difference between EMFAC 2007 and 2011 is that EMFAC 2011

interpolated and extrapolated revised emissions estimate to derive GHG emissions estimates for the years 2020, 2030, and 2050.

Table 1
City of Sacramento Demographic Data Projections

	2005	2020	2030	2050
Population	457,837	563,156	640,764	776,415
Housing	178,699	237,194	276,191	354,186
Industrial Employment	21,531	24,636	26,706	30,846
Non-retail Employment	285,664	362,582	413,861	516,419
Agricultural Employment	12,759	12,965	13,654	16,126

Source: ICF 2010

Summary of Results

Table 2 summarizes the results of the base-year (2005) inventory, and business-as usual projections for 2020, 2030, and 2050.

Table 2
City of Sacramento Base-Year Greenhouse Gas Emissions Inventory and Future-Year Projections

Emissions Sector	MT of CO_2e			
	2005	2020	2030	2050
Residential Energy	748,792	993,900	1,157,307	1,484,125
Commercial/Industrial Energy	979,777	1,243,593	1,419,470	1,771,224
Industrial-Specific	28,656	32,789	35,544	41,054
Transportation (On-Road Mobile)	2,013,962	2,193,916	2,313,886	2,553,825
Solid Waste	241,862	285,143	313,248	378,605
Wastewater Treatment	57,380	70,579	80,306	97,307
Water Consumption	12,810	15,757	17,928	21,724
High GWP	165,916	204,083	232,207	281,366
Agriculture	2,054	2,087	2,198	2,596
Off-Road Equipment	192,768	244,673	279,276	348,483

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incorporates emission reductions anticipated from recent increases in fuel economy standards and technology changes that will affect the future vehicle fleet. EMFAC 2007 is still an acceptable model and still accurately characterizes mobile-source emissions within the City, particularly because legislative reductions are taken outside the GHG inventory modeling and projections, as described below under "State and Federal Emission Reduction Programs" and summarized in Table 6. Use of EMFAC 2011 will be a factor for consideration when the City monitors and updates its GHG inventory over the CAP implementation period.

Total	**4,443,977**	**5,286,520**	**5,851,370**	**6,980,309**

Notes: CO_2e = carbon dioxide equivalent; GWP=global warming potential, MT= metric tons.
Source: Ascent 2011, Fehr & Peers 2011; ICF 2011, compiled by Ascent in 2011

Jurisdictional Control

Of the sectors studied in the emissions inventory, the sectors (and portions thereof) over which the City has jurisdiction are somewhat limited. For example, the City retains discretionary authority over most land use decisions within its incorporated limits, which are known to influence VMT, but does not control public transit and has no jurisdiction over fuel economy standards, which are determined by the federal government. Similarly, the City has the ability to implement energy efficiency standards by ordinance for buildings constructed or renovated in the City, but it does not control the composition of Sacramento Metropolitan Utilities District's (SMUD) energy portfolio, which is regulated at the State level. The degree to which State and federal regulations may influence GHG emissions within the City is discussed later in this report.

Sectors over which the City has very limited control include the off-road equipment fleet and high GWP GHG-emitting processes (e.g., the City does not have jurisdiction over equipment emission rates from the tail pipe, and high GWP GHGs are being addressed through programs of the California Air Resources Board [ARB]). For these reasons, these sectors were removed from the inventory for purposes of GHG emissions reduction target development. In addition, there is very little agricultural land within City limits and agriculture-related emissions within the City are expected to remain constant or decrease over the CAP planning period. Agricultural GHG emissions compose a very small portion of the total GHG inventory (less than 0.1%), and will not be a source of cost-effective GHG reduction strategies in the CAP. Thus, agricultural GHG emissions were also removed from the City's jurisdictional inventory. The GHG emissions over which the City has jurisdiction are reported below in Table 3. The jurisdictional inventory will be the subject of GHG reduction efforts and target-setting, discussed below.

Table 3
City of Sacramento Jurisdictional Greenhouse Gas Emissions Inventory and Future-Year Projections

Emissions Sector	MT of CO_2e			
	2005	2020	2030	2050
Residential Energy	748,792	993,900	1,157,307	1,484,125
Commercial/Industrial Energy[1]	979,777	1,243,593	1,419,470	1,771,224
Industrial Specific Energy	28,656	32,789	35,544	41,054
Transportation (On-Road Mobile)	2,013,962	2,193,916	2,313,886	2,553,825
Solid Waste	241,862	285,143	313,248	378,605
Wastewater Treatment	57,380	70,579	80,306	97,307
Water Consumption	12,810	15,757	17,928	21,724
Total	**4,083,239**	**4,835,677**	**5,337,689**	**6,347,864**

Notes: CO_2e = carbon dioxide equivalent; MT= metric tons.
[1] Some utility customers may choose not to disclose their energy consumption information. In these cases where a customer elects to keep this information confidential, its consumption data is aggregated into the Commercial/Industrial Energy sector. The Industrial Specific Energy sector represents energy consumed by industrial buildings where the customer did not chose to keep its consumption information confidential.
Source: Ascent 2011, Fehr & Peers 2011; ICF 2011, compiled by Ascent in 2011

City of Sacramento Communitywide Greenhouse Gas Emissions Reduction Target

In this memorandum, please note that year 2005 GHG levels are also referred to as "base year" or "existing" levels as this was the most recent year with comprehensive communitywide inventory data. Also, as part of the City's Phase 1 efforts, a minimum 15% reduction below 2005 levels by 2020 was identified for internal operations only (e.g., local government-owned) consistent with guidance provided in the California Air Resources Board's (ARB) Climate Change Scoping Plan (Scoping Plan) (ARB 2008).

With respect to communitywide GHGs, attaining a 15% reduction below base year (2005) levels would require an emissions reduction of approximately 612,486 metric tons carbon dioxide equivalent per year (MT CO_2e/year) by 2020, or 1,364,924 MT CO_2e/year below 2020 projected levels. This is approximately a 28% reduction from projected 2020 emission levels. This reduction would need to be achieved in the context of future growth, as the City anticipates approximately 116,400 additional people by 2020 (ICF 2010). GHG emissions in the City would be limited to approximately 3,470,753 MT CO_2e/year in 2020. This emissions limit represents 15% below the 2005 GHG emission levels under the City's jurisdiction. Refer to Table 4 for a summary of this information. Please note that this 15% reduction would be the minimum required to comply with statewide GHG emissions reduction efforts (e.g., Assembly Bill [AB] 32) and current guidance offered by ARB.

Table 4
Greenhouse Gas Emissions Reduction Target

	Target (15% reduction from 2005 levels by 2020)	
	MT CO_2e/yr	% reduction
Emissions Limit	3,470,753	-
Reduction from Existing	612,486	15%
Reduction from 2020 Projected	1,364,924	28%

Notes: CO_2e = carbon dioxide equivalent; MT= metric tons.
Source: Data compiled by Ascent in 2011

Interim Future Emission Reduction Goals

The identified target discussed above would achieve minimum compliance with AB 32. In order to comply with the intent of Executive Order S-3-05, and set the City on a path toward continued GHG emission reductions beyond 2020, the following interim future GHG emissions reduction goals are worthy of consideration. S-3-05 requires an 80% reduction in statewide GHG emissions below 1990 levels by 2050.

According to the ARB's Scoping Plan, 15% below 2005 emission levels would be comparable to 1990 statewide emission levels (ARB 2008). If we assume that 15% below 2005 levels would also be analogous to 1990 emission levels for the City, we can treat the 2020 GHG reduction target as a proxy for 1990 emission levels in order to apply the 80% below 1990 emission goal to the City's data.

It is not the obligation of the City to comply with S-3-05. However, the City could strive to achieve the following interim goals presented in Table 5. The data in Table 5 were interpolated linearly assuming an 80% reduction in emissions below the City's 2020 target by 2050:

Table 5
City of Sacramento Interim Future Greenhouse Gas Emissions Reduction Goals

2030		2050	
% Below Existing	MT CO_2e/year Reduction from Existing (2005)	% Below Existing	MT CO_2e/year Reduction from Existing (2005)
38%	1,538,020	83%	3,389,088

Notes: CO_2e = carbon dioxide equivalent; MT= metric tons.
Source: Data compiled by Ascent in 2011

It would be unreasonable to expect that the City could achieve the aggressive emission reductions presented above without the aid of statewide programs, changes in technology, and/or funding assistance. Identification of potentially feasible, post-2020 actions would require subsequent analysis, City planning decisions, and coordination with state programs.

State and Federal Emissions Reduction Programs

Existing federal regulations addressing GHG emissions from passenger cars and trucks (e.g., Corporate Average Fuel Economy [CAFE)] standards revised in the 2007 House Energy Bill; State and federal Advanced Clean Cars programs) and State-issued regulations to increase the amount of electricity generated from renewable sources (e.g., California Renewable Energy Portfolio Standard Program) will likely reduce the rate of GHG emissions increase associated with mobile sources and energy consumption.

In December 2008, ARB adopted its *Climate Change Scoping Plan*, which contains the main strategies California will implement to achieve reduction of approximately 118 million metric tons (MMT) of CO_2e, or approximately 22% from the state's projected 2020 emissions level of 545 MMT of CO_2e under a business-as-usual scenario (this is a reduction of 47 MMT CO_2e, or almost 10%, from 2008 emissions). ARB's original 2020 projection was 596 MMT CO_2e, but this revised 2020 projection takes into account the economic downturn that occurred in 2008 (ARB 2011). In August 2011, the Scoping Plan was re-approved by ARB, and includes the Final Supplement to the Scoping Plan Functional Equivalent Document (FED), which further-examined various alternatives to Scoping Plan measures. The Scoping Plan also includes ARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. ARB estimates the largest reductions in GHG emissions to be achieved by implementing the following measures and standards (ARB 2011):

- improved emissions standards for light-duty vehicles (estimated reductions of 30.1 MMT CO_2e),

- the Low-Carbon Fuel Standard (15.0 MMT CO_2e),
- energy efficiency measures in buildings and appliances (11.9 MMT CO_2e), and
- a renewable portfolio and electricity standards for electricity production (23.4 MMT CO_2e).

ARB has not yet determined what amount of GHG reductions it recommends from local government operations; however, the *Scoping Plan* does state that land use planning and urban growth decisions will play an important role in the state's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. ARB further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The *Scoping Plan* states that the ultimate GHG reduction assignment to local government operations is to be determined (ARB 2008). With regard to land use planning, the *Scoping Plan* expects approximately 3.0 MMT CO_2e will be achieved associated with implementation of SB 375, which is discussed further below (ARB 2011).

At the local level, ARB issued the Sacramento Area Council of Governments (SACOG) GHG emission reduction targets for light-duty mobile-sources of 7% by 2020 and 16% by 2035, pursuant to Senate Bill 375 (SACOG 2010). For the purposes of this CAP, the City will be quantifying the GHG emission reduction benefits of individual land use and transportation measures. Because measures implemented by SACOG to achieve the SB 375 GHG reduction targets would likely be similar to programs implemented by the City as identified in the CAP, it is possible that some double-counting would occur if both the City's CAP measures and SB 375 targets were credited. Therefore, no legislative reductions were assumed from SB 375.

In addition, SMUD achieved 12% renewable energy in its portfolio in 2006 (SMUD 2008). SMUD plans to meet the 33% renewable energy portfolio standard by 2020, which would result in an additional 21% reduction in GHG emissions from electricity consumption in the City. For other applicable programs, Ascent applied the emission reductions estimated in the Scoping Plan to the associated emission sectors in the City's inventory. See Table 6 for a summary of estimated emission reductions from State and federal programs that would affect the City's projected GHG emissions.

If all programs are implemented as described in the Scoping Plan and by SMUD, the City's 2020 emissions would be reduced by a maximum of 13.6% from projected levels, leaving approximately 14.4% to be accomplished by the City's CAP. The effect of legislation on the City's GHG emissions projections is summarized in Table 6. It is anticipated that future legislation will be introduced to support longer-term GHG emissions reductions beyond 2020, but the effects of future legislation on the City's GHG emissions inventory is unknown at this time. Therefore, no additional reductions from legislation were accounted for beyond 2020.

Table 6
Estimated Effects of State and Federal Programs on City of Sacramento Greenhouse Gas Emissions Projections

Scoping Plan Measure	Emissions Sector	Scoping Plan-Estimated Emission Reduction (MMT CO2e by 2020)	Projected 2020 Emissions of Sector (MMT CO2e by 2020)	Statewide % Reduction	Local % Reduction	Inventory Subsector	% of City's Inventory Affected in 2020	Scaled % Reduction from 2020 Projected Emissions
Federal Fuel Economy Standards; AB 1493 (Pavley) and Advanced Clean Cars	Transportation	30.1	210.0	14.3%	-	80.3% (light-duty vehicles)	45.4%	5.2%
Energy Efficiency Measures; California Green Building Code[1]	Energy	11.9	167.7	7.1%	-	-	46.9%	3.3%
Renewable Electricity Standard; Renewable Portfolio Standard	Energy	21.3	185.9	11.5%	21%	51.6% (electricity)	46.9%	5.1%
Total								**13.6%**

Notes: CO_2e = carbon dioxide equivalent; MMT= million metric tons.
[1] Energy Efficiency Measures and Green Building Code assumes that development would implement the basic Green Building Code Standards (CalGreen).
Source: ARB 2010; SACOG 2010; SMUD 2008. Data compiled by Ascent in 2011

Conclusion

The GHG reduction target described above is approximately 612,486 MT CO_2e/year below base-year (2005) emission levels and 1,364,924 MT CO_2e/year below business-as-usual 2020 projected levels. This represents a 15% reduction below base-year (2005) emissions and approximately 28% below projected 2020 GHG emissions. Future year (beyond 2020) GHG reduction goals could involve GHG reductions of approximately 3.4 million MT CO_2e/year by 2050, which is approximately 83% below projected 2050 emissions. This future reduction goal is not regulatory, but would put the City on track with the framework established within Executive Order S-3-05 to reduce the State's GHG emissions to 80% below 1990 levels by 2050.

Ascent recommends quantification of GHG reduction measures in the CAP separately from potential reductions that may occur from legislation. If legislative reductions are not realized, the City should be in a position to achieve its GHG reduction targets with its own actions and programs. This approach would provide a greater margin of environmental protection in the event that State programs to reduce GHG emissions are not realized.

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Memo

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Date: January 5, 2012

To: Helen Selph, Erik de Kok, Tom Pace (City of Sacramento)

From: Curtis Alling, Honey Walters, and Heather Phillips

Subject: **City of Sacramento Greenhouse Gas Emissions Reduction Analysis (Gap Analysis)-Final**

cc: Ted Holzem (Mintier Harnish)

Introduction

This technical memorandum submitted by Ascent Environmental, Inc. (Ascent) presents information related to the greenhouse gas (GHG) emissions reduction effectiveness of the City's existing strategies (e.g., 2030 General Plan, Sustainability Implementation Plan, and Municipal [Phase 1] activities, and others) for use in the communitywide Climate Action Plan (CAP), which is currently in progress. The GHG reduction effectiveness of these initial CAP strategies was estimated for the years 2020, 2030, and 2050. The associated reductions were applied to the GHG emission projections for the aforementioned future years and compared with the minimum target and interim future year goals as described for the City below and in the technical memorandum submitted on June 3, 2011 (*City of Sacramento Greenhouse Gas Emissions Reduction Target and Goals-Revised Draft*) and finalized October 25, 2011. This exercise is referred to as the "gap analysis", whereby the amount of emissions reduction expected by programs already underway (or currently under consideration) is estimated and, thus, the "gap", or shortfall, below the City's minimum GHG reduction target is determined. The City's baseline jurisdictional GHG emissions inventory and projections that form the basis of this work are summarized in Table 1. The GHG reductions were quantified relative to the future year projections wherever substantial evidence and reasonable assumptions were available to support calculations for comparison purposes as summarized in Tables 2 and 3. Also, as part of the City's Phase 1 efforts, a minimum 15% reduction below 2005 levels by 2020 was identified for internal operations only (e.g., local government-owned) consistent with guidance provided in the California Air Resources Board's (ARB) Climate Change Scoping Plan (Scoping Plan) (ARB 2008).

With respect to communitywide GHGs, attaining a 15% reduction below base year (2005) levels would require an emissions reduction of approximately 612,486 metric tons carbon dioxide equivalent per year (MT CO_2e/year) by 2020, or 1,364,924 MT CO_2e/year below 2020 projected levels. This is approximately a 28% reduction from projected 2020 emission levels. This reduction would need to be achieved in the context of future growth, as the City anticipates approximately 116,400 additional people by 2020 (ICF 2010). GHG emissions in the City would be limited to approximately 3,470,753 MT CO_2e/year in 2020. This emissions limit represents 15% below the 2005 GHG emission levels under the City's jurisdiction. Refer to Table 2 for a summary of this information. Please note that this 15% reduction would be the minimum required to comply with statewide GHG emissions reduction efforts (e.g., Assembly Bill [AB] 32) and current guidance offered by ARB.

Table 1
City of Sacramento Jurisdictional Greenhouse Gas Emissions Inventory and Future-Year Projections

Emissions Sector	MT CO_2e/year			
	2005	2020	2030	2050
Residential Energy	748,792	993,900	1,157,307	1,484,125
Commercial/Industrial Energy[1]	979,777	1,243,593	1,419,470	1,771,224
Industrial Specific Energy	28,656	32,789	35,544	41,054
Transportation (On-Road Mobile)	2,013,962	2,193,916	2,313,886	2,553,825
Solid Waste	241,862	285,143	313,248	378,605
Wastewater Treatment	57,380	70,579	80,306	97,307
Water Consumption	12,810	15,757	17,928	21,724
Total	**4,083,239**	**4,835,677**	**5,337,689**	**6,347,864**

Notes:
CO_2e = carbon dioxide equivalent; MT= metric tons.
[1] Some utility customers may choose not to disclose their energy consumption information. In these cases where a customer elects to keep this information confidential, its consumption data is aggregated into the Commercial/Industrial Energy sector. The Industrial Specific Energy sector represents energy consumed by industrial buildings where the customer did not chose to keep its consumption information confidential.
Source: Ascent 2011, Fehr & Peers 2011; ICF 2011, compiled by Ascent in 2011

Table 2
Greenhouse Gas Emissions Reduction Target

	Target (15% reduction from 2005 levels by 2020)	
	MT CO_2e/yr	% reduction
Emissions Limit	3,470,753	-
Reduction from Existing	612,486	15%
Reduction from 2020 Projected	1,364,924	28%

Notes: MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

The identified target discussed above would achieve minimum compliance with AB 32. In order to comply with the intent of Executive Order S-3-05, and set the City on a path toward continued GHG emission reductions beyond 2020, the following interim future GHG emissions reduction goals are worthy of consideration. S-3-05 requires an 80% reduction in statewide GHG emissions below 1990 levels by 2050.

According to the ARB's Scoping Plan, 15% below 2005 emission levels would be comparable to 1990 statewide emission levels (ARB 2008). If we assume that 15% below 2005 levels would also be analogous to 1990 emission levels for the City, we can treat the 2020 GHG reduction target as a proxy for 1990 emission levels in order to apply the 80% below 1990 emission goal to the City's data.

It is not the obligation of the City to comply with S-3-05. However, the City could strive to achieve the following interim goals presented in Table 3. The data in Table 3 were interpolated linearly assuming an 80% reduction in emissions below the City's 2020 target by 2050:

Table 3
City of Sacramento Interim Future Greenhouse Gas Emissions Reduction Goals

2030		2050	
% Below Existing (Reduction from 2020 Projected)	MT CO_2e/year Reduction from Existing (Reduction from 2020 Projected)	% Below Existing (Reduction from 2020 Projected)	MT CO2e/year Reduction from Existing (Reduction from 2020 Projected)
38% (52%)	1,538,020 (2,792,470)	83% (89%)	3,389,088 (5,653,713)

Notes: CO_2e = carbon dioxide equivalent; MT= metric tons; existing = 2005.
Source: Data compiled by Ascent in 2011

It would be unreasonable to expect that the City could achieve the aggressive emission reductions presented above without the aid of statewide programs, changes in technology, and/or funding assistance. Identification of potentially feasible, post-2020 actions would require subsequent analysis, City planning decisions, and coordination with state programs.

Calculation Methods

There were two methods employed for calculating GHG reduction effectiveness of the identified CAP strategies, known as "top-down" and "bottom-up". The top-down method applies scaling indicators to the City's GHG emissions inventory to determine the quantity of emissions that would be affected by a strategy. For example, improvements to the City's bicycle infrastructure would reduce emissions from the transportation sector (i.e., 45% of the GHG inventory in 2020) by 1.5% (Fehr & Peers 2011). Thus, 45% x 1.5% would reduce the City's 2020 GHG emissions by 0.7%.

On the other hand, a bottom-up method uses an activity and emissions factor to determine the amount of GHG reduction. For example, installation of solar panels on new residential development would result in savings of approximately 4,500 kilowatt-hours per year (KWh/yr) per home. The Sacramento Municipal Utilities District (SMUD) generates electricity with an emission factor of 0.616 pounds (lb) CO_2e per KWh. Therefore, each photovoltaic system would eliminate approximately 2,783 lb CO_2e/year or 1.3 MT CO_2e/yr. Please note that numbers may not match exactly due to rounding.

GHG reductions were calculated in a step-wise manner for the future years of 2020, 2030, and 2050. In other words, GHG reductions (MT CO_2e/year) are assessed during a snapshot in time in years 2020, 2030, and 2050. This is a simplified method of characterizing GHG reductions, which would more realistically occur on a continuous basis. However, a step-wise method is appropriate for a planning-level document, such as a CAP, since the City's GHG reduction targets and monitoring of CAP implementation progress would be tied to these future years.

Importantly, GHG reductions were quantified for strategies wherever substantial evidence and reasonable assumptions were available to support calculations. The City has identified numerous programs and policies that were not quantifiable at this time, but are still expected to reduce GHG emissions. Such programs will be addressed qualitatively in the CAP and treated as supporting measures to the strategies that were quantified, and will be tracked for potential quantification in the future.

Summary of Results

The following sections discuss the assumptions and estimated effectiveness of the identified GHG reduction strategies. These strategies are contained (or tied to) the City's 2030 General Plan, Sustainability Master Plan, or were initiated by other agencies (e.g., SMUD and the Sacramento Area Council of Governments [SACOG]). Some of the strategies are already underway, adopted, proposed, or even controversial and still under evaluation. These CAP strategies are organized by emissions sector (e.g., energy, transportation, solid waste, and water/wastewater). Assumptions used to support smud sathe quantification of each strategy's effectiveness were developed in coordination with City staff and described within each measure summary table. Table 4, below, presents an overall summary of the GHG reduction strategy and gap analysis. Figure 1 also depicts each strategy's contribution to the total estimated GHG emissions reduction in 2020. Please note that the options shown for RECO (Option 2 - building permit trigger), CECO (Option 2 - building permit trigger), and Rental Housing Energy and Water Efficiency Program (Option 2) are those that are currently contained in the Final version of the CAP. Other options for these were evaluated and considered (e.g., point of sale) as discussed below.

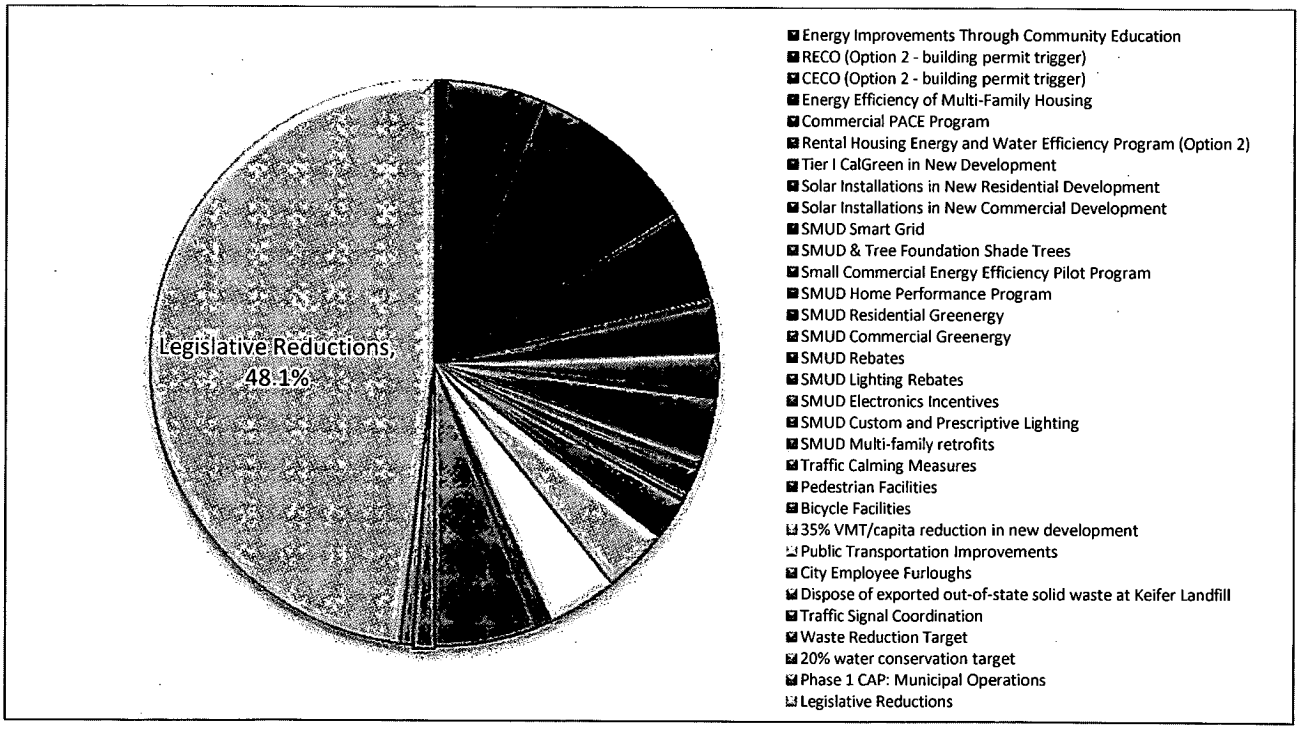

Figure 1: Contribution of GHG Reduction Strategies and Legislative Reductions Towards Meeting the Recommended GHG Reduction Target in 2020

Table 4
Greenhouse Gas Reduction Strategy and Gap Analysis Summary

Action #		2020 (MT CO_2e/yr)	2030 (MT CO_2e/yr)	2050 (MT CO_2e/yr)
Energy Efficiency Strategies				
3.1.1	Energy Improvements Through Community Education	5,594	6,442	8,138
3.2.2	RECO (Option 2: building permit trigger) [1]	3,193	6,742	13,839
3.2.4	CECO (Option 2: building permit trigger) [1]	50,071	79,804	91,830
3.3.1	Energy Efficiency Through Increased Residential Density	8,474	25,894	88,983
3.2.1	Commercial PACE Program	18,225	18,225	18,225
3.2.3	Rental Housing Energy and Water Efficiency Program (Option 2) [1]	32,887	64,269	113,212
3.3.2	CalGreen Tier 1 Energy Efficiency in New Development	30,535	81,428	183,214
3.4.1	Solar Installations in New Residential Development	71,134	129,354	245,795
3.4.2	Solar Installations in New Commercial/Industrial Development	1,717	2,862	5,152
3.1.2	SMUD Smart Grid	69,215	79,498	100,064
3.1.3	SMUD & Tree Foundation Shade Trees	1,507	1,507	1,507
3.2.5	Small Commercial Energy Efficiency Pilot Program	1,219	1,219	1,219
3.2.6	SMUD Home Performance Program	1,964	1,964	1,964
3.4.3	SMUD Residential Greenergy	38,037	38,037	38,037
	SMUD Commercial Greenergy	32,434	32,434	32,434
3.1.4	SMUD Appliance Rebates	3,597	3,597	3,597
	SMUD Lighting Rebates	46,015	46,015	46,015
	SMUD Electronics Incentives	9,406	9,406	9,406
	SMUD Custom and Prescriptive Lighting Incentives	17,956	17,956	17,956
	SMUD Multi-Family Retrofits	2,410	2,410	2,410
Subtotal (Energy Efficiency Strategies)		*445,590*	*649,062*	*1,022,995*
Transportation and Land Use Strategies				
2.1.1	Traffic Calming Measures	1,097	1,157	1,376
2.2.1	Pedestrian Facilities	6,582	6,942	8,255
2.3.1	Bicycle Facilities	32,909	34,708	41,277
1.1.1	35% VMT/capita Reduction Standard in New Development	51,507	70,572	99,193
2.4.1	Public Transportation Improvements	54,848	115,694	127,691
2.7.1	City Employee Furloughs	223	223	223
2.5.1	Dispose of exported out-of-state solid waste at Keifer Landfill	1,804	1,804	1,804
2.6.1	Traffic Signal Coordination	10,431	22,021	27,816
Subtotal (Transportation and Land Use Strategies)		*159,400*	*253,121*	*303,973*
Solid Waste Strategies				
4.2.1	Waste Reduction Target	79,404	129,834	194,711
Subtotal (Solid Waste Strategies)		*79,404*	*129,834*	*194,711*
Water & Wastewater Strategies				
5.1.1	Recycled Water for Non-potable Uses	0	1,310	1,587
	20% Water Conservation Target	17,267	19,647	23,806
Subtotal (Water & Wastewater Strategies)		*17,267*	*20,956*	*25,393*
Phase 1 CAP: Municipal Operations[2]		10,075	10,075	10,075
Total (all strategies, reduction from projected)		***711,737***	***1,063,048***	***1,557,148***
Legislative Reductions (reduction from projected)		659,415 (13.6%)	728,156 (13.6%)	877,392 (13.8%)

Table 4
Greenhouse Gas Reduction Strategy and Gap Analysis Summary

Action #		2020 (MT CO_2e/yr)	2030 (MT CO_2e/yr)	2050 (MT CO_2e/yr)
Total (all strategies plus legislative, reduction from projected)		***1,371,151***	***1,791,203***	***2,434,540***
GHG Emissions Reduction Target/Goal (from Tables 2 and 3, reduction from projected)		1,364,924	2,792,470	5,653,713
(Surplus)/Gap		***(6,227)***	***1,001,267***	***3,219,174***

Notes: [1] Please note that the options shown for RECO (Option 2 - building permit trigger), CECO (Option 2 - building permit trigger), and Rental Housing Energy and Water Efficiency Program (Option 2) are those that are currently contained in the Final version of the CAP. Other options for these were evaluated and considered (e.g., point of sale) as discussed below. [2] City of Sacramento CAP: Phase 1 Internal Operations. February 2010; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; subtotal and totals may not sum exactly due to rounding.

Source: Data compiled by Ascent in 2011

Energy Efficiency Strategies

The following strategies address the energy sector, which includes residential and nonresidential electricity and natural gas consumption.

Action 3.1.1: Energy Improvements through Consumer Behavior and Education

This strategy was derived from the GHG Reduction Measure Analysis for SMUD (Measure Energy-7), and would "Launch a comprehensive social marketing campaign that leverages available tools from the social sciences to influence behaviors that impact GHG emissions in targeted areas" (ICF 2011). This strategy was estimated to reduce energy consumption in the County by 1% with 25% market penetration.

Calculation method: top-down

Year	Measure Performance[1]	Sector (Energy)	Participation Rate[2]	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)
2020	1%	46.3%	25%	0.1%	5,594
2030	1%	48.3%	25%	0.1%	6,442
2050	1%	51.3%	25%	0.1%	8,138

Notes: [1] SMAQMD 2009. Spare the Air Control Measure Program; Revision to State Implementation Plan Staff Report. http://airquality.org/notices/stateplan/20100128TriennialReport2009Hearing.pdf pg 9-5. [2] ICF GHG Reduction Measure Analysis for SMUD. April 2011. Measure E-7; MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

Action 3.2.2: Residential Energy Conservation Ordinance (RECO)

This strategy would involve retrofitting existing owner-occupied residential units (at the time of building permit for HVAC upgrades or renovating greater than $50,000 in value) to improve energy efficiency of the City's housing stock. This measure was assumed to reduce residential energy consumption by 15% and would apply to homes constructed prior to 2000. The program would focus on homes constructed prior to 1980 (i.e., pre-Title 24 homes) at first (i.e., during 2012-2016 implementation), and would then also phase in retrofit of units constructed between 1980 and 2000. Three different program trigger levels were evaluated initially, and it was assumed that 100% of affected homeowners would participate in the regulatory retrofit program.

Calculation method: top-down

Please note that three options are shown below as all were evaluated and considered as part of the gap analysis. The City has selected option 2 (building permit trigger for the purposes the actions contained in the CAP.

Option 1: Program Complete by End-Date-Certain (2020)

Year	Measure Performance	Sector (Residential Energy)	Subsector (Owner Occupied)[1]	Participation Rate[2]	Eligible Housing Stock[1]	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)	Cumulative GHG Reduction (MT CO_2e/yr)
2020	15%	20.6%	53.0%	100%	68.7%	1.1%	54,300	54,300

2030	15%	21.7%	53.0%	100%	59.0%	1.0%	54,300	54,300
2050	15%	23.4%	53.0%	100%	46.0%	0.9%	54,300	54,300

Option 2: Building Permit Trigger (building permit pulled for HVAC upgrade or home renovation greater than $50,000 value)

Year	Measure Performance	Sector (Residential Energy)	Subsector (Owner Occupied)[1]	#permits pulled (annual)[2]	# years	%units affected	Participation Rate[2]	Eligible Housing Stock[1]	%units undergo RECO	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)	Cumulative GHG Reduction (MT CO_2e/yr)
2020	15%	20.6%	53.0%	1550	9	5.9%	100%	68.7%	2.1%	0.07%	3,193	3,193
2030	15%	21.7%	53.0%	1550	10	6.5%	100%	59.0%	2.0%	0.07%	3,548	6,742
2050	15%	23.4%	53.0%	1550	20	13.1%	100%	46.0%	3.2%	0.11%	7,097	13,839

Option 3: Point-of-Sale Requirement

Year	Measure Performance	Sector (Residential Energy)	Subsector (Owner Occupied)[1]	%sales (annual)[3]	# years	%units affected	Participation Rate[2]	Eligible Housing Stock[1]	%units undergo RECO	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)	Cumulative GHG Reduction (MT CO_2e/yr)
2020	15%	20.6%	53.0%	5%	9	45%	100%	68.7%	16.4%	0.5%	24,435	24,435
2030	15%	21.7%	53.0%	5%	10	50%	100%	59.0%	15.6%	0.5%	27,150	51,585
2050	15%	23.4%	53.0%	5%	20	100%	100%	46.0%	24.4%	0.9%	54,300	105,884

Notes: [1] City of Sacramento Housing Element. 2008, and City of Sacramento 2030 General Plan Buildout Model; [2] City of Sacramento. June 7, 2011 email from Helen Selph; [3] Sacramento Association of Realtors; Green Building Task Force discussions; HVAC = Heating, Ventilation, and Air Conditioning; MT CO_2e/yr = metric tons carbon dioxide equivalent per year. Eligible Housing Stock decreases as units undergo retrofit during the prior planning period; grey cells are used in calculation of "% units undergo RECO"; cells with diagonal cross-hatch pattern under option 1 show %'s for informational purposes, but are not used as this program would end in 2020.
Source: Data compiled by Ascent in 2011

Action 3.2.4: Commercial Energy Conservation Ordinance (CECO)

This strategy would involve retrofitting existing commercial and industrial buildings to improve energy efficiency of the City's building stock. The requirement would be triggered when a building permit application is submitted for renovations or additions of greater than 25,000 sq. ft. of commercial or greater than 100,000 sq. ft. of industrial. This measure was assumed to reduce commercial/industrial energy consumption by 15% and would apply to buildings constructed prior to 2000. The program would focus on buildings constructed prior to 1980 (i.e., pre-Title 24 structures) at first (i.e., during 2012-2016 implementation), and would then also phase in retrofit of buildings constructed between 1980 and 2000. Three different program trigger levels were evaluated, and it was assumed that 100% of affected property owners would participate in the regulatory retrofit program. It was assumed that commercial building stock age would be similar to that of residential units used under the RECO calculation above.

Calculation method: top-down

Please note that three options are shown below as all were evaluated and considered as part of the gap analysis. The City has selected option 2 (building permit trigger for the purposes the actions contained in the CAP.

Option 1: Program Complete by End-Date-Certain (2020)

Year	Measure Performance	Sector (Commercial/Industrial Energy)	Participation Rate	Eligible Building Stock[1]	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)	Cumulative GHG Reduction (MT CO_2e/yr)
2020	15%	25.7%	100%	68.7%	2.4%	118,426	118,426
2030	15%	21.7%	Same assumptions as for 2020 since program would be completed			118,426	118,426
2050	15%	23.4%				118,426	118,426

Option 2: Building Permit Trigger (building permit pulled for renovation or addition of greater than 25,000 square feet of commercial or 100,000 square feet of industrial)

Year	Measure Performance	Sector (Commercial/ Industrial Energy)	#permits pulled (annual)[2]	#years	%building stock affected	Participation Rate[2]	Eligible Building Stock[1]	%units undergo CECO	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)	Cumulative GHG Reduction (MT CO_2e/yr)
2020	15%	25.7%	4.3%	9	39.1%	100%	68.7%	26.8%	1.04%	50,071	50,071
2030	15%	21.7%	4.3%	10	43.4%	100%	32.2%	14.0%	0.56%	29,732	79,804

2050	15%	23.4%	4.3%	20	86.8%	100%	5.2%	4.5%	0.19%	12,026	91,830

Option 3: Voluntary

Year	Measure Performance	Sector (Commercial/Industrial Energy)	Participation Rate	Eligible Building Stock[1]	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)	Cumulative GHG Reduction (MT CO_2e/yr)
2020	15%	25.7%	1%	68.7%	0.03%	1,282	1,282
2030	15%	21.7%	1%	58.3%	0.02%	1,242	2,524
2050	15%	23.4%	1%	44.8%	0.02%	1,189	3,713

Notes: [1] City of Sacramento Housing Element. 2008, and City of Sacramento 2030 General Plan Buildout Model; [2] City of Sacramento 2011. Accela Query of commercial projects greater than 25,000 square feet or industrial projects greater than 100,000 square feet. 71 projects out of 1,637 total permits between 2005-2010 exceeded this trigger. Eligible Building Stock decreases as units undergo retrofit during the prior planning period; grey cells are used in calculation of "% units undergo CECO"; MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

Action 3.3.1: Energy Efficiency Through Increased Residential Density

GHG reductions will be achieved through increases in energy efficiency as housing trends from single-family to multi-family in the City. This measure only applies to the portion of the inventory associated with new development. According to *Growing Cooler: The Evidence on Urban Development and Climate Change*, a publication by the Urban Land Institute, single family housing consumes 35% more energy for space heating and 21% more for space cooling than multi-family housing.

Calculation method: top-down

Year	Measure Performance[1]	Portion of Inventory Affected (MT CO_2e/yr)	Subsector (Electric, Natural Gas)	Subsector (Space Heating/Cooling)[2,3]	% trend in housing stock toward multi-family[4]	GHG Reduction (MT CO_2e/yr)
2020	35%	245,108	53.2% (Natural Gas)	44.0% (Space Heating)	39%	7,765
	21%	245,108	36.0% (Electric)	9.9% (Space Cooling)	39%	709
2030	35%	408,515	53.2% (Natural Gas)	44.0% (Space Heating)	71%	23,727
	21%	408,515	36.0% (Electric)	9.9% (Space Cooling)	71%	2,167
2050	35%	735,333	53.2% (Natural Gas)	44.0% (Space Heating)	135%	81,535
	21%	735,333	36.0% (Electric)	9.9% (Space Cooling)	135%	7,447

Notes: [1] Ewing, et. al. 2008. *Growing Cooler: The Evidence on Urban Development and Climate Change*. pg 110; [2] California Energy Commission. 2010. Energy Almanac. California Electricity Consumption by End Use. PG&E Estimates for year 2020. http://www.energyalmanac.ca.gov/electricity/electricity_stats/index.html; [3] California Energy Commission. 2010. Energy Almanac. California Residential Natural Gas Consumption by End Use. http://www.energyalmanac.ca.gov/naturalgas/residential_use.html. [4] City of Sacramento 2030 General Plan Buildout Model; MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

Action 3.2.1: Commercial Property Assessed Clean Energy (PACE) Program

This measure assumes a pilot PACE program for commercial SMUD customers that would improve energy efficiency of those customers' facilities by 15%. It was assumed that the City would implement 90 PACE projects per year over 5 years, for a total of 450 projects. Of those projects, 74% would be small energy-user customers (18,039 kWh/yr on average) and 26% would be medium-to-large energy users (162,548 kWh/yr on average for the medium user and 2,957,578 KWh/yr on average for large user). It was also assumed that the medium and large users affected by the PACE program would also implement retro-commissioning measures for an additional average 155,194 KWh/yr energy savings each.

Calculation method: bottom-up

Year	Measure	Energy	Project	Customer Type	# of projects[1]	Energy Savings	SMUD	Conversion	Cumulative

	Performance	Consumption/ project (KWh/yr)[1]	Distribution[1]			(KWh/yr)	emission factor (lb CO_2e/KWh)[2]	(lb/MT)	GHG Reduction (MT CO_2e/yr)
2020	15%	18,039	74%	Small	450	901,048	0.865	2,204	354
	15%	1,560,063	26%	Med/Large	450	45,536,745	0.865	2,204	17,872
2030	Program would be completed by 2020					901,048	0.865	2,204	354
						45,536,745	0.865	2,204	17,872
2050						901,048	0.865	2,204	354
						45,536,745	0.865	2,204	17,872

Notes: [1] Ryan Sharp, 2011. SMUD Center for Strategic Economic Research (CSER); [2] SMUD; July 28, 2011 email from Obediah Bartholomy to Erik deKok; SMUD's 2010 avoided emission factor is 865 lb/KWh; KWh/yr = kilowatt-hours per year; lb/MT = pounds per metric ton; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; SMUD = Sacramento Municipal Utilities District; SMUD's emission factor used in this calculation does not account for its current achievements or plans to comply with the renewable portfolio standard (RPS) because RPS is accounted for in legislative reductions discussed later in this report.
Source: Data compiled by Ascent in 2011

Action 3.2.3: Rental Housing Energy and Water Efficiency Program

This strategy would involve retrofitting existing renter-occupied residential units to improve energy efficiency of the City's housing stock. This measure was assumed to reduce residential energy consumption and would apply to homes constructed prior to 1980. The program would focus on homes constructed prior to 1980 (i.e., pre-Title 24 homes) at first (i.e., during 2012-2016 implementation), and would then also phase in retrofit of units constructed between 1980 and 2000. Energy efficiency upgrades of basic (15%) and full-house performance (50%) were evaluated at two trigger levels (voluntary and mandatory).

Calculation method: top-down

Please note that three options are shown below as all were evaluated as part of the gap analysis. The City has selected option 2 for the purposes the actions contained in the CAP.

Option 1: Voluntary Basic Weatherization

Year	Measure Performance[3]	Sector (Residential Energy)	Subsector (Renter Occupied)[1]	Eligible Housing Stock[1]	Inspection Rate (annual)[2]	# of years	Participation rate[2]	Scaled % reduction	GHG Reduction	Cumulative GHG Reduction (MT CO_2e/yr)
2020	15%	20.6%	47%	68.7%	8%	9	1%	0.0%	329	329
2030	15%	21.7%	47%	59.0%	7%	10	1%	0.0%	314	643
2050	15%	23.4%	47%	46.0%	5%	20	1%	0.0%	489	1,132

Option 2: Mandatory Basic Weatherization

Year	Measure Performance[3]	Sector (Residential Energy)	Subsector (Renter Occupied)[1]	Eligible Housing Stock[1]	Inspection Rate (annual)[2]	# of years	Participation rate[2]	Scaled % reduction	GHG Reduction	Cumulative GHG Reduction (MT CO_2e/yr)
2020	15%	20.6%	47%	68.7%	8%	9	100%	0.7%	32,887	32,887
2030	15%	21.7%	47%	59.0%	7%	10	100%	0.6%	31,382	64,269
2050	15%	23.4%	47%	46.0%	5%	20	100%	0.8%	48,943	113,212

Option 3: Voluntary Full House Performance

Year	Measure Performance[3]	Sector (Residential Energy)	Subsector (Renter Occupied)[1]	Eligible Housing Stock[1]	Inspection Rate (annual)[2]	# of years	Participation rate[2]	Scaled % reduction	GHG Reduction	Cumulative GHG Reduction (MT CO_2e/yr)
2020	50%	20.6%	47%	68.7%	8%	9	1%	0.0%	1,096	1,096
2030	50%	21.7%	47%	59.0%	7%	10	1%	0.0%	1,046	2,142
2050	50%	23.4%	47%	46.0%	5%	20	1%	0.0%	1,631	3,774

Notes: [1] City of Sacramento Housing Element. 2008; City of Sacramento 2030 General Plan Buildout Model; [2] US DOE. April 2011; CO_2e/yr = metric tons carbon dioxide equivalent per year; eligible Housing Stock decreases as units undergo retrofit during the prior planning period.
Source: Data compiled by Ascent in 2011

Action 3.3.2: Tier 1 CalGreen Energy Efficiency in New Development

This strategy would require Tier 1 CalGreen Building Code standards for new development starting in 2014. Tier 1 would result in approximately 15% better energy efficiency performance above the standard mandatory California Green Building Code.

Calculation method: top-down

Year	Customer Type	Portion of Inventory Affected ($MT\ CO_2e/yr$)	Measure Performance[1]	GHG Reduction ($MT\ CO_2e/yr$)
2020	Residential	98,043	15%	14,706
	Nonresidential	105,526	15%	15,829
2030	Residential	261,450	15%	39,217
	Nonresidential	281,404	15%	42,211
2050	Residential	588,266	15%	88,240
	Nonresidential	633,158	15%	94,974

Notes: [1] California Building Standards Commission. CalGreen. CCR Title 24, Part 11; $MT\ CO_2e/yr$ = metric tons carbon dioxide equivalent per year; This strategy applies to emissions from new development only starting in 2014.
Source: Data compiled by Ascent in 2011

Action 3.4.1: Solar Installations in New Residential Development of projects 10+ units

This strategy was derived from the GHG Reduction Measure Analysis for SMUD (Measure E-8). This strategy assumes that new residential development would install photovoltaic systems that would generate 4,519 KWh/yr per system (ICF 2011).The participation rate was calculated based on data from the City of Sacramento to derive an assumed % of units that would be developed in projects of 10 or more units.

Calculation method: bottom-up

Year	# of eligible homes	Participation Rate[1]	# of systems	system size (KWh/yr)[2]	SMUD emission factor ($lb\ CO_2e/KWh$)[3]	Conversion (lb/MT)	GHG reduction/ system ($MT\ CO_2e/yr$)	GHG reduction ($MT\ CO_2e/yr$)	Cumulative GHG reduction ($MT\ CO_2e/yr$)
2020	47,647	84.2%	40,108	4,519	0.865	2,204	1.774	71,134	71,134
2030	38,997	84.2%	32,827	4,519	0.865	2,204	1.774	58,220	129,354
2050	77,995	84.2%	65,654	4,519	0.865	2,204	1.774	116,441	245,795

Notes: [1] City of Sacramento. Participation rate calculated based on # of units that would be constructed as projects of 10+ units. (~16% of sf units and ~90% mf units); [2] ICF 2011. GHG Reduction Measure Analysis for SMUD. Measure E-8. Average system capacity = 3.4 KW (produces 4,519 KWh/yr), [3] SMUD; July 28, 2011 email from Obediah Bartholomy to Erik deKok; SMUD's 2010 avoided emission factor is 865 lb/KWh; KWh/yr = kilowatt-hours per year; lb/MT = pounds per metric ton; $MT\ CO_2e/yr$ = metric tons carbon dioxide equivalent per year; SMUD = Sacramento Municipal Utilities District; SMUD's emission factor used in this calculation does not account for its current achievements or plans to comply with the renewable portfolio standard (RPS) because RPS is accounted for in legislative reductions discussed later in this report.
Source: Data compiled by Ascent in 2011

Action 3.4.2: Solar Installations in New Commercial/Industrial Development of projects greater than 25,000 square feet of commercial or 100,000 square feet of industrial

This strategy was derived from the GHG Reduction Measure Analysis for SMUD (Measure E-9). This strategy assumes that new commercial or industrial development would install photovoltaic systems that would generate 15% of the project's energy demand on-site through renewable energy (ICF 2011). The Portion of Eligible Building Stock was calculated based on data from the City of Sacramento to derive an assumed % of commercial or industrial projects that would be greater than 25,000 square feet or 100,000 square feet, respectively.

Calculation method: top-down

Year	Measure Performance[1]	Portion of eligible building stock[2]	Participation Rate	Portion of GHG Inventory Affected	GHG reduction ($MT\ CO_2e/yr$)
2020	15%	4.3%	100%	263,816	1,717
2030	15%	4.3%	100%	439,693	2,862
2050	15%	4.3%	100%	791,447	5,152

Notes: [1] ICF 2011. GHG Reduction Measure Analysis for SMUD. Measure E-9. [2] City of Sacramento. 2011. Accela Query of commercial projects greater than 25,000 square feet or industrial projects greater than 100,000 square feet. 71 projects out of 1,637 total permits between 2005-2010 exceeded this trigger);

MT CO_2e/yr = metric tons carbon dioxide equivalent per year;
Source: Data compiled by Ascent in 2011

Action 3.1.2: SMUD Smart Grid

SMUD's Smart Grid program is estimated to result in an estimated 4% energy savings and 2% transmission savings by 2030. This assumption was applied to the entire CAP planning horizon.

Calculation method: top-down

Year	Measure Performance[1]	Sector (Energy, electricity)	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)
2020	6%	23.9%	1.4%	69,215
2030	6%	24.8%	1.5%	79,498
2050	6%	26.3%	1.6%	100,064

Notes: [1] SMUD Smart Grid Activities 2010 presentation; MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

Action 3.1.3: SMUD & Tree Foundation Shade Trees

This strategy is already underway by SMUD (and the Tree Foundation), and acts to reduce the urban heat island effect, and associated energy consumption. SMUD estimates that its Shade Tree program has planned to reduce energy consumption up to 14.22 GWh/yr 2012 in Sacramento County. According to SMUD, 27% of the shade tree program is in the City's territory. It is anticipated that the program would expand in future years, but data was not available.

Calculation method: bottom-up

Year	Annual Savings (GWh/yr)[1]	Portion in City Territory	conversion to KWh	annual savings (KWh/yr)	SMUD emission factor (lb CO_2e/KWh)[2]	Conversion (lb/MT)	GHG reduction (MT CO_2e/yr)
2020	14.22	27%	1,000,000	3,839,400	0.865	2,204	1,507
2030	14.22	27%	1,000,000	3,839,400	0.865	2,204	1,507
2050	14.22	27%	1,000,000	3,839,400	0.865	2,204	1,507

Notes: [1] email from Daniel Hamilton, Senior Energy Efficiency Planner at SMUD..; [2] SMUD; July 28, 2011 email from Obediah Bartholomy to Erik deKok; SMUD's 2010 avoided emission factor is 865 lb/KWh; GWh/yr = gigawatt-hours per year; KWh/yr = kilowatt-hours per year; lb/MT = pounds per metric ton; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; SMUD = Sacramento Municipal Utilities District; SMUD's emission factor used in this calculation does not account for its current achievements or plans to comply with the renewable portfolio standard (RPS) because RPS is accounted for in legislative reductions discussed later in this report.
Source: Data compiled by Ascent in 2011

Action 3.2.5: Small Commercial Energy Efficiency Pilot Program

This strategy is already underway by the City and SMUD, which are partnering on an incentive program for small commercial customers.

Calculation method: bottom-up

Year	Annual Savings (KWh/yr)[1]	SMUD emission factor (lb CO_2e/KWh)[2]	Conversion (lb/MT)	GHG reduction (MT CO_2e/yr)
2020	3,105,150	0.865	2,204	1,219
2030	Same as 2020, as program would be completed by 2012.			1,219
2050				1,219

Notes: [1] SMUD. Forecast for Small Commercial Energy Efficiency Ramp-up. Email from Cheri Davis to Yvette Rincon; [2] SMUD; July 28, 2011 email from Obediah Bartholomy to Erik deKok; SMUD's 2010 avoided emission factor is 865 lb/KWh; KWh/yr = kilowatt-hours per year; lb/MT = pounds per metric ton; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; SMUD = Sacramento Municipal Utilities District; SMUD's emission factor used in this calculation does not account for its current achievements or plans to comply with the renewable portfolio standard (RPS) because RPS is accounted for in legislative reductions discussed later in this report.
Source: Data compiled by Ascent in 2011

Action 3.2.6: SMUD Home Performance Program

This strategy is already underway by SMUD, which offers low-cost energy audits to existing residential customers. The program was estimated to result in approximately 207 single-family retrofits at 30% improvement in energy efficiency, 11 single-family retrofits at 15% improvement, and 2,025 multi-family units at 20% within in the City of Sacramento. It was estimated that the Home Performance Program would be complete by 2012.

Calculation method: bottom-up

Year	# Homes Affected[1]		% of Homes Affected	Measure Performance	Sector (Residential Energy)	Scaled % Reduction	GHG reduction (MT CO_2e/yr)
2020	207	Single-family	0.1%	30%	20.6%	0.01%	260
2020	11	Single-family	0.0%	15%	20.6%	0.00%	7
2020	2,025	Multi-family	0.9%	20%	20.6%	0.04%	1,697
Total 2020							1,964
2030	Same as 2020, as program would be completed by 2012.						1,964
2050							1,964

Notes: [1]July 25, 2011 Email from Steve Vang, SMUD to Helen Selph; KWh/yr = kilowatt-hours per year; lb/MT = pounds per metric ton; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; SMUD = Sacramento Municipal Utilities District; SMUD's emission factor used in this calculation does not account for its current achievements or plans to comply with the renewable portfolio standard (RPS) because RPS is accounted for in legislative reductions discussed later in this report.
Source: Data compiled by Ascent in 2011

Action 3.4.3: SMUD Greenergy

This strategy is already underway by SMUD. The SMUD Greenergy program will meet up to 100% of customers' electricity usage with power generated from renewable resources like wind, water, sun and biomass. Customers opt in to pay an additional fee on their utility bills each month to purchase Greenergy. Greenergy is provided in addition to SMUD's RPS requirements. It was conservatively assumed that the number of Greenergy subscribers in the City would remain the same as the average during 2008-2010. In other words, there would be no net increase in Greenergy subscribers, as existing customers would drop the subscription at the same rate as new customers sign up.

Calculation method: bottom-up

	Year	Annual Savings (KWh/yr)[1]	SMUD emission factor (lb CO_2e/KWh)[2]	Conversion (lb/MT)	GHG reduction (MT CO_2e/yr)
Residential	2020	96,917,724	0.865	2,204	38,037
	2030	Same as 2020, as the number of subscriptions was assumed to remain constant			38,037
	2050				38,037
	Year	Annual Savings (KWh/yr)[1]	SMUD emission factor (lb CO_2e/KWh)[2]	Conversion (lb/MT)	SMUD emission factor (lb CO_2e/KWh)[2]
Commercial	2020	82,640,000	0.865	2,204	32,434
	2030	Same as 2020, as the number of subscriptions was assumed to remain constant			32,434
	2050				32,434

Notes: [1] SMUD. September 8, 2011 and August 10, 2011 emails from Daniel Hamilton, Senior Energy Efficiency Planner at SMUD, to Helen Selph; [2] SMUD; July 28, 2011 email from Obediah Bartholomy to Erik deKok; SMUD's 2010 avoided emission factor is 865 lb/KWh; KWh/yr = kilowatt-hours per year; lb/MT = pounds per metric ton; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; SMUD = Sacramento Municipal Utilities District; SMUD's emission factor used in this calculation does not account for its current achievements or plans to comply with the renewable portfolio standard (RPS) because RPS is accounted for in legislative reductions discussed later in this report.
Source: Data compiled by Ascent in 2011

Action 3.4.1: SMUD Appliance Rebates

This strategy is already underway by SMUD. SMUD buys down the cost of energy-efficient electric appliances and products and offers rebates and incentives to customers. In addition, SMUD offers affordable financing to purchase energy-efficient appliances. This program was conservatively assumed to achieve maximum participation in 2010, based on an average of participation during 2008-2010, and linearly decrease through 2020, as the program would reach saturation.

Calculation method: bottom-up

Year	Annual Savings (KWh/yr)[1]	SMUD emission factor (lb CO_2e/KWh)[2]	Conversion (lb/MT)	GHG reduction (MT CO_2e/yr)
2008-2010 Average	1,221,938	0.865	2,204	480
2020	9,164,531	0.865	2,204	3,597
2030	Same as 2020, as program was assumed to achieve maximum participation in 2010 and saturation in 2020.			3,597
2050				3,597

Notes: [1] SMUD. August 10, 2011 email from Daniel Hamilton, Senior Energy Efficiency Planner at SMUD, to Helen Selph; [2] SMUD; July 28, 2011 email from Obediah Bartholomy to Erik deKok; SMUD's 2010 avoided emission factor is 865 lb/KWh; KWh/yr = kilowatt-hours per year; lb/MT = pounds per metric ton; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; SMUD = Sacramento Municipal Utilities District; SMUD's emission factor used in this calculation does not account for its current achievements or plans to comply with the renewable portfolio standard (RPS) because RPS is accounted for in legislative reductions discussed later in this report.
Source: Data compiled by Ascent in 2011

Action 3.4.1: SMUD Lighting Rebates

This strategy is already underway by SMUD. SMUD offers standard rebates for the installation of energy-efficient lighting. Rebates include LED lamps, fixtures, and other forms of highly-efficient lighting for residential and commercial customers. This program was conservatively assumed to achieve maximum participation in 2010, based on an average of participation during 2008-2010, and linearly decrease through 2020, as the program would reach saturation.

Calculation method: bottom-up

Year	Annual Savings (KWh/yr)[1]	SMUD emission factor (lb CO_2e/KWh)[2]	Conversion (lb/MT)	GHG reduction (MT CO_2e/yr)
2008-2010 Average	15,632,566	0.865	2,204	6,135
2020	117,244,242	0.865	2,204	46,015
2030	Same as 2020, as program is assumed to achieve maximum participation in 2010 and saturation in 2020.			46,015
2050				46,015

Notes: [1] SMUD. August 10, 2011 email from Daniel Hamilton, Senior Energy Efficiency Planner at SMUD, to Helen Selph; [2] SMUD; July 28, 2011 email from Obediah Bartholomy to Erik deKok; SMUD's 2010 avoided emission factor is 865 lb/KWh; KWh/yr = kilowatt-hours per year; lb/MT = pounds per metric ton; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; SMUD = Sacramento Municipal Utilities District; SMUD's emission factor used in this calculation does not account for its current achievements or plans to comply with the renewable portfolio standard (RPS) because RPS is accounted for in legislative reductions discussed later in this report.
Source: Data compiled by Ascent in 2011

Action 3.4.1: SMUD Electronics Incentives

This strategy is already underway by SMUD. SMUD provides incentives to retailers in the Sacramento region to stock the most energy-efficient major electronics, including televisions and computer monitors. This program was conservatively assumed to achieve maximum participation in 2010, based on an average of participation during 2009-2010, and linearly decrease through 2020, as the program would reach saturation.

Calculation method: bottom-up

Year	Annual Savings (KWh/yr)[1]	SMUD emission factor (lb CO_2e/KWh)[2]	Conversion (lb/MT)	GHG reduction (MT CO_2e/yr)
2009-2010 Average	3,687,097	0.865	2,204	1,447
2020	23,966,127	0.865	2,204	9,406
2030	Same as 2020, as program is assumed to achieve maximum participation in 2010 and saturation in 2020.			9,406
2050				9,406

Notes: [1] SMUD. August 10, 2011 email from Daniel Hamilton, Senior Energy Efficiency Planner at SMUD, to Helen Selph; [2] SMUD; July 28, 2011 email from Obediah Bartholomy to Erik deKok; SMUD's 2010 avoided emission factor is 865 lb/KWh; KWh/yr = kilowatt-hours per year; lb/MT = pounds per metric ton; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; SMUD = Sacramento Municipal Utilities District; SMUD's emission factor used in this

calculation does not account for its current achievements or plans to comply with the renewable portfolio standard (RPS) because RPS is accounted for in legislative reductions discussed later in this report.
Source: Data compiled by Ascent in 2011

Action 3.4.1: SMUD Custom and Prescriptive Lighting

This strategy is already underway by SMUD. SMUD encourages the successful installation of LED lighting in local commercial applications, and offers incentives for qualified LED lighting systems. This program was conservatively assumed to achieve maximum participation in 2010, based on an average of participation during 2008-2010, and linearly decrease through 2020, as the program would reach saturation.

Calculation method: bottom-up

Year	Annual Savings (KWh/yr)[1]	SMUD emission factor (lb CO_2e/KWh)[2]	Conversion (lb/MT)	GHG reduction (MT CO_2e/yr)
2008-2010 Average	6,100,060	0.865	2,204	2,394
2020	45,750,453	0.865	2,204	17,956
2030	Same as 2020, as program is assumed to achieve maximum participation in 2010 and saturation in 2020.			17,956
2050				17,956

Notes: [1] SMUD. August 10, 2011 email from Daniel Hamilton, Senior Energy Efficiency Planner at SMUD, to Helen Selph; [2] SMUD; July 28, 2011 email from Obediah Bartholomy to Erik deKok; SMUD's 2010 avoided emission factor is 865 lb/KWh; KWh/yr = kilowatt-hours per year; lb/MT = pounds per metric ton; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; SMUD = Sacramento Municipal Utilities District; SMUD's emission factor used in this calculation does not account for its current achievements or plans to comply with the renewable portfolio standard (RPS) because RPS is accounted for in legislative reductions discussed later in this report.
Source: Data compiled by Ascent in 2011

Action 3.4.1: SMUD Multi-Family Retrofits

This strategy is already underway by SMUD. SMUD offers multi-family prescriptive rebates for multi-family residential customers seeking to retrofit units and common spaces to increase energy efficiency. This program offers rebates specific to the type of appliance, lighting, or improvement utilized, and encourages comprehensive analysis of the energy performance of each multifamily building. This program was conservatively assumed to be placed on hold while the Home Performance Program is administered through 2012. It is unknown at this time to what extent this program would be reinstated, thus the total emission reduction from retrofits completed during 2008-2010 is reported here.

Calculation method: bottom-up

Year	Annual Savings (KWh/yr)[1]	SMUD emission factor (lb CO_2e/KWh)[2]	Conversion (lb/MT)	GHG reduction (MT CO_2e/yr)
2008-2010 Total	6,139,508	0.865	2,204	2,410
2020	6,139,508	0.865	2,204	2,410
2030	Same as 2020, as program is assumed to achieve maximum participation in 2010 and saturation in 2020.			2,410
2050				2,410

Notes: [1] SMUD. August 10, 2011 email from Daniel Hamilton, Senior Energy Efficiency Planner at SMUD, to Helen Selph; [2] SMUD; July 28, 2011 email from Obediah Bartholomy to Erik deKok; SMUD's 2010 avoided emission factor is 865 lb/KWh; KWh/yr = kilowatt-hours per year; lb/MT = pounds per metric ton; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; SMUD = Sacramento Municipal Utilities District; SMUD's emission factor used in this calculation does not account for its current achievements or plans to comply with the renewable portfolio standard (RPS) because RPS is accounted for in legislative reductions discussed later in this report.
Source: Data compiled by Ascent in 2011

Transportation and Land Use Strategies

The following strategies address on-road mobile-source emissions. The City's GHG inventory was revised to reflect the most recent version of SACOG's SACSIM Travel Demand Forecast Model, which includes assumptions on planned transportation infrastructure projects. Thus, the City's GHG emissions inventory projections account for public transit mode share, which is why there is no separate measure quantification related to public transit. If the City were to achieve GHG emissions reductions associated with public transportation, it would need to

pursue transit infrastructure projects above and beyond what is already planned by Regional Transit and other transit agencies serving the region.

Since land use planning is an important factor influencing vehicle miles of travel (VMT), the CAP includes an assessment of the VMT reduction effects associated with the City's general plan land use and circulation elements. This assessment was performed by comparing household-generated VMT from the regional SACSIM model. The intent of this assessment was to gauge how the general plan contributes to changes in household-generated VMT compared to a "business-as-usual" forecast as shown in Table 5 below. The data in Table 5 offers two methods for potentially capturing the influence of the City's general plan on VMT. Method 1 compares the difference between a scenario where the 2005 VMT generated per household (HH) condition would continue into the future, without the 2030 general plan. Comparing this 2005 estimate (representing business-as-usual) with the 2035 VMT generated per HH reveals a reduction of 8.2%. Given the importance of land use and transportation inputs to the model, the General Plan is a significant contributor to this long-term reduction trend. Just how much; though, is difficult to determine. Method 2 may shed some light on this question because it adjusts the Method 1 difference to account for the fact the overall regional VMT generated per HH is projected to decline by 5.8% through 2035 as a result of other factors discussed below. After the adjustment, the City's net reduction in VMT generated per HH is 2.4% better than the regional average. This is a notable improvement over business-as-usual conditions.

This assessment has many limitations because the extent to which the VMT forecasts are influenced by other model input variables or the land use and network changes throughout the rest of the region cannot be verified without further analysis. It is not possible within this study to truly isolate the effect of the City's General Plan land uses from other SACSIM model parameters; such as public transportation infrastructure, bicycle and pedestrian infrastructure, design and connectivity parameters, roadway congestion, and other factors; to which the model is sensitive.

Table 5
City of Sacramento VMT Summary by Regional Analysis District (RAD)

Area	2005		2035		% Change
	HH	VMT generated per HH	HH	VMT generated per HH	
Downtown	16,807	14.4	35,085	12.6	-12.5%
South Natomas	14,969	42.0	20,015	37.2	-11.4%
North Natomas	13,160	60.5	35,734	49.1	-18.9%
North Sacramento	21,567	37.1	28,217	35.9	-3.2%
East Sacramento	30,475	29.1	43,767	27.6	-5.2%
Land Park – Pocket – Meadowview	43,129	42.4	56,824	40.7	-4.0%
South Sacramento	50,386	43.7	62,243	41.0	-6.2%
City of Sacramento Totals	**190,493**	**38.8**	**281,885**	**35.6**	**-8.2%**
Regional Totals	**768,089**	**51.7**	**1,258,003**	**48.7**	**-5.8%**

Notes: HH = households; RAD = Regional Analysis District; VMT = vehicle miles traveled.
Source: SACOG, 2009; Fehr & Peers, 2011 – SACSIM Regional Travel Demand Forecasting Model.

Action 2.1.1: Traffic Calming Measures
Continue to increase the use of traffic calming measures within the City that reduce motor vehicle speeds and encourage pedestrian and bicycle trips with traffic calming features. Traffic calming features may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections, median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/chokers, and others. A typical range for vehicle miles traveled (VMT) reduction

for this strategy is 0.25 – 1.00%. Given that traffic calming projects have been completed in the majority of eligible neighborhoods, the estimated VMT reduction for any further measures is 0.05%

Calculation method: top-down

Year	Measure Performance[1]	Sector (Transportation)	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)
2020	0.05%	45.4%	0.02%	1,097
2030	0.05%	43.3%	0.02%	1,157
2050	0.05%	40.2%	0.02%	1,277

Notes: [1] Fehr & Peers 2011; MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

Action 2.2.1: Increase Pedestrian Facilities within the City by 1% annually

A typical range of effectiveness of this strategy is 0 - 10% VMT reduction within a specific site. Given that this measure applies to incremental improvements to the already robust citywide pedestrian network, this measure is estimated to achieve a VMT reduction of 0.3%. It should be noted that the effectiveness of this measure is predicated upon a 1.5% decrease in automobile mode share over the same time period, in line with the forecasting completed for the 2030 General Plan Update EIR.

Calculation method: top-down

Year	Measure Performance[1]	Sector (Transportation)	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)
2020	0.3%	45.4%	0.1%	6,582
2030	0.3%	43.3%	0.1%	6,942
2050	0.3%	40.2%	0.1%	7,661

Notes: [1] Fehr & Peers 2011; MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

Action 2.3.1: Increase Bicycle Facilities within the City by 5% annually

A sustained 5% annual increase in bicycle infrastructure would result in a substantial increase in facilities during the planning horizon, and would likely result in a greater shift in mode share to bicycle travel than contemplated in the 2030 GP EIR modeling. It is estimated that this increase would result in an additional VMT reduction of 1.5%.

Calculation method: top-down

Year	Measure Performance[1]	Sector (Transportation)	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)
2020	1.5%	45.4%	0.7%	32,909
2030	1.5%	43.3%	0.7%	34,708
2050	1.5%	40.2%	0.6%	38,307

Notes: [1] Fehr & Peers 2011; MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

Action 2.4.1: Increase Public Transit Service 5% by 2020 and 10% by 2030

This measure intends to increase public transit service (i.e., frequency of service, number of transit lines and stops) above-and-beyond what is already planned in the Metropolitan Transportation Plan by 5% in 2020 and 10% by 2030. The Center for Clean Air Policy (CCAP) attributes a 0.5% reduction in VMT and associated GHG emissions per 1% improvement in transit frequency.

Calculation method: top-down

Year	Measure Performance[1]	Sector (Transportation)	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)
2020	2.5%	45.4%	1.1%	54,848
2030	5.0%	43.3%	2.2%	115,694
2050	5.0%	40.2%	2.0%	127,691

Notes: [1] Center for Clean Air Policy (CCAP). Transportation Emission Guidebook, as cited in: CAPCOA 2010. Quantifying GHG Mitigation Measures; MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

Action 1.1.1: 35% VMT/Capita Reduction Standard in New Development

This measure would require new development within the City to demonstrate that it would generate VMT/capita 35% below the statewide average VMT/capita.

Calculation method: top-down

Year	Portion of Inventory Affected (MT CO_2e/yr)	Projected Citywide VMT/capita (annual)[1]	% Below 2009 Statewide Average[2,3]	Measure Performance	GHG Reduction (MT CO_2e/yr)
2020	179,954	8,367	6.4%	28.6%	51,507
2030	299,924	7,912	11.5%	23.5%	70,572
2050	539,863	7,451	16.6%	18.5%	99,193

Notes: [1] Fehr & Peers 2011; [2] Federal Highway Administration 2009, Table VM-2 - Highway Statistics; [3] U.S. Census Bureau, 2005-2009 American Community Survey; MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

Action 2.7.1: City Employee Furlough Days

The City of Sacramento has implemented regular employee furloughs, estimated at 71,847 furloughed employee-days per year. It was assumed that 2-one-way trips of average distance 12.45 miles per trip per furloughed employee would be avoided per furlough day. It was assumed that furloughed employees would complete other vehicle trips on their day-off, with an average distance of 7.22 miles/trip. The estimated avoided VMT minus the substituted VMT would yield a difference of 764,452 avoided VMT/year. Allocating for Internal-Internal, External-Internal, and Internal-External VMT according to the method with which the City's transportation sector of the GHG inventory was developed yields 493,072 VMT attributable to the City. The same mobile-source emission factor as was used to develop the transportation sector of the City's GHG inventory was used to calculate the avoided GHG emissions associated with employee furloughs. The City anticipates that the furlough days used in this calculation would be permanent.

Calculation method: bottom-up

Year	Furloughed employee days/year	Home-based-work trips avoided (trips/year)	VMT avoided (VMT/year)	Home-other VMT substituted per year	Avoided VMT/year	Avoided VMT/year with II, X-I, I-X Allocation[3]	Emission factor (MT CO_2e/mile)[2]	GHG reduction (MT CO_2e/yr)
2020	71,847	143,694	1,801,923	1,307,471	764,452	493,072	0.000452	223
2030	Same assumptions applied for future years.							223
2050								223

Notes: [1] City of Sacramento. Email from Mary Ann Turner in Payroll, to Helen Selph, June 27, 2011.
; [2] EMFAC 2007. Weighted emission factor by speed bin for Sacramento County; [3] Fehr & Peers 2011. I-I = Internal to Internal vehicle trip; I-X = Internal to External vehicle trip; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; VMT = vehicle miles traveled; X-I = External to Internal vehicle trip.
Source: Data compiled by Ascent in 2011

Action 2.5.1: Transport City Solid Waste to Keifer Landfill Instead of Exporting Out-of-state

Under existing conditions, 156,023 tons of waste generated by the City of Sacramento annually (community-wide) is exported out-of-state for disposal. If that waste were disposed of at Keifer Landfill instead, this could result in a reduction of approximately 1,279,389 VMT per year associated with waste hauling. It was assumed that each waste haul truck would carry an average of 15 tons of waste per trip, and that waste would be disposed of in Sparks, Nevada under existing conditions.

Calculation method: bottom-up

Year	Tons waste transported out-of-state[1]	tons/waste hauling truck	# waste hauling truck trips	average distance to Sparks, NV (miles)	average distance to Keifer landfill (miles)	VMT reduction/trip	VMT reduction	Emission factor (MT CO_2e/mile)[2]	GHG reduction (MT CO_2e/yr)
2020	156,023	15	10,402	135	12	123	1,279,389	0.0014101	1,804
2030	Same assumptions applied for future years.								1,804
2050									1,804

Notes: [1] CalRecycle. 2005. Disposal Reporting System. http://www.ciwmb.ca.gov/LGCentral/Reports/DRS/Destination/JurDspFa.aspx; [2] EMFAC 2007. Emission Factor for Heavy-Duty Trucks; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; VMT = vehicle miles traveled.
Source: Data compiled by Ascent in 2011

Action 2.6.1: Traffic Signal Coordination

This measure assumes that the City could improve traffic flow and associated fuel economy of vehicles traveling on City streets. According to the Federal Highway Administration, there is evidence of 4-13% reductions in fuel consumption for signal coordination projects and a specific 8.6% reduction in fuel consumption based on the California Fuel Efficient Traffic Signal Management Program. According to the City of Sacramento, approximately 50% of traffic signals could be synchronized by 2035. It was conservatively assumed that only internal-internal (I-I) VMT would be affected by signal coordination. An average GHG reduction per year was calculated in 2035 and linearly extrapolated to calculate GHG reduction from signal coordination in 2020, 2030, and 2050.

Calculation method: bottom-up

Year	Measure Performance[1]	Portion of Signals Eligible for Coordination by 2035[2]	Scaled Measure Performance	Portion of VMT Affected (I – I) (VMT/day)[3]	Gallons of Fuel (assumes 22 mpg)[3]	Fuel Reduction (gallons/day)	Emission factor (MT CO_2e/mile)[4]	Cumulative GHG reduction (MT CO_2e/yr)	Average GHG Reduction (MT CO_2e/yr)
2020								10,431	
2030								22,021	
2035	22,021	50%	4.3%	4,425,645	201,166	8,650	8.81	27,816	1,159
2050								27,816	

Notes: [1] FHWA 2011. http://www.fhwa.dot.gov/environment/glob_c5.pdf; [2] Ryan Billeci, Telecommunication Engineer City of Sacramento - DOT. July 11, 2011 Email to Helen Selph and Ed Cox stating that 10-15 signals per year are added to coordination; [3] Fehr & Peers 2011; [4] California Climate Action Registry 2009; I-I = Internal to Internal vehicle trip; mpg = miles per gallon; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; VMT = vehicle miles traveled.
Source: Data compiled by Ascent in 2011

Solid Waste and Recycling Strategies

The following strategy would result in GHG emission reductions associated with solid waste disposal by increasing diversion. These calculations do not account for increased energy associated with recycling diverted solid waste because that assumption was not known at this time. These calculations focus on the avoided GHG emissions at affected landfills associated with reduced disposal rates. A variety of qualitative strategies will support the City's achievement of the waste disposal targets.

Action 4.2.1: Per Capita Waste Disposal Target

The City has currently achieved a diversion rate of 43% under existing conditions, and aims to increase diversion by 32% to meet a 75% per capita waste diversion requirement by 2020. This would result in disposal rate of 3.45 lb/capita per day in 2020. In addition, the City aims to achieve a 1.38 lb/capita/day disposal rate (90% diversion rate by 2030), which represents an increase of 47% in diversion above the existing 43%. Finally, the City's General Plan includes a policy to achieve zero waste (100% diversion) by 2040, which represents a 57% increase in diversion above existing conditions. The GHG emission reductions that would be achieved through reduced per capita disposal rates apply to the net increase in GHG emissions in the solid waste sector over the projection period, and do not apply to waste-in-place.

Calculation method: top-down

Year	Portion of Inventory Affected (MT CO_2e/year)	Measure Performance	GHG Reduction (MT CO_2e/yr)
2020: 75% diversion (3.45 lb/person/day disposal rate) from the waste stream by 2020	248,137	32.0%[1]	79,404
2030: 90% diversion (1.38 lb/person/day disposal rate) from the waste stream by 2030	276,242	47.0%[1]	129,834
2050: 100% diversion (0 lb/person/day disposal rate) from the waste stream by 2040	341,599	57.0%[2]	194,711

Notes: [1] City of Sacramento; April 27, 2011 email from Helen Selph; [2] City of Sacramento 2030 General Plan. MT CO_2e/yr = metric tons carbon dioxide

equivalent per year.
Source: Data compiled by Ascent in 2011

Water Consumption and Waste Water Strategies

The following strategies would result in GHG emission reductions associated with water consumption and waste water through water conservation. A variety of qualitative and quantitative strategies will support the City's achievement of the water conservation targets, as presented later in this section.

Action 5.1.1: Recycled Water for Outdoor (non-potable) Water Use

This strategy was derived from derived from ICF GHG Reduction Measure Analysis for SMUD Measure Wastewater-1 (ICF 2011). It was assumed that recycled water would be feasible for approximately 2% of the City by the year 2030. Recycled water infrastructure was anticipated to be cost-prohibitive, and thereby, infeasible in 2020.

Calculation method: top-down

Year	Measure Performance[1]	Sector (water/wastewater)	Subsector (outdoor)[2]	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)
2020	0%	1.8%	67%	0.0%	-
2030	2%	1.8%	67%	0.0%	1,310
2050	2%	1.9%	67%	0.0%	1,587

Notes: [1] August 26, 2011 email from Jim Peifer, Sacramento Department of Utilities, to Helen Selph, regarding recycled water; [2] City of Sacramento 2010. Draft Interim Water Conservation Plan pages 16-17; MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

Action 5.1.1: 20% Reduction in Water Consumption by 2020

This measure is based on the State's plan to achieve a 20% reduction in per-capita water use by 2020. The 20x2020 Water Conservation Plan was released by the State Water Resources Control Board in February 2010.

Calculation method: top-down

Year	Measure Performance[1]	Sector (water/wastewater)	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)
2020	20%	1.8%	0.4%	17,267
2030	20%	1.8%	0.4%	19,647
2050	20%	1.9%	0.4%	23,806

Notes: [1] State Water Resources Control Board. 2010 (February). 20x2020 Water Conservation Plan. Available: http://www.swrcb.ca.gov/water_issues/hot_topics/20x2020/docs/20x2020plan.pdf; MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

Water Consumption and Waste Water Sub-Gap Analysis

The following strategies would help the City achieve the mandate of 20% reduction in per-capita water consumption by 2020, and would result in GHG emission reductions of approximately 16,700 MT CO_2e/year by 2020.

Water Meters and Automated Meter Infrastructure

The City is in the process of installing water meters and automated meter infrastructure (AMI) in residential land uses. Water meters will result in City residents paying for water according to their usage and AMI will give residents information about inefficient uses of water (e.g., "water-wise" calls, which will help customers identify and repair leaks). The program would apply to residential water consumption only, since most commercial customers are already metered in Sacramento. In addition, homes constructed after 1992 are already metered, so this strategy was only applied to residential housing stock constructed prior to 1992. The City's Interim Water

Management Plan estimates that residential customers reduce water consumption by an average of 20% per meter. The water meter installation program would be completed by 2025.

Calculation method: top-down

Year	Water Meters Installed[1]	Proportion of Customers Affected	% of pre-1992 homes (unmetered)[2]	Measure Performance[3]	Sector (water/wastewater)	Subsector (Residential)[3]	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)
2011	33,800	20.2%	81.0%	20%	1.7%	62%	0.0%	1,418
2020	71,600	63.1%	63.5%	20%	1.8%	62%	0.1%	4,261
2030	61,700	100%	54.5%	20%	1.8%	62%	0.1%	6,601
2050	-	100%	42.5%	20%	1.9%	62%	0.1%	6,237

Notes: [1] City of Sacramento. April 20, 2011 email from Helen Selph; [2] City of Sacramento Housing Element. 2008; City of Sacramento 2030 General Plan Buildout Model; [3] City of Sacramento. Interim Water Management Plan; MT CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

CalGreen Tier 1 Water Efficiency Standards in New Development

This strategy would require new construction to implement CalGreen Tier 1 Water Efficiency measures as mandatory standards. In nonresidential development, this would result in 30% improvement in indoor water efficiency and reduce the use of outdoor potable water to a quantity that does not exceed 60% reference evapotranspiration (ETo) times the landscape area plus 1 elective measure. 60% was assumed as a proxy for reduction in nonresidential outdoor water consumption. For new residential development, kitchen faucets shall have a maximum flow rate of no greater than 1.5 gallons per minute and shall reduce the use of outdoor potable water for landscaping to a quantity that does not exceed 65% ETo times the landscape area, in addition to 2 electives. The CalGreen mandatory baseline requires a 20% increase in indoor water efficiency for residential uses. Therefore, 20% and 65% reductions were assumed for residential indoor and outdoor water consumption, respectively.

Calculation method: top-down

Year	Portion of Inventory Affected (MT CO_2e/yr)	Land Use Category	Indoor/Outdoor	Measure Performance[1]	Subsector (Indoor/Outdoor)[2]	Subsector (Residential, Nonresidential)[2]	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)
2020	16,146	Nonresidential	Indoor	30%	33%	24%	2.4%	380
			Outdoor	65%	67%	24%	10.2%	1,646
	16,146	Residential	Indoor	20%	33%	62%	4.1%	663
			Outdoor	60%	67%	62%	24.6%	3,979
Total 2020								**6,669**
2030	28,044	Nonresidential	Indoor	30%	33%	24%	2.4%	660
			Outdoor	65%	67%	24%	10.2%	2,859
	28,044	Residential	Indoor	20%	33%	62%	4.1%	1,152
			Outdoor	60%	67%	62%	24.6%	6,911
Total 2030								**11,583**
2050	48,841	Nonresidential	Indoor	30%	33%	24%	2.4%	1,149
			Outdoor	65%	67%	24%	10.2%	4,980
	48,841	Residential	Indoor	20%	33%	62%	4.1%	2,006
			Outdoor	60%	67%	62%	24.6%	12,037
Total 2050								**20,172**

Notes: [1] State of California. CalGreen. CCR Title 24, Part 11; [2] City of Sacramento 2010. Draft Interim Water Conservation Plan. MT CO_2e/yr = metric tons carbon dioxide equivalent per year; This strategy was applied to emissions from new development only.
Source: Data compiled by Ascent in 2011

CalGreen Water Efficiency Standards in RECO (Option 2: Building Permit Trigger)

This strategy accounts for the required the baseline CalGreen water efficiency measures as part of the Residential Energy Conservation Ordinance (RECO) option 2 (building permit trigger) (described above under Energy Strategies). The baseline CalGreen water efficiency standards would reduce residential water consumption by 20%.

Calculation method: top-down

Year	Measure Performance[1]	Sector (water/wastewater)	Subsector (Residential)[2]	% Units undergo RECO[3]	Scaled % Reduction	GHG Reduction (MT CO_2e/yr)	Cumulative GHG Reduction (MT CO_2e/yr)
2020	20%	1.8%	62%	2.1%	0.00%	229	229
2030	20%	1.8%	62%	2.0%	0.00%	249	478
2050	20%	1.9%	62%	3.2%	0.01%	471	949

Notes: [1] State of California. CalGreen. CCR Title 24, Part 11; [2] City of Sacramento. Interim Water Management Plan; [3] City of Sacramento Housing Element. 2008; City of Sacramento 2030 General Plan Buildout Model; MT CO_2e/yr = metric tons carbon dioxide equivalent per year; RECO = Residential Energy Conservation Ordinance.
Source: Data compiled by Ascent in 2011

CalGreen Water Efficiency Standards in Rental Housing Energy and Water Efficiency Program (Option 2: Mandatory Basic Weatherization)

This strategy accounts for the required baseline CalGreen water efficiency measures as part of the Rental Housing Energy and Water Efficiency Program option 2 (mandatory basic weatherization) (described above under Energy Strategies). The baseline CalGreen water efficiency standards would reduce residential water consumption by 20%.

Calculation method: top-down

Year	Measure Performance[1]	Sector (water/ wastewater)	Subsector (Residential)[2]	Subsector (Renter Occupied)[3]	Eligible Housing Stock[3]	Inspection Rate (annual)[4]	# of years	Participation rate[4]	Scaled % reduction	GHG Reduction (MT CO_2e/yr)	Cumulative GHG Reduction (MT CO_2e/yr)
2020	20%	1.8%	62%	47%	50.9%	8%	9	75%	0.03%	1,313	1,313
2030	20%	1.8%	62%	47%	29.7%	7%	10	75%	0.02%	831	2,144
2050	20%	1.9%	62%	47%	27.0%	5%	20	75%	0.02%	1,428	3,572

Notes: [1] California Building Standards Commission. CalGreen. CCR Title 24, Part 11; [2] City of Sacramento. Interim Water Management Plan; [3] City of Sacramento Housing Element. 2008; City of Sacramento 2030 General Plan Buildout Model; [4] US Department of Energy. April 2011; CO_2e/yr = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

A summary of the collective performance of the individual water conservation strategies is provided below in Table 6. These strategies would be expected to reduce GHG emissions associated with water consumption and wastewater treatment by approximately 13,889 MT CO_2e/year of the 17,267 MT CO_2e/year associated with the state-mandated 20% per-capita water conservation improvement. Thus, additional strategies or increased participation would be needed to demonstrate that this goal could be achieved through City-initiated programs. In addition, the City has identified other strategies to reduce water consumption for inclusion in the CAP that could not be quantified at this time. These "qualitative" strategies would support the success of those quantified here. However, please note that this analysis also shows that the benefits of City-initiated programs would achieve greater emission reductions than would be expected from the State's legislative requirement in the longer-term (i.e., 2030-2050).

Table 6
Summary of Water Consumption and Waste Water Sub-Gap Analysis

Strategy	GHG Emission Reduction (MT CO_2e/yr)		
	2020	2030	2050
Water Meters and Automated Meter Infrastructure	5,678	6,601	6,237
Calgreen Tier I Standards in new development	6,669	11,583	20,172
CalGreen water efficiency standards in RECO	229	478	949
CalGreen water efficiency standards in Rental Housing Energy and Water Efficiency Program	1,313	2,144	3,572
Total	**13,889**	**20,805**	**30,930**
GHG Reductions Anticipated from 20% Water Consumption Reduction Target[1]	17,267	19,647	23,806

Notes: MT CO_2e/yr = metric tons carbon dioxide equivalent per year; RECO = Residential Energy Conservation Ordinance; Totals may not sum exactly due to rounding.
Source: Data compiled by Ascent in 2011

State and Federal Emissions Reduction Programs

Existing federal regulations addressing GHG emissions from passenger cars and trucks (e.g., Corporate Average Fuel Economy [CAFE)] standards revised in the 2007 House Energy Bill; State and federal Advanced Clean Cars programs) and State-issued regulations to increase the amount of electricity generated from renewable sources (e.g., California Renewable Energy Portfolio Standard Program) will likely reduce the rate of GHG emissions increase associated with mobile sources and energy consumption.

In December 2008, ARB adopted its *Climate Change Scoping Plan*, which contains the main strategies California will implement to achieve reduction of approximately 118 million metric tons (MMT) of CO_2e, or approximately 22% from the state's projected 2020 emission level of 545 MMT of CO_2e under a business-as-usual scenario (this is a reduction of 47 MMT CO_2e, or almost 10%, from 2008 emissions). ARB's original 2020 projection was 596 MMT CO_2e, but this revised 2020 projection takes into account the economic downturn that occurred in 2008 (ARB 2011). In August 2011, the Scoping Plan was re-approved by ARB, and includes the Final Supplement to the Scoping Plan Functional Equivalent Document (FED), which further-examined various alternatives to Scoping Plan measures. The Scoping Plan also includes ARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. ARB estimates the largest reductions in GHG emissions to be achieved by implementing the following measures and standards (ARB 2011):

- improved emissions standards for light-duty vehicles (estimated reductions of 30.1 MMT CO_2e),
- the Low-Carbon Fuel Standard (15.0 MMT CO_2e),
- energy efficiency measures in buildings and appliances (11.9 MMT CO_2e), and
- a renewable portfolio and electricity standards for electricity production (23.4 MMT CO_2e).

ARB has not yet determined what amount of GHG reductions it recommends from local government operations; however, the *Scoping Plan* does state that land use planning and urban growth decisions will play an important role in the state's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. ARB further acknowledges that decisions on how land is used will have large impacts on the GHG

emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The *Scoping Plan* states that the ultimate GHG reduction assignment to local government operations is to be determined (ARB 2008). With regard to land use planning, the *Scoping Plan* expects approximately 3.0 MMT CO_2e will be achieved associated with implementation of SB 375, which is discussed further below (ARB 2011).

At the local level, ARB issued the Sacramento Area Council of Governments (SACOG) GHG emission reduction targets for light-duty mobile-sources of 7% by 2020 and 16% by 2035, pursuant to Senate Bill 375 (SACOG 2010). For the purposes of this CAP, the City will be quantifying the GHG emission reduction benefits of individual land use and transportation measures. Because measures implemented by SACOG to achieve the SB 375 GHG reduction targets would likely be similar to programs implemented by the City as identified in the CAP, it is possible that some double-counting would occur if both the City's CAP measures and SB 375 targets were credited. Therefore, no legislative reductions were assumed from SB 375.

In addition, SMUD achieved 12% renewable energy in its portfolio in 2006 (SMUD 2008). SMUD plans to meet the 33% renewable energy portfolio standard by 2020, which would result in an additional 21% reduction in GHG emissions from electricity consumption in the City. For other applicable programs, Ascent applied the emission reductions estimated in the Scoping Plan to the associated emission sectors in the City's inventory. See Table 7 for a summary of estimated emission reductions from State and federal programs that would affect the City's projected GHG emissions.

If all programs are implemented as described in the Scoping Plan and by SMUD, the City's 2020 emissions would be reduced by a maximum of 13.6% from projected levels, leaving approximately 14.4% to be accomplished by the City's CAP. The effect of legislation on the City's GHG emissions projections is summarized in Table 7. It is anticipated that future legislation will be introduced to support longer-term GHG emissions reductions beyond 2020, but the effects of future legislation on the City's GHG emissions inventory is unknown at this time. Therefore, no additional reductions from legislation were accounted for beyond 2020.

Table 7
Estimated Effects of State and Federal Programs on City of Sacramento Greenhouse Gas Emissions Projections

Scoping Plan Measure	Emissions Sector	Scoping Plan-Estimated Emission Reduction (MMT CO_2e by 2020)	Projected 2020 Emissions of Sector (MMT CO_2e by 2020)	Statewide % Reduction	Local % Reduction	Inventory Subsector	% of City's Inventory Affected in 2020	Scaled % Reduction from 2020 Projected Emissions
Federal Fuel Economy Standards; AB 1493 (Pavley) and Advanced Clean Cars	Transportation	30.1	210.0	14.3%	-	80.3% (light-duty vehicles)	45.4%	5.2%
Energy Efficiency Measures; California Green Building Code	Energy	11.9	167.7	7.1%	-	-	46.9%	3.3%
Renewable Electricity Standard; Renewable Portfolio Standard	Energy	21.3	185.9	11.5%	21%	51.6% (electricity)	46.9%	5.1%
Total								**13.6%**

Notes: [1] Energy Efficiency Measures and Green Building Code assumes that development would implement the basic Green Building Code Standards (CalGreen); grey cells contain statewide data for information purposes, but calculations rely solely on local % reduction; CO_2e = carbon dioxide

equivalent; MMT= million metric tons.
Source: ARB 2011; SACOG 2010; SMUD 2008. Data compiled by Ascent in 2011

Conclusion

The GHG reductions estimated for the City's identified strategies, as described above and detailed in the attached supporting calculations, sum to approximately 711,737 MT CO_2e/year below projected 2020 GHG emission levels. Legislation would reduce 2020 projected emissions by approximately 659,415 MT CO_2e/year by 2020. Collectively, these would reduce GHG emissions by 1.371 million MT CO_2e/year in 2020, which meets the City's GHG reduction target of 1.365 million MT CO_2e/year in 2020. These results are summarized below in Table 8.

Table 8
Gap Analysis Summary

	2020 (MT CO_2e/year)	2030 (MT CO_2e/year)	2050 (MT CO_2e/year)
Total (all strategies, reduction from projected)	711,737	1,063,048	1,557,148
Legislative Reductions (reduction from projected)	659,415 (13.6%)	728,156 (13.6%)[1]	877,392 (13.8%)[1]
Total (all strategies plus legislative, reduction from projected)	1,371,151	1,791,203	2,434,540
GHG Emissions Reduction Target/Goal (from Tables 2 and 3, reduction from projected)	1,364,924	2,792,470	5,653,713
Gap/(Surplus)	**(6,227)**	**1,001,267**	**3,219,174**

Notes: [1] Legislative reductions calculated in Table 7 were applied to the City's GHG emissions projections for 2030 and 2050. The percent reduction associated with legislation increases slightly due to changes in the composition of the City's GHG inventory (increase in energy and mobile-source emissions sectors relative to other sectors); MT CO_2e/year = metric tons carbon dioxide equivalent per year.
Source: Data compiled by Ascent in 2011

It is anticipated that long-term interim benchmarks will need to rely heavily on introduction of additional GHG-reducing legislation, evolution of new technologies, and the ability to quantify GHG reduction benefits of strategies that are evaluated qualitatively in this initial version of the CAP.

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DRAFT

FEHR & PEERS

TECHNICAL MEMORANDUM

Date: May 27, 2011

To: Honey Walters, Ascent

From: Ronald T. Milam - Fehr & Peers

Subject: City of Sacramento 2035 VMT Forecast ***RS11-2878***

Fehr & Peers has completed a forecast of year 2035 vehicle miles of travel (VMT) for the City of Sacramento. The forecast was generated by capturing the VMT generated by the City using the current version of the regional SACSIM travel forecasting (TDF) model. This version of the model is being used for the SACOG Metropolitan Transportation Plan (MTP) update and, as such, is still subject to change as the MTP process advances.

The VMT forecasts are summarized in Table 1 and 2 and are derived from the following trip types.

- Internal–Internal (I-I) – Trips that begin and end in the City
- Internal–External (I-X) – Trips that begin in the City and end in another City
- External–Internal (X-I) – Trips that begin outside the City and end inside the City

The allocation of VMT includes 100 percent responsibility for all I-I trips and 50 percent of I-X and X-I trips. This methodology is consistent with the Regional Target Advisory Committee (RTAC) recommendations. The resulting average weekday VMT in 2035 for the City of Sacramento is approximately 14,379,400. This value is lower than the previous 2030 VMT forecast that was prepared for the City as part of the Sacramento County General Plan analysis despite a longer-term horizon year. The lower value is mainly a result of the revised socioeconomic projections contained in the current SACSIM model. These projections reflect the effects of the 2008/09 recession and are the most current for the region.

Please contact us with any questions.

TABLE 1 – 2035 CITY OF SACRAMENTO VMT BY TRIP TYPE					
VMT Trip Type	AM Peak Period	PM Peak Period	Midday Period	Evening Period	Daily
Internal-Internal	813,187	1,005,825	1,413,779	1,192,854	4,425,645
Internal-External[1]	814,357	1,239,864	1,518,535	1,429,800	5,002,556
External-Internal[1]	1,172,883	959,324	1,531,775	1,287,239	4,951,221
Total	2,800,427	3,205,013	4,464,089	3,909,893	14,379,422

1. These values reflect half of the responsibility from the VMT as the external jurisdictions would be responsible for the other half.

Source: Fehr & Peers, 2011 – SACSIM 2035 Regional Travel Demand Forecasting Model.

TABLE 2 – 2035 CITY OF SACRAMENTO VMT SUMMARY BY SPEED					
VMT Speed Bins (MPH)	AM Peak Period	PM Peak Period	Midday Period	Evening Period	Daily
0 - 5	485	273	65	76	899
5 - 10	4,338	8,144	804	233	13,519
10 - 15	19,653	26,608	10,952	2,850	60,063
15 - 20	101,500	142,638	133,729	98,065	475,932
20 - 25	387,282	474,872	572,164	437,373	1,871,691
25 - 30	258,342	328,576	310,318	216,094	1,113,330
30 - 35	379,943	423,639	561,541	471,731	1,836,854
35 - 40	308,983	433,029	492,277	514,198	1,748,487
40 - 45	243,942	339,615	220,596	183,956	988,109
45 - 50	359,864	308,138	498,650	139,422	1,306,074
50 - 55	432,115	402,949	715,951	345,437	1,896,452
55 - 60	213,437	262,633	842,140	1,282,267	2,600,477
60 - 65	75,776	40,194	79,787	164,113	359,870
65 - 70	14,767	13,705	25,115	54,078	107,665
70 - 75	0	0	0	0	0
>75	0	0	0	0	0
Total	2,800,427	3,205,013	4,464,089	3,909,893	14,379,422

Source: Fehr & Peers, 2011 – SACSIM 2035 Regional Travel Demand Forecasting Model.