Santa Ana

Climate Action Plan

Final

Prepared by ICLEI–USA
December 2015

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Thanks to the City Council for their leadership and support.

Miguel A. Pulido	*Mayor*
Vincent Sarmiento	*Mayor Pro Tem*
Michele Martinez	*Members of the City Council*
Angelica Amezcua	
P. David Benavides	
Roman Reyna	
Sal Tinajero	

Thank you to the City of Santa Ana Staff and Climate Action Plan Steering Committee for their contributions to the Climate Action Plan.

Consulting Team:

ICLEI Local Governments for Sustainability–USA	*Project Lead*
AECOM	
Global Green	
Fehr and Peers	
Mariann Long and Associates	

Message from the City Manager

Community Members,

For many years, the City of Santa Ana has taken the lead in reducing greenhouse gas emissions and conserving resources citywide. As a result, Santa Ana's per capita emissions are lower compared to other California cities and the State. Energy efficiency and sustainability have been guiding principles to ensure that the actions taken today will preserve the ability to meet the needs of future generations.

The purpose of this Climate Action Plan is to develop and implement strategies to reduce greenhouse gas emissions from City operations and the community. These strategies include using energy and water more efficiently, increasing renewable energy, enhancing access to sustainable transportation modes, recycling waste, and building sustainable communities. These actions will benefit the community by boosting the local economy, reducing traffic congestion, improving air quality, lowering energy use and cost, and improving the quality of life.

I would like to express our gratitude to the Mayor and City Council for their outstanding leadership and vision. We are committed to creating a more livable, sustainable, and economically vibrant community. I look forward to working together with the community and achieving great progress through the implementation of the Climate Action Plan.

Best,

David Cavazos
City Manager

Executive Summary

This Climate Action Plan (CAP) represents the City of Santa Ana's commitment to improving quality of life by reducing carbon pollution and energy use, both from its own operations and from the community as a whole. To develop this CAP, an inventory was conducted to determine baseline greenhouse gas emissions from the community and from municipal operations for calendar year 2008. A forecast was made of business-as-usual emissions in the absence of any emissions reduction actions. This forecast was then adjusted to account for the emissions reduction expected from statewide policies and from actions that have already been taken by the City since the baseline inventory.

In 2014, the City Council adopted emissions reduction goals for the CAP. For community-wide emissions, the reduction goal is 15% below the baseline year 2008 by 2020, and 30% below the baseline year 2008 by 2035. For municipal operations emissions the reduction goal is 30% by 2020 and 40% by 2035.

Based on community input, suggestions from City staff, analysis of other communities' climate action plans, and consultant recommendations, a list of measures to reduce emissions was developed. These measures address emissions in five sectors: Transportation and Land Use, Energy, Solid Waste, Water, and Wastewater. The total emissions reduction from all measures in each sector is shown in Table E.1.

Table E.1: Summary of CAP Measure Emissions Reduction by Sector

	Reduction ($MTCO_2e$/Year)*	
Sectors	**2020**	**2035**
Transportation and Land Use	9,150	73,873
Energy	36,423	47,909
Solid Waste, Water, and Wastewater	9,097	13,811
Total	**54,670**	**135,593**

*Metric tons of carbon dioxide equivalent per year

The measures in this CAP are projected to accomplish the goals of a 15% reduction in community-wide emissions by 2020 and nearly reach 30% reduction by 2035. It is anticipated that new policy and technology options for reducing emissions will become available before 2035; the CAP will be updated periodically to meet the 2035 goal. The CAP measures affecting municipal operations are projected to accomplish goals of 30% reduction by 2020 and 40% reduction by 2035.

The implementation plan and anticipated start dates for each measure are presented in Chapter 4. Suggestions for using resources more efficiently at home and at work are provided in Chapter 5. Reaching the emissions reduction goals will require residents, businesses, and City government to work together. The result will be reduced traffic congestion, improved air quality, lower energy use and cost, and improved quality of life for the entire community.

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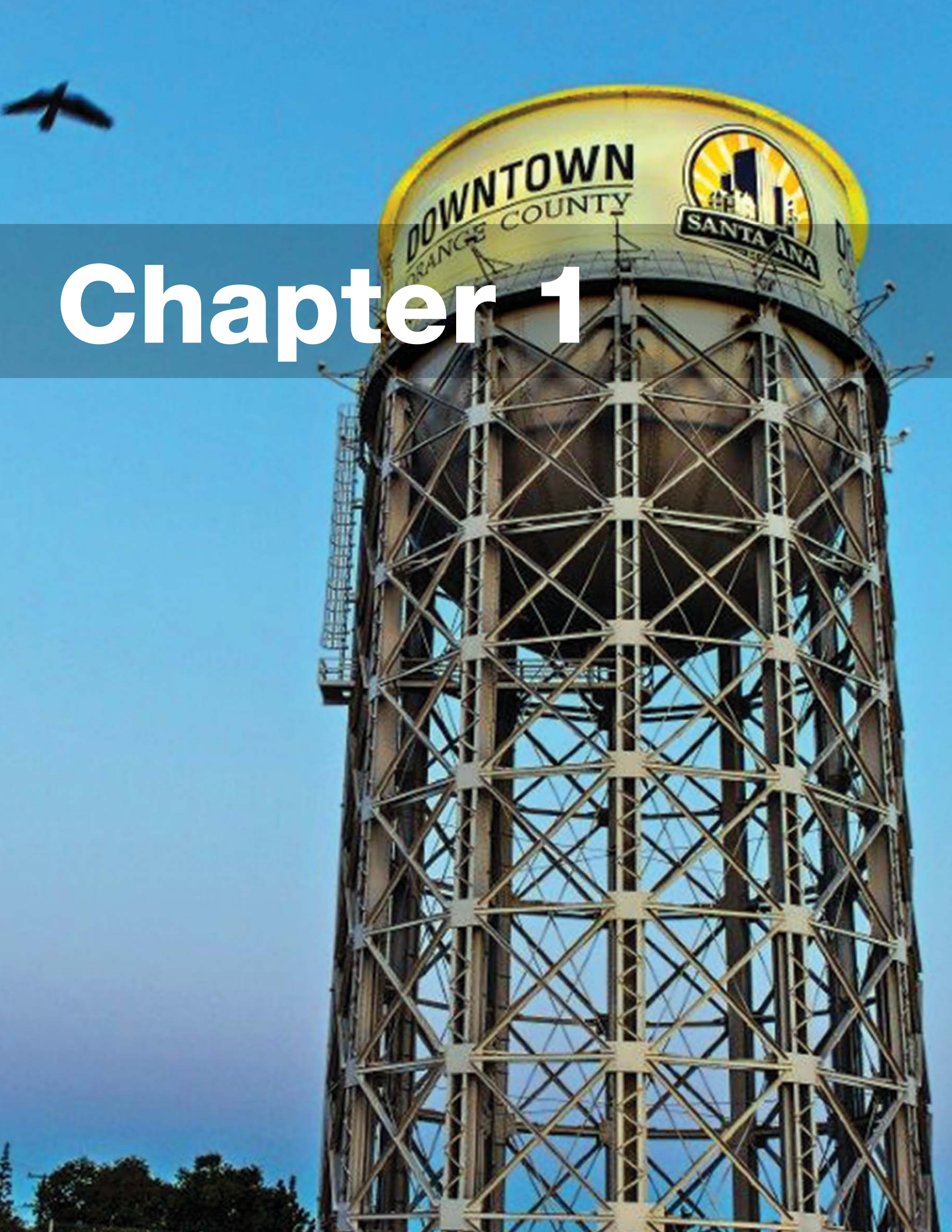

Chapter 1

Introduction

Background

Santa Ana has a land area of approximately 27 square miles and a population of over 335,000. It is the third most densely populated city in California and the 57th most-populous city in the United States. Santa Ana is located in the heart of Orange County with City, County, State, and Federal government agencies headquartered near the historic downtown.

Purpose

This Climate Action Plan (CAP) represents the City of Santa Ana's commitment to improving quality of life by reducing carbon pollution, both from its own operations and from the community as a whole. By completing this CAP, Santa Ana joins many other communities in California and throughout the United States that have acknowledged not only that climate action and economic prosperity can coexist, but that efforts to reduce carbon pollution can strongly support the local economy by cutting costs, creating jobs, and attracting investment.

More efficient use of energy decreases utility and transportation costs for residents, businesses, and City government. In addition to the direct benefits of these savings, money not spent on energy is more likely to be spent at local businesses and added to the local economy. Moreover, retrofitting homes and businesses to be more efficient creates local jobs for contractors in building testing, insulating, air sealing, and installation of energy efficient or renewable energy equipment.

Many of the transportation-related measures in this plan increase opportunities for walking and bicycling, and promote the creation of walkable spaces. These increased opportunities are good for residents' health, and walkable spaces increase quality of life and bring economic benefits to local businesses through increased customers. Reducing energy and fossil fuel use also improves air quality, reducing the negative impacts of pollution on health.

Using electricity and water more efficiently can help support the supply infrastructure, making these systems more resilient. For example, when energy demand is high and supply is short, power interruptions can sometimes be the result. Lowering energy use during peak demand periods reduces the risk of power interruptions and the economic losses associated with such interruptions.

By reducing energy use and pollution, Santa Ana also contributes to reducing greenhouse

gas (GHG) emissions. GHG emissions have the potential to adversely affect the environment because they contribute, on a cumulative basis, to climate change. Climate change is increasing the weather-related risks faced by communities across the country, including Santa Ana. Major risks to Southern California inland areas include extreme heat waves, which can impact human health and infrastructure, and a less reliable water supply.

While impacts are now beginning to appear, they are projected to intensify throughout the twenty-first century, with costly consequences if no action is taken. To slow down and ultimately reverse climate change, organizations in every sector of the economy and all levels of government will need to implement new policies to create more efficient, cleaner, and safer communities. This CAP is the City's next step along that path.

Legislative Overview

State-level policies in California serve as regulatory drivers for action at the local government level. California has adopted a wide variety of regulations aimed at reducing the state's GHG emissions. Key legislation pertaining to California GHG reduction targets is described below.

Assembly Bill 32: Global Warming Solutions Act

California passed the Global Warming Solutions Act, also known as Assembly Bill 32 (AB 32), in 2006. This bill charged the California Air Resources Board (CARB) with implementing a comprehensive statewide program to reduce GHG emissions. AB 32 established the following GHG emissions reduction targets for California:

- 2000 levels by 2010
- 1990 levels by 2020

These targets apply to statewide emissions across all sectors of the economy. AB 32 does not require that individual local governments reduce their community emissions to these levels, nor does it require that local governments adopt climate action plans. However, the AB 32 Scoping Plan, prepared by CARB to map out strategies for reaching the AB 32 targets, does identify an important role for local governments in implementing many of the strategies.

Senate Bill 375

Senate Bill 375 (SB 375) enhances California's ability to reach its AB 32 targets by promoting good planning through its goal of developing more sustainable communities. SB 375 requires CARB to develop regional GHG emissions reduction targets for passenger vehicles. CARB has established regional targets for 2020 and 2035 for each region covered by one of the state's 18 metropolitan planning organizations. The targets for the Southern California Association of Governments (SCAG), where Santa Ana is located, are 8% below 2005 levels by 2020, and 13% below 2005 levels by 2035. SCAG adopted the 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS): Towards a Sustainable Future. Many of the measures in this CAP help to implement strategies from the RTP/SCS in Santa Ana.

Executive Order S-3-05

Executive Order S-3-05, issued by Governor Schwarzenegger, reinforces the targets established in AB 32 and SB 375 and also sets a schedule for reporting the measured impacts of climate change upon California's natural environment and the emissions reduction efforts undertaken by a myriad of state, regional, and local groups. Executive Order S-3-05 also establishes an additional GHG reduction target of 80% below 1990 levels by 2050.

California Environmental Quality Act and Senate Bill 97

The California Environmental Quality Act (CEQA) requires public agencies to evaluate the environmental impacts of discretionary development plans and projects in their jurisdictions. Senate Bill 97, passed in 2007, directed the Governor's Office of Planning and Research to develop and recommend new guidelines to analyze GHG impacts under CEQA. The CEQA guidelines were updated in March 2010 to require analysis of climate change in CEQA documents. Many jurisdictions are finding that climate change impacts from local government activities are significant under CEQA, and are identifying emissions reduction targets and climate action plans as mitigation measures to reduce climate change impacts to less-than-significant levels.

Local Government Action

Many communities throughout the United States are taking responsibility for planning reductions in energy use and emissions. Through proactive measures in land use, transportation, energy efficiency, green building, waste diversion, and more, local governments help residents and businesses save money while improving quality of life and reducing emissions in their communities.

In 2007, the City of Santa Ana signed the U.S. Mayors' Climate Protection Agreement, committing to reduce GHG emissions. In addition to more than 1,000 local governments worldwide, Santa Ana joined ICLEI – Local Governments for Sustainability (ICLEI). This association for local governments enables members to share knowledge and successful strategies

toward increasing local sustainability.[1] ICLEI members represent the most forward-thinking and adept local governments that are working to make their communities more livable, prosperous, and environmentally sound.

ICLEI provides a framework and methodology for local governments to identify and reduce GHG emissions, organized along Five Milestones (also shown in Figure 1.1):

1. Conduct an inventory and forecast of local greenhouse gas emissions.
2. Establish greenhouse gas emissions reduction targets.
3. Develop a climate action plan for achieving the emissions reduction targets.
4. Implement the climate action plan.
5. Monitor and report on progress.

This CAP represents completion of Milestone 3. Chapter 4 of this CAP lays out strategies for Santa Ana to use in completing Milestones 4 and 5.

Santa Ana General Plan

This CAP builds upon a well-developed body of goals and policies in the Santa Ana General Plan, including the Energy Element that was first created in 1982. The Energy Element identified goals to "reduce consumption of non-renewable energy" and to "support development and utilization of new energy sources." The City is in the process of updating the Circulation Element of the General Plan, which includes Complete Streets policies to bring the City in compliance with the Complete Streets Act. The transportation actions in this CAP have been aligned with

Figure 1.1: ICLEI's Five Milestones

[1] ICLEI was formerly known as the International Council for Local Environmental Initiatives, the name has been changed to ICLEI – Local Governments for Sustainability. http://www.icleiusa.org

the latest updates to the General Plan Circulation Element. In addition, by promoting jobs in areas such as energy efficiency retrofits, the CAP supports the Economic Development Element goal to "increase employment opportunities for local residents." And the CAP measures that reduce City energy costs support the goal of "keeping taxes and fees at a fair level competitive with those of comparable communities."

Because the CAP will require approval of certain discretionary actions by the City, the CAP is subject to CEQA. It is anticipated that the CAP will not have a significant effect on the environment. The City plans to prepare an Initial Study and file a Negative Declaration finding that the project will not have a significant effect on the environment.

Santa Ana Sustainability Leadership and Accomplishments

In addition to the leadership demonstrated through signing the Mayors' Climate Protection Agreement and partnering with ICLEI, Santa Ana has already taken steps to reduce energy use and emissions.[2] These actions address the City-owned operations and the wider community. Furthermore, Santa Ana's baseline inventory shows that per-capita community emissions are already well below those of peer communities in California.

Community-wide Initiatives

At the community scale, several initiatives are underway that improve quality of life in Santa Ana while reducing carbon pollution. Collectively, these initiatives reduce emissions by 27,238 metric tons of carbon dioxide equivalent ($MTCO_2e$)/year. The following describes some of these programs.

Transportation and Land Use Plans
Within the transportation and land use sector, there are several measures that are planned for, but have yet to be implemented:

- The Santa Ana Regional Transportation Center (SARTC) is a focal point of transportation in Orange County, and co-locates Amtrak, Metrolink, Orange County Transit Authority, intercity and interstate bus transportation, and taxi services. Santa Ana received $3 million in grant funds for two transit improvement projects – the SARTC Master Plan and the Santa Ana Boulevard Grade Separation. The SARTC Master Plan is completed and includes design of a transportation facility, expanded parking facility, and infrastructure to support a fixed guideway system, streetcar, and bus rapid transit. The Santa Ana Boulevard Grade Separation will improve pedestrian and bicycle user safety, and reduce traffic congestion along Santa Ana Boulevard. It includes a railroad bridge that will accommodate a multi-modal corridor for pedestrian, bicycle, and fixed guideway components. This commitment to long-range, sustainable planning was one factor in the selection of Santa Ana as a major transportation grant recipient.

[2] Throughout this section, the emissions reduction figures were calculated using the most up-to-date data available as of September 2014.

- The City is in the process of drafting a Pedestrian Master Plan and updating its Bicycle Master Plan. Combined, the Bicycle and Pedestrian Master Plan outlines and prioritizes future active transportation improvements.
- The Transit Zoning Code, adopted in June of 2010, provided new zoning for over 400 acres in Santa Ana's downtown core. The new zoning supports compact development that is transit-friendly and allows for a mix of uses that will place housing closer to transit and jobs. The first projects developed under the new zoning will create over 120 units of new infill development within a 1-mile radius of the SARTC. This new housing represents a range of high-quality, compact development from row housing to courtyard-style apartments. Many of these new units will be marketed as affordable housing.
- Other areas allowing mixed use and higher density near transit include the Metro East Mixed Use Overlay Zone east of the SARTC. The Harbor Mixed Use Transit Corridor Specific Plan allows for 2,000 new residential units and mixed units along a Bus Rapid Transit line and adjacent to the proposed Garden Grove/ Santa Ana Fixed Guideway. The General Plan Land Use Element designates a total of seven areas of the City as mixed-use District Centers. District centers are to be developed to provide shopping, business, cultural, education, recreation, entertainment, and housing opportunities, and the most intense development in the City is targeted to those areas.

Energy

Many building efficiency measures have been brought about through a successful partnership with Southern California Edison (SCE) business and residential programs. The actions that have been employed are diverse depending on the specific program, but because these have been carried out through the utility partnership, reliable estimates of energy savings are available. The total reduction resulting from these programs is estimated at 7,517 $MTCO_2e$/year. Table 1.1 contains a summary of these actions along with the associated emissions reduction for each.

Table 1.1: SCE Program Impacts

Program Name	Annual kWh Saved	Emissions Reduced ($MTCO_2e$/Year)
SCE Small and Medium Business Direct Install	21,143,409	6,051
Residential Energy Efficiency Kits	2,287,550	655
Energy Star Qualified Refrigerator Rebates	1,401,859	401
Residential Lamp Exchange	1,120,207	172
LED Holiday Light Exchange	388,470	111
Residential CFL Bulbs Giveaway	361,375	103
Elementary School Living Wise Program	84,000	24
Total	**26,786,870**	**7,517**

In addition to the retrofits from SCE programs, natural gas retrofits were accomplished through similar programs from the Southern California Gas Company (SCG). Those programs are reducing an estimated 8,362 MTCO2e/year and are summarized in Table 1.2.

Table 1.2: SCG Program Impacts

Program Name	Annual Therms Saved	Emissions Reduced ($MTCO_2e$/Year)
Commercial	1,019,806	5,411
Single Family	258,112	1,370
Multifamily	241,924	1,284
Mobile Home	55,931	297
Total	**1,575,773**	**8,362**

Weatherization is another program that has reduced emissions from residential energy use. The Weatherization program delivered through the Community Action Partnership and funded through Federal grants reached 3,291 low-income households with weatherization assistance since 2008. Actions taken in homes can include combinations of a number of energy savings measures, such as sealing air ducts, insulating, glazing windows, and tuning up or replacing air conditioning and heating equipment. The combined electricity and natural gas savings from this program result in an estimated emissions reduction of 1,553 $MTCO_2e$/year.

Finally, new solar energy installations on homes and businesses are also reducing emissions. According to the Go-Solar California website, 11.9 MW of solar capacity has been installed in Santa Ana since 2008. These installations are estimated to produce an emissions reduction of 5,751 $MTCO_2e$/year.[3]

Solid Waste, Water, and Wastewater

The City of Santa Ana has an exemplary recycling program with an overall diversion rate of 67%. A comparison of diversion rates from 2008 and 2011 shows an incremental reduction of landfilled waste that translates to an emissions reduction of 2,060 $MTCO_2e$/year.[4] The most significant portion of the total reduction is achieved from diversion of green waste from the landfill, as this reduces a high proportion of landfill emissions.

The extraction, delivery, and treatment of water consume large amounts of energy. By conserving water, energy consumption is also reduced. Within Santa Ana, large volumes of water are conserved annually through SoCal Water$mart and other programs that provide incentives from the Metropolitan Water District such as irrigation controllers, ultra-low flush toilets, clothes washers, etc. The estimated total emissions reduction from water conservation programs in Santa Ana is 1,853 $MTCO_2e$/year.[5] In addition, since 2008, Santa Ana has progressively increased the volume of reclaimed water used in non-potable applications by 53.4 million gallons, from 62.3 to 115.7 million gallons. Each gallon of reclaimed

[3] It is likely that this number underestimates the total slightly due to the fact that Go-Solar California only tracks installations that occurred as part of the California Solar Initiative rebate program. Total electricity generated from these systems was calculated using the average annual kWh production per kW installed capacity of 1,678 for systems in the South Coast Air District.

[4] This assumes that the waste characterization (percentage of different waste types) and total generation in 2011 were the same as those reported for 2008.

[5] For the calculation of this measure, water conserved was converted to energy consumption using the same values for water use intensity as were used in the baseline inventory. Source: CEC. 2006. Refining Estimates of Water-Related Energy Use in California prepared by Navigant Consulting, Inc.

water saves energy because it was not pumped from outside state water sources like some of the potable water is, and because it will be used for nonpotable applications, less energy intensive water treatment is needed. The total energy savings is estimated to be 494,928 kWh/year, resulting in an emissions reduction of 142 $MTCO_2e$/year.[6] Santa Ana uses 64 gallons of water per capita per day, among the lowest in Orange County, which averages approximately 128 gallons per day.

Municipal Operations Actions

The City of Santa Ana has implemented several changes to its own operations that are leading by example and saving taxpayer dollars.

LED Street Lighting
Santa Ana has reported saving an annual 1,267,531 kWh/year by replacing 1,262 high pressure sodium fixtures with LED fixtures. The new fixtures are reducing emissions by 365 $MTCO_2e$/year. In addition to reduced energy consumption, the lifetime of LED lights is considerably longer than many other types of lighting and can reduce replacement costs. LED fixtures can also provide greater directionality for outdoor lighting, thereby reducing light pollution.

American Recovery and Reinvestment Act of 2009
The City received American Recovery and Reinvestment Act (ARRA) funds for energy efficient improvements such as lighting and heating and air conditioning systems at City facilities and parks. These projects reduce electricity use by 1,255,864 kWh/year and save Santa Ana taxpayers over $100,000/year. The resulting emissions reduction is 362 $MTCO_2e$/year.

Water Wells Motor Efficiency Upgrade
Energy efficient motors were recently installed at many City water wells, saving over one million kWh/year. The resulting emissions reduction from this action is 461 $MTCO_2e$/year. The Santa Ana groundwater wells are known for producing some of the best tasting water in the country, and do so with a reduced environmental impact.

Alternative Fuel Vehicle Policy
The South Coast Air Quality Management District Rule 1191 requires City vehicles operators to acquire low-emitting gasoline or alternative-fuel vehicles to reduce air toxic and criteria pollutants emissions.

The City is meeting this Rule through its Alternative Fuel Vehicle Policy to reduce emissions through the purchase of hybrid vehicles and vehicles powered by compressed natural gas (CNG), electricity, and propane. The City has 51 alternative fuel vehicles in its fleet, including 20 electric and 21 hybrid vehicles. The City's infrastructure consists of CNG fueling and electric charging stations. In 2016, the City will add public access electric charging stations.

[6] The estimated energy intensity to supply recycled water in the Los Angeles area is 1,841 kWh/million gallons, compared with 11,110 kWh/million gallons for potable water used in outdoor applications. Source: Navigant Consulting. 2008. The Role of Recycled Water in Energy Efficiency and Greenhouse Gas Reduction. Table 4-13

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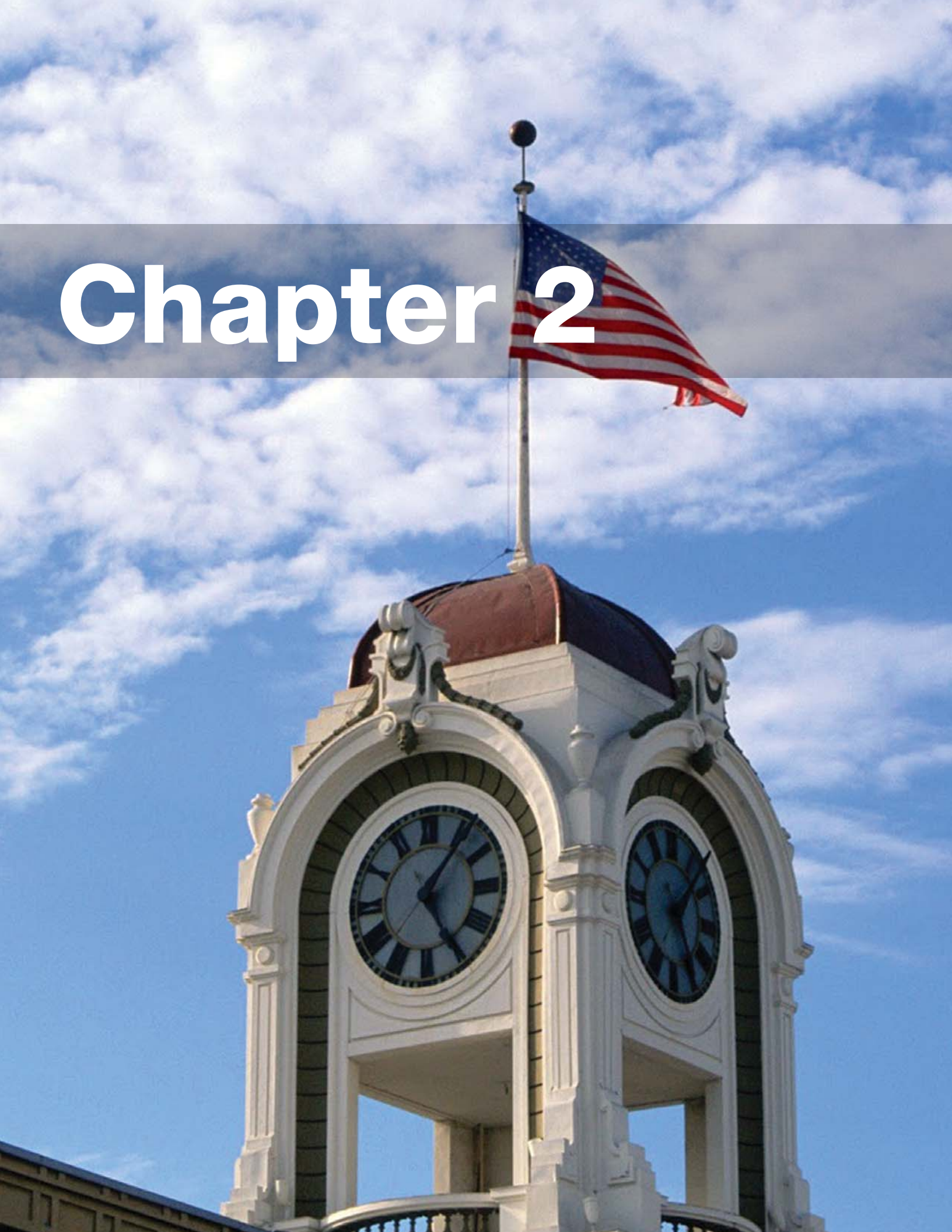


Chapter 2

Emissions Inventory, Forecasts, and Goals

Inventory Overview

The first step toward reducing GHG emissions is to identify baseline levels of emissions in the community. For local governments, it is helpful to look at two sets of emissions: community-wide and municipal operations emissions. Municipal operations emissions are a subset of community-wide emissions, as shown in Figure 2.1. The City has indirect ability to influence many sources and activities producing community-wide emissions, while it has more direct control over municipal operations emissions. An inventory was conducted of community-wide and municipal operations emissions for calendar year 2008.

Figure 2.1: Relationship between Community-wide and Municipal Operations Emissions

The municipal operations inventory is in accordance with the Local Government Operations Protocol.[7] A US Community Protocol[8] for community-wide emissions accounting was released in October 2012, after the completion of this inventory, however this inventory is compliant with the Community Protocol. The inventory was conducted using ICLEI's Clean Air and Climate Protection (CACP) software.

[7] http://www.icleiusa.org/tools/ghg-protocol/local-government-operations-protocol-1/local-government-operations-protocol

[8] http://www.icleiusa.org/tools/ghg-protocol/community-protocol

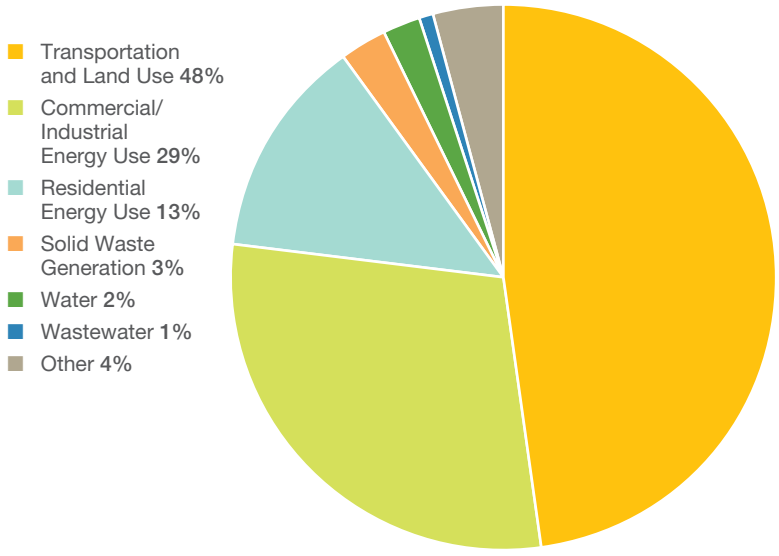
Community-wide Baseline Emissions

Under the Community Protocol, communities can choose one or more frameworks to look at emissions. This inventory uses the "Local Government Significant Influence" frame, which includes those emissions sources and activities that the City government has significant ability to influence through regulation, incentives, or other measures. In 2008, emissions from these sources and activities in Santa Ana were approximately 1.96 million metric tons of CO_2e ($MMTCO_2e$). As shown in Table 2.1 and Figure 2.2, the largest sector in the community-wide inventory is the transportation and land use sector, which accounts for 48% of emissions. Commercial/industrial energy use is next at 29% of emissions.

Table 2.1: 2008 Community-wide Greenhouse Gas Emissions Inventory

Sector	$MTCO_2e$	% of Total CO_2e
Transportation and Land Use	943,033	48%
Commercial / Industrial Energy Use	565,681	29%
Residential Energy Use	249,834	13%
Solid Waste Generation	55,193	3%
Water	36,231	2%
Wastewater	30,223	1%
Other	79,236	4%
Total	**1,959,431**	**100%**

Figure 2.2: 2008 Community-wide Greenhouse Gas Emissions Inventory



Per-capita Emissions

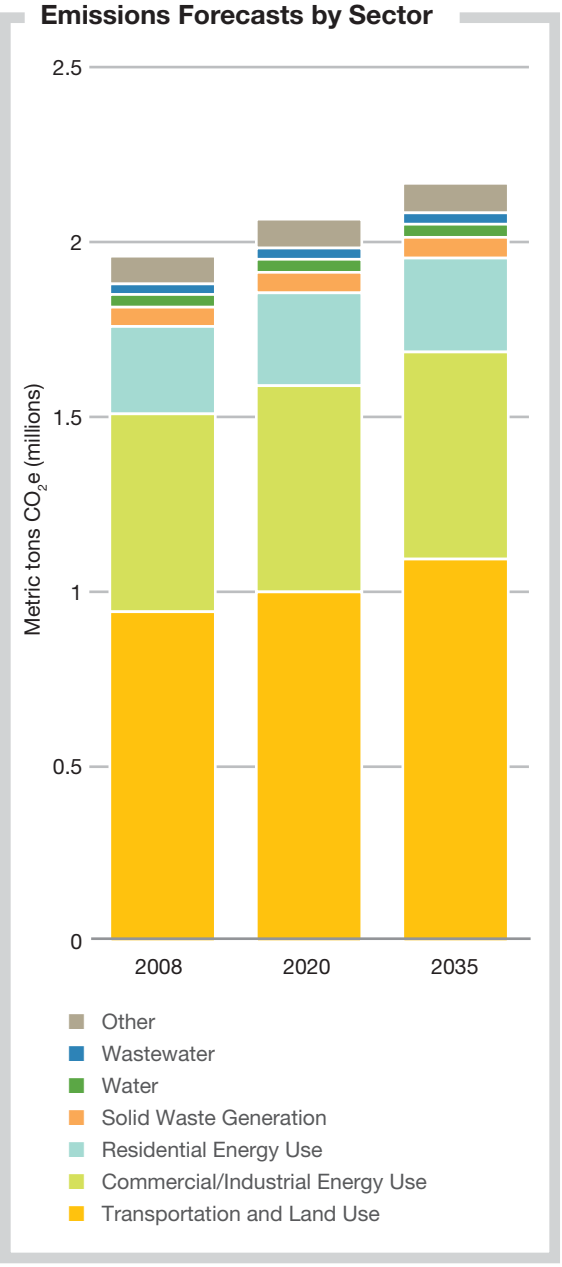
Emissions are often standardized based on population to produce a per-capita emissions estimate. Applying the City's 2008 population, baseline emissions were approximately 5.5 $MTCO_2e$ per person. This is significantly lower than the per-capita emissions level of nearby cities such as Laguna Beach in 1990 was 13.0, Mission Viejo in 2008 was 7.25, and Aliso Viejo in 2008 was 7.1 $MTCO_2e$ per person. The City of Los Angeles, in 2004 had emissions of 13.5 $MTCO_2e$ per person.[9]

Community-wide Emissions Forecast

Community-wide GHG emissions were projected for 2020 and 2035 under a business-as-usual (BAU) scenario. The community-wide BAU scenario estimates trends in transportation and land use, energy, solid waste, water, and wastewater based on SCAG forecasts of population, housing, and employment for the City, and assumes that historic trends in energy consumption and waste generation continue. Future vehicle miles traveled are estimated from a travel demand model, consistent with the Orange County subregional Sustainable Communities Strategy.[10]

Forecast emissions by sector are shown in Table 2.2 and Figure 2.3. Overall, community-wide emissions are estimated to increase by 5% by 2020 and 11% by 2035. The largest emissions increase would occur within the transportation and land use sector, which is estimated to increase 6% by 2020, and 16% by 2035.

Figure 2.3: 2008 Community-wide Emissions Forecasts by Sector



[9] City of Los Angeles 2007. *GREEN LA -An Action Plan to Lead the Nation In Fighting Global Warming.* Available at: http://www.ci.la.ca.us/ead/pdf/GreenLA_CAP_2007.pdf

[10] Southern California Council of Governments 2011. http://rtpscs.scag.ca.gov/Documents/2012/draft/SR/2012dRTP_SubregionalSustainableCommunitiesStrategies.pdf

Table 2.2: Community-wide Business-as-Usual Emissions Forecasts

Sector	2008 $MTCO_2e$	2020 $MTCO_2e$	2035 $MTCO_2e$	% Change from 2008 to 2020	% Annual Growth Rate from 2008 to 2020	% Change from 2008 to 2035	Annual Growth Rate 2008 to 2035
Transportation and Land Use	943,033	999,732	1,093,632	6%	0.29%	16%	0.28%
Commercial / Industrial Energy	565,681	589,476	591,972	4%	0.28%	5%	0.03%
Residential Energy	249,834	265,459	268,463	6%	0.41%	7%	0.08%
Solid Waste	55,193	58,645	59,309	6%	0.41%	7%	0.08%
Water	36,231	37,313	37,477	3%	0.33%	3%	0.03%
Wastewater	30,223	32,113	32,477	6%	0.41%	7%	0.08%
Other	79,236	82,526	84,420	4%	0.31%	7%	0.17%
TOTAL	1,959,431	2,065,263	2,167,750	5%		11%	

* Sectors may not add to the totals due to rounding.

Municipal Operations Baseline Emissions

Municipal operations during 2008 accounted for approximately 1.6% of total community-wide GHG emissions, totaling 32,410 $MTCO_2e$. The largest source of municipal emissions was energy consumption within the buildings and facilities sector, which accounted for 30% of all municipal emissions (Figure 2.4 and Table 2.3). This 2008 baseline includes street lights that are operated by SCE, but will be acquired by the City.

SCE provided electricity consumption data in kilowatt-hours per year for 2008. SCG provided natural gas consumption data in therms per year for 2008. The City provided total fuel consumption and vehicle miles traveled (VMT) data for the City vehicle fleet in 2009, which was used as a proxy year

Figure 2.4: 2008 Municipal Operations Greenhouse Gas Emissions

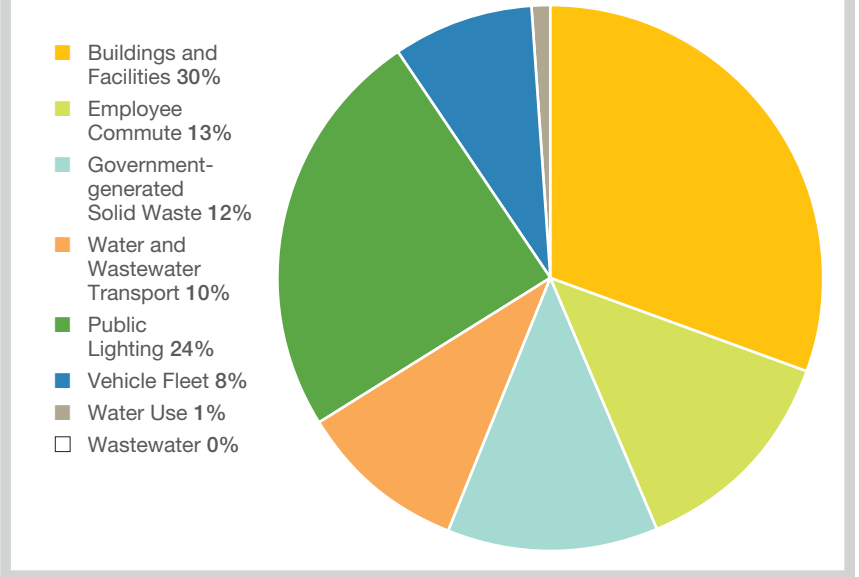


Table 2.3: 2008 Municipal Operations Greenhouse Gas Emissions

Sector	kWh	$MTCO_2e$	% of Total CO_2e*
Buildings and Facilities	30,096,817	9,830	30%
Public Lighting	15,942,280	7,777	24%
Employee Commute	—	4,280	13%
Government-Generated Solid Waste	—	4,012	12%
Water and Wastewater Transport	11,639,798	3,351	10%
Vehicle Fleet	—	2,730	8%
Water	—	274	1%
Wastewater	—	156	0%
Totals	**57,678,895**	**32,410**	**100%**

* Sectors may not add to the totals due to rounding.

for 2008. Orange County vehicle emissions factors from the Emission Factors (EMFAC) database were used and CO_2 emissions were converted to CO_2e by dividing by 0.95 (accounting for CH_4 and N_2O). Community- and municipal-generated solid waste data was provided by the City.

Municipal Operations Emissions Forecast

City staff has decreased significantly in recent years, and may decrease further in coming years. Because of this trend it was assumed that no growth would occur in municipal operations; therefore BAU municipal operations emissions in 2020 and 2035 are expected to be the same as in 2008.

Emissions Reduction Goals

Santa Ana has established a goal to reduce community-wide emissions 15% by 2020. This goal will be measured against the 2008 baseline emissions of 1.96 $MMTCO_2e$. The City's energy savings goal by 2020 is a reduction of 70 million kWh/year from 2008 baseline community usage. In addition, Santa Ana has established a goal to reduce community-wide emissions 30% by 2035. The energy savings goal by 2035 is 100 million kWh/year. To meet the City's 2020 goal of 15% below 2008 baseline emissions, Santa Ana would need a reduction of 400,000 $MTCO_2e$. To meet the City's 2035 goal of 30% below 2008 baseline emissions, Santa Ana will need a reduction of 800,000 $MTCO_2e$. For municipal operations emissions, the City has established goals of 30% reduction by 2020 and 40% reduction by 2035. A reduction of 9,700 $MTCO_2e$ is needed to reach the 30% municipal operations goal, and a reduction of 13,000 $MTCO_2e$ is needed to reach the 40% goal. The municipal operations energy saving goals are 15 million kWh/year by 2020 and 20 million kWh/year by 2035.

State Emissions Reduction

To effectively plan for meeting these goals, it is important to consider the impact that actions from the State of California will likely have on local emissions. Actions such as the Renewable Portfolio Standard (RPS) and vehicle fuel economy regulations will have far reaching impacts in reducing emissions. This reduction, combined with the reduction from measures already implemented by the City that are identified in Chapter 1, provides the starting point for the new actions that will be identified in Chapter 3.

Renewable Portfolio Standard

The Renewable Portfolio Standard (RPS)[11] will reduce the emissions generated from every kWh of electricity consumed. To calculate the impact of this action, future year emissions factors of the RPS were applied to projected BAU electricity consumption. The emissions reductions from the RPS for 2020 and 2035 are presented in Table 2.4.

Table 2.4: Santa Ana Emissions Reduction from the State RPS

Year	2020	2035
Reduced Emissions ($MTCO_2e$/Year)	182,020	182,762

Vehicle Fuel Efficiency

In addition to systematic changes in the electricity grid, large scale changes in the emissions impact of transportation are underway as a result of increasing fuel economy of passenger vehicles from the Pavley regulations.[12] The Pavley regulations are projected to have approximately the same impact on calendar-year fuel economies as national Corporate Average Fuel Economy standards. The emissions reductions from the Pavley regulations for 2020 and 2035 are presented in Table 2.5.

Table 2.5: Santa Ana Emissions Reduction from the Pavley Regulations

Year	2020	2035
Reduced Emissions ($MTCO_2e$/Year)	130,308	335,939

Combined Impact

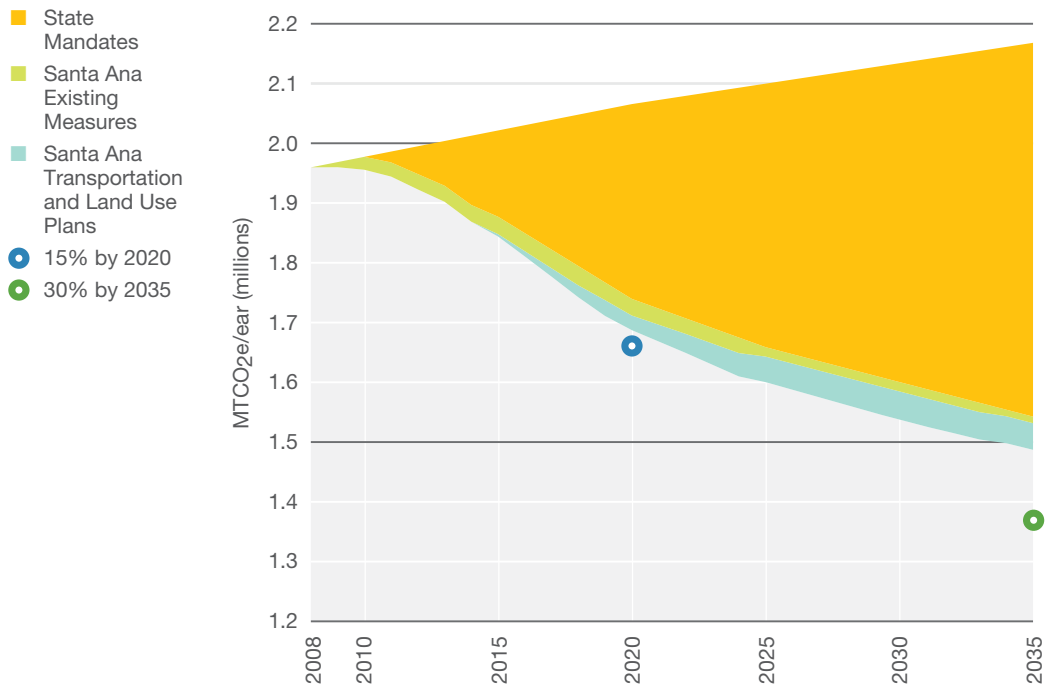
The combined impact of the RPS and vehicle efficiency standards will result in a substantial reduction in emissions in Santa Ana. The total reduction from these measures, in addition to the reduction from the existing measures and transportation plans discussed in Chapter 1, is presented in Figure 2.5. It is important to note that this part of the analysis assumes both the RPS and Pavley standards will be fully implemented as planned.

As displayed in Figure 2.5, state mandates will play a very important part in moving Santa Ana toward its emissions reduction goals. Two additional factors are important contributors to the emissions reduction seen in the adjusted forecast: the significant actions already undertaken by Santa Ana, and the fact that Santa Ana is mostly built out and has only modest projected increases in population and employment. Other communities, particularly those with higher projected population and employment growth rates, may not have such a favorable adjusted forecast. This adjusted forecast positions Santa Ana to make a substantial reduction below baseline by implementing the new measures described in Chapter 3 of the CAP.

[11] Southern California Council of Governments 2011. http://rtpscs.scag.ca.gov/Documents/2012/draft/SR/2012dRTP_SubregionalSustainableCommunitiesStrategies.pdf

[12] For more information on Pavley standards see http://www.arb.ca.gov/cc/ccms/ccms.htm

Figure 2.5: Adjusted Forecast



Looking Ahead

This CAP will evolve and respond as new opportunities for reducing GHG emissions in Santa Ana are discovered. Already there are transportation and land use projects in development that will boost future emissions reduction. The design phase has begun for the Orange County (OC) Streetcar, a clean electric transit mode for transit-dependent commuters within Santa Ana. It will provide last-mile connectivity from the Metrolink Transit Corridor to businesses, job centers, and activity nodes. The OC Streetcar will be the first fixed-rail transit system in Orange County. Another project in development is Non-Motorized Connectivity, a sidewalk and ramp inventory analysis and improvement plan that provides for safer, more comfortable pathways. Increasing pedestrian trips will reduce GHG emissions over time. Additionally, the Bike Master Plan is in development as part of the Circulation Element update. The Plan will identify opportunities for safe, connected, on- and off-street bike paths and trails. The expected increase in bike mobility will reduce GHG emissions.

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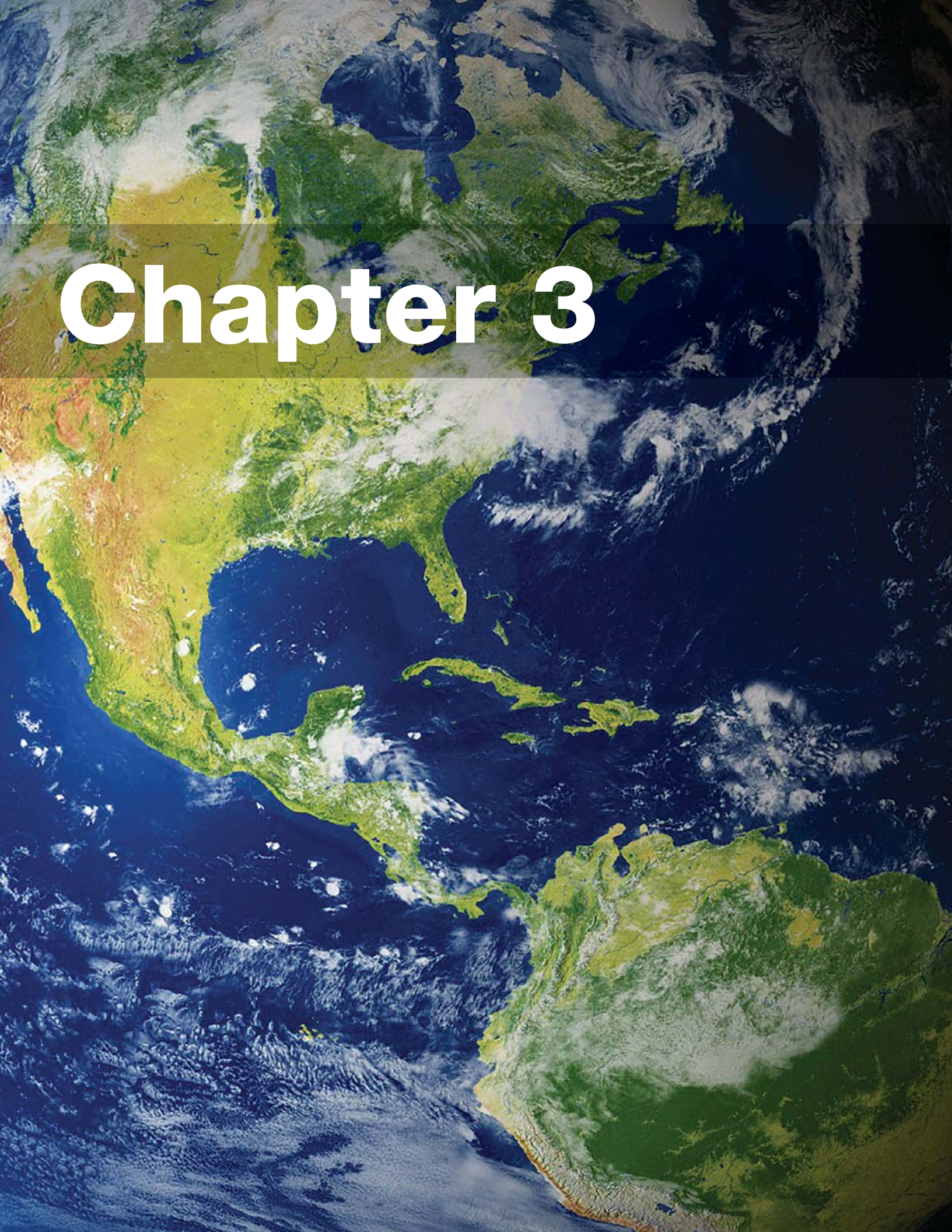


Chapter 3

Climate Action Plan Measures

Process and Overview

The measures in this Climate Action Plan were developed by ICLEI with input from Santa Ana City staff, from public engagement sessions, and through review of climate action plans of other cities in the region. An initial public engagement session was held in March 2012, where participants suggested emissions reduction measures they would like to see included in the CAP. The measures on this initial list were then analyzed for feasibility and vetted by City staff. Once a working list of measures was arrived at, the emissions reduction for each was calculated. A key requirement was that the measures collectively bring Santa Ana to the emissions reduction goal of 15% below year 2008 by 2020. The working list of measures was presented to key stakeholders and to the public in additional workshops in July 2014. Feedback from these sessions was incorporated, resulting in the measures included in the CAP.

The CAP measures reduce emissions in five sectors: Transportation and Land Use; Energy; and Solid Waste, Water, and Wastewater (combined). The overall reduction expected from the CAP measures in each sector is shown in Table 3.1.

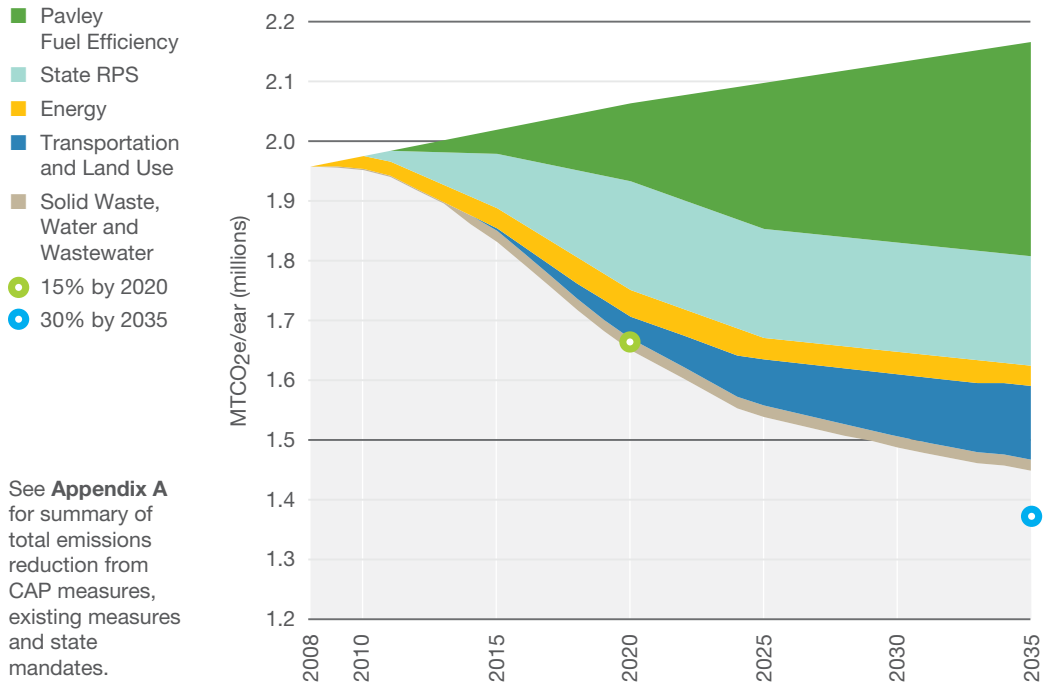
Table 3.1: Summary of CAP Measure Emissions Reduction by Sector

	Reduction (MTCO2e/Year)	
Sectors	**2020**	**2035**
Transportation and Land Use	9,150	73,873
Energy	36,423	47,909
Solid Waste, Water, and Wastewater	9,097	13,811
Total	**54,670**	**135,593**

Summary of Emissions Reduction

The measures in this CAP are projected to accomplish the goal of a 15% reduction in community-wide emissions by 2020, and to nearly reach the 30% reduction by 2035 goal, as shown in Figure 3.1. It is anticipated that new policy and technology options for reducing emissions may become available before 2035; the CAP will need to be updated and additional measures may need to be added to meet the 2035 goal. The CAP measures affecting municipal operations are projected to accomplish both the 30% reduction by 2020 goal and the 40% reduction by 2035 goal.

Figure 3.1: Emissions Reduction Goals and Reduction Achieved by CAP



See **Appendix A** for summary of total emissions reduction from CAP measures, existing measures and state mandates.

Measure Structure

Measures are defined as separate and distinct actions to reduce energy consumption, vehicle miles, water use or waste; or to substitute renewable energy for fossil fuels. Calculation of the energy savings and emissions reduction from each measure starts with a projection of the activity affected, such as the number of homes or square footage of commercial space made more efficient, or a percentage reduction in overall vehicle-miles for the community. This number is multiplied by the energy savings per home or other unit to determine the overall energy savings. Finally, energy savings are multiplied by an emissions factor per kWh, gallon of gasoline, or other energy unit.

Each measure is presented on a separate page, which includes a general description as well as a table providing a summary of the emissions reduction, costs, and co-benefits of the measure. Explanation of this table is provided below.

Description	Explanation/Available Options
Type of Measure	Voluntary, Incentivized, City Ordinance (applies to community measures only), State Mandate.
Emissions Reduction in 2020	Estimated emissions reduction
Emissions Reduction in 2035	Estimated emissions reduction
Co-benefits	Reduced energy cost (may be to City, businesses, or residents); improved air quality; improved health; reduced water use; reduced waste generation; improved public realm.
Cost to City Private Cost	None, Low, Low-Medium, Medium-High, High. Note: these refer to up-front, not net costs.
Potential Funding Sources	Where funds will come from to implement measure.
Ease of Implementation	This applies only to the City. How easy or difficult is it for the City to implement the measure: Easy, Medium, Difficult.

Climate Action Plan Measures

Transportation and Land Use Measures

Transportation accounted for 48% of community emissions in 2008. Collectively, the measures identified in this section are estimated to reduce those emissions by 9,150 $MTCO_2e$/year by 2020 and 73,873 $MTCO_2e$/year by 2035, as identified in Table 3.2. Detailed descriptions of each measure are provided on the following pages.

Table 3.2: Transportation and Land Use Measures Summary

Name	Reduction ($MTCO_2e$/Year) 2020	2035
Development of Local Retail Service Nodes	916	14,660
Local Residential Nodes near Retail and Employment	916	14,660
Traffic Signal Synchronization Program	2,504	5,864
Local Employment Nodes near Residential and Retail Areas	366	5,864
End of Trip Facilities in New Projects	366	5,864
Safe Routes to Schools	2,129	4,984
Design Guidelines for External Bike/Pedestrian/Transit Connectivity	311	4,984
Design Guidelines for Internal Bike/Pedestrian/Transit Connectivity	311	4,984
Adjust Parking Ratios	311	4,984
Community-wide Bike Sharing Stations	311	4,984
Municipal Operations Measure	709	2,041
Total	**9,150**	**73,873**

Development of Local Retail Service Nodes

About half of the 97 Transportation Analysis Zones in the City have no retail uses. Development that provides a mix of housing, commercial space, services, and job opportunities close to public transportation reduces dependency on cars and time spent in traffic, and more closely links residents to jobs and services. Providing local retail can reduce the need to drive. Employment areas that include retail services also experience higher levels of public transit usage, since workers are able to commute from their homes and access services to meet their midday shopping and eating needs within a comfortable walking distance.

For this measure, the City will develop an incentive program to encourage more local retail development. This incentive program will be referenced in an update of the Zoning Code. Incentives might include reductions in parking requirements and other related policy changes.

Implementing this strategy will require both staff time and the assistance of outside consultants.

Type of Measure
Incentivized

Emissions Reduction in 2020
916 $MTCO_2e$

Emissions Reduction in 2035
14,660 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health, improved public realm

Cost to City
Low to Medium

Private Cost
Medium to High

Potential Funding Sources
General Fund

Ease of Implementation
Medium

Transportation & Land Use

Local Residential Nodes near Retail and Employment

Type of Measure
Incentivized

Emissions Reduction in 2020
916 $MTCO_2e$

Emissions Reduction in 2035
14,660 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health, improved public realm

Cost to City
Low to Medium

Private Cost
Medium to High

Potential Funding Sources
General Fund

Ease of Implementation
Medium

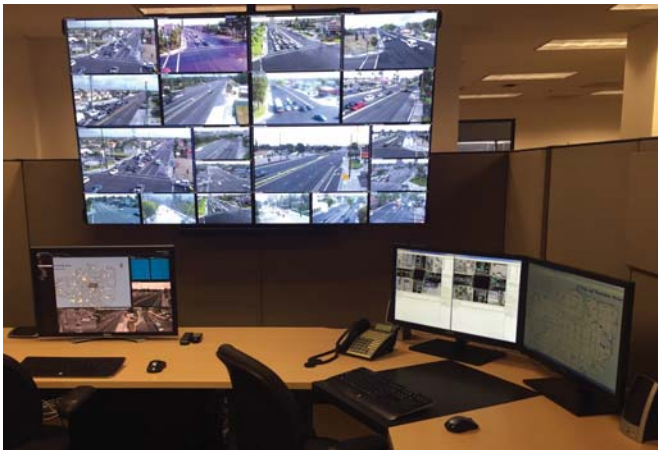
Many of the commercial and employment corridors throughout the City have limited or no residential development. This strategy envisions that the City would locate new residential development within these retail and employment corridors to create a more optimal mix of land uses. This mix of land uses could potentially divert some work, shopping, and eating trips from automobile use to bicycle and pedestrian travel. This higher level of mixed-use is also more conducive to the increased use of transit.

The City will develop an incentive program to encourage new residential projects to locate within these commercial and employment corridors. Potential incentives include amending zoning, density bonuses, reductions in parking requirements, and other similar efforts. These incentives will be referenced in an update of the Zoning Code and other related documents.

Implementing this strategy will require both staff time and the assistance of outside consultants.

Traffic Signal Synchronization Program

Corridors with synchronized and coordinated traffic signals tend to have shorter travel times, less delay, and reduced congestion. These factors combine reduced fuel usage and emissions. Historical studies have indicated that signal timing improvements can reduce GHG emissions in a corridor by as much as 10%. The Orange County Transportation Authority (OCTA) has an on-going program to implement traffic signal coordination and synchronization along major corridors throughout Orange County.



For this measure, the City will identify five additional corridors beyond those implemented by OCTA, where traffic signal synchronization will be implemented. The City will be responsible for the planning, design, and construction of these improvements to complement what OCTA is already committed to providing.

This strategy will require capital investment by the City. Traffic signal synchronization within a major corridor can cost upwards of $500,000 for planning, engineering, and construction, based on similar budgets for these projects throughout Orange County. The City will deploy this strategy on lower-volume roadways beyond the regional corridors already identified by OCTA, which is estimated to lower the cost to approximately $200,000 per corridor, or $1,000,000 for the measure as a whole. It is possible that some of this funding could be obtained through grants and other agencies, but it is likely that the implementation of this strategy would require some level of investment.

Type of Measure
Voluntary

Emissions Reduction in 2020
2,504 $MTCO_2e$

Emissions Reduction in 2035
5,864 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health

Cost to City
Medium to High

Private Cost
None

Potential Funding Sources
Grants, Measure M funding, General Fund

Ease of Implementation
Medium

Transportation & Land Use

Local Employment Nodes near Residential and Retail Areas

Type of Measure
Incentivized

Emissions Reduction in 2020
366 $MTCO_2e$

Emissions Reduction in 2035
5,864 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health, improved public realm

Cost to City
Low to Medium

Private Cost
Medium to High

Potential Funding Sources
General Fund

Ease of Implementation
Medium

The relationship between land use form and travel behavior is a key element of planning initiatives aimed at reducing car travel. Areas with higher levels of mixed-use development including employment, retail, and housing produce lower VMT than areas where one of these uses predominates. There are several areas of the City that are predominantly residential, with little or no employment.

The City will create an incentive program to encourage additional employment within or adjacent to residential areas. It is anticipated that this employment will occur through the development of small businesses within these residential areas, such as live/work units, small professional service offices, and other similar types of uses. Potential incentives could include parking variances, reductions in building and permit fees, amending zoning districts to allow neighborhood commercial, and other related items.

End-of-trip Facilities in New Projects

End-of-trip facilities can include bike lockers, showers, and changing rooms. These facilities often are used by cyclists, and encourage cycling use, particularly for work.

The City will amend its Municipal Code to require the placement of end-of-trip facilities in new office and larger retail buildings meeting certain criteria (for example, those larger than 25,000 square feet). The City will perform additional analysis to determine the appropriate criteria.

Type of Measure
Ordinance

Emissions Reduction in 2020
366 $MTCO_2e$

Emissions Reduction in 2035
5,864 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health

Cost to City
Medium to High

Private Cost
Medium

Potential Funding Sources
General Fund

Ease of Implementation
Medium

Transportation & Land Use

Safe Routes to School

Type of Measure
Voluntary

Emissions Reduction in 2020
2,129 $MTCO_2e$

Emissions Reduction in 2035
4,984 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health, improved public realm

Cost to City
Low

Private Cost
None

Potential Funding Sources
Federal and State grants

Ease of Implementation
Easy

Safe Routes to School is a program funded by the Federal and State governments to increase the safety for children walking and bicycling to school, and to encourage these modes instead of driving. Safe Routes to School activities can include improvements to physical infrastructure such as sidewalks and bike paths, educational programming, and planning needed to implement these strategies. Safe Routes to School can increase physical activity of children, producing health benefits, and walking or bicycling helps children arrive at school with minds alert and ready to learn. In addition, a study conducted by Marin County, CA found that the implementation of a Safe Routes to School program reduced single automobile usage at schools by 13%.[13]

The City of Santa Ana has implemented Safe Routes to School previously; this strategy involves the preparation of additional Safe Routes to School grants for schools within the City. These grant applications will be submitted to the existing State and Federal Safe Routes to School programs, to obtain funding for planning, design, and construction of improvements as specified within the grant applications.

[13] Safe Routes to School Program Evaluation, August 2004

Design Guidelines for External Bike/Pedestrian/Transit Connectivity

One factor which limits use of bicycles, pedestrian routes, and transit facilities is the lack of access and connectivity with development projects. For example, it is not uncommon for multifamily developments to have security fencing which prevents residents from accessing nearby sidewalks and bus stops. This strategy entails the development of access guidelines for new development that specify the level of connectivity from these sites to the external non-automotive network.

The City will create guidelines that specify a minimum level of connectivity between various projects and the external transportation network for travel modes other than automobiles. For example, the guidelines might specify minimum spacing for gates or access points along fences for multifamily uses or specify that access has to be provided to any adjacent transit stop. These guidelines will be implemented in the Zoning Code or Citywide Design Guidelines and other applicable documents.

Type of Measure
Ordinance

Emissions Reduction in 2020
311 $MTCO_2e$

Emissions Reduction in 2035
4,984 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health, improved public realm

Cost to City
Low to Medium

Private Cost
Low

Potential Funding Sources
General Fund

Ease of Implementation
Medium

Transportation & Land Use

Design Guidelines for Internal Bike/Pedestrian/Transit Connectivity

Type of Measure
Ordinance

Emissions Reduction in 2020
311 $MTCO_2e$

Emissions Reduction in 2035
4,984 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health, improved public realm

Cost to City
Low to Medium

Private Cost
Low

Potential Funding Sources
General Fund

Ease of Implementation
Medium

In addition to external connectivity issues, internal bicycle and pedestrian connections within a development site are also an important factor in facilitating non-automotive travel. The level of connectivity relates to the ability to travel within the development to other locations without having to use vehicles or an external roadway network. Internal connectivity is often hindered through the use of fencing to segregate uses within a mixed-use site, lack of sidewalks and bicycle connections, and other related items.

The City will create guidelines that address internal site connectivity within new development sites. Issues that will be addressed include fencing or other physical barriers, sidewalks, landscaping, and other related items. These guidelines will be referenced in the Zoning Code or Citywide Design Guidelines and other applicable documents.

Adjust Parking Ratios

Large amounts of parking indicate a priority for automobile travel over other modes. In addition, drivers who are unable to find readily available parking are more inclined to consider other travel modes instead of driving. This strategy will reduce the minimum amount of parking required in new multifamily residential developments by reducing the City's existing parking ratios.

This strategy will be implemented by changing parking requirements for new projects in the City's Zoning Code.

Type of Measure
Ordinance

Emissions Reduction in 2020
311 $MTCO_2e$

Emissions Reduction in 2035
4,984 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health, improved public realm

Cost to City
Low to Medium

Private Cost
None

Potential Funding Sources
General Fund

Ease of Implementation
Medium

Transportation & Land Use

Community-wide Bike Sharing Stations

Type of Measure
Voluntary

Emissions Reduction in 2020
311 $MTCO_2e$

Emissions Reduction in 2035
4,984 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health, improved public realm

Cost to City
Medium to High

Private Cost
Low

Potential Funding Sources
Private implementation partner, General Fund

Ease of Implementation
Medium

Bike sharing stations make bicycles easily available at a low-cost hourly rate. This strategy entails the development of bike sharing stations at several locations throughout the City including the Santa Ana Regional Transportation Center, major bus stop locations, City Hall, and other locations. These easily accessible bicycles can extend the trips possible through transit, or directly substitute for automobile trips on their own.

Bike sharing will require up-front costs to construct the stations and purchase the bicycles, funding for ongoing operating costs, and staff time to oversee and implement the program. Some portion of the costs could be borne by a private vendor who would be responsible for the operation of the facilities, with both rental fees and potential advertising revenue offsetting costs. Based on a review of implementations in Washington, DC and Minneapolis, the initial construction cost for six stations will be approximately $360,000. The City will also be required to allocate some staff time on an ongoing basis to oversee the bike sharing system.

Alternative Fuel Vehicle Fleet

The City is in the process of replacing fleet vehicles with hybrid, CNG, electric, and propane fueled vehicles as replacement is needed. These replacements have been supported by grant funds from the Mobile Source Air Pollution Reduction Review Committee. For this measure, replacement of fleet vehicles will continue with all vehicles expected to be hybrid, CNG, electric, or propane fueled by 2035.

Type of Measure
Mandate

Emissions Reduction in 2020
709 $MTCO_2e$

Emissions Reduction in 2035
2,041 $MTCO_2e$

Co-Benefits
Reduced energy cost to City, improved air quality, improved health

Cost to City
Medium to High

Private Cost
None

Potential Funding Sources
General Fund, Grants

Ease of Implementation
Medium

Climate Action Plan Measures

Community-wide Energy Measures

Commercial, industrial, and residential energy use is responsible for 42% of community-wide emissions in Santa Ana. Collectively, the measures identified in this section are estimated to reduce those emissions by 36,423 $MTCO_2e$/year by 2020 and 47,909 $MTCO_2e$/year by 2035, as identified in Table 3.3. Detailed descriptions of each measure are provided on the following pages.

Table 3.3: Energy Measures Summary

Name	Reduction (kWh/Year) 2020	2035	Reduction ($MTCO_2e$/Year) 2020	2035
Property Assessed Clean Energy (PACE) Financing—Commercial*	15,625,000	31,250,000	3,791	8,458
SCE Small and Medium Business Direct Install ***	21,143,400	21,143,400	7,793	7,793
Property Assessed Clean Energy (PACE) Financing—Residential *	6,393,600	22,834,300	1,633	5,833
Solar Photovoltaic Systems – New Private Installs***	1,678,000	1,678,000	4,881	4,881
SCE and SCG Residential Programs*	5,643,400	5,643,400	3,965	3,965
Weatherization*	891,860	891,860	3,720	3,720
SCG Commercial Programs**	-	-	3,280	3,280
Streetlight Purchase and Retrofit***	809,310	12,948,950	160	2,556
Benchmarking and Retrocommissioning*	2,715,000	3,802,500	1,533	2,147
Title 24 Energy Efficiency Standards–Commercial*	698,500	1,496,800	490	1,050
Title 24 Energy Efficiency Standards–Residential*	2,175,500	4,661,900	329	705
Solar Hot Water Heating Systems for Laundromats**	-	-	267	267
Green Business Challenge Program*	156,000	156,000	78	78
Municipal Operations Measures*	15,259,200	9,240,900	4,503	3,176
Total	**73,188,770**	**115,748,010**	**36,423**	**47,909**

*Note that emissions reduction from these measures include natural gas and electricity savings.

**Emissions reduction from these measures is due entirely to natural gas savings.

***Emissions reduction from these measures is due entirely to electricity savings.

Property Assessed Clean Energy (PACE) Financing for Commercial Properties

PACE is an energy efficiency financing program operated by private contractors in many communities in California. PACE financing is available for a wide range of energy and water saving measures, and for renewable energy generation. Repayment of loans through the program is made on the property tax bill for the property. Communities must opt into the program, the Santa Ana program began January 2015. PACE makes it easier for owners of commercial property to implement energy efficiency and renewable energy projects that can save them money, make their properties more valuable, and create local jobs. The program is offered by private entities. Many cities and counties in California have already opted into the program.

The program's most common customers are medium-sized businesses or buildings with a typical project cost around $175,000. Savings were estimated based on recent California program data. The financing can be used for a variety of energy efficiency projects including air conditioning and heating systems, lighting upgrades, cool roofing materials, and can also be used for solar installations.

The program will be promoted through the City's comprehensive CAP Outreach and Education program, as described in Chapter 4.

Type of Measure
Incentivized

Emissions Reduction in 2020
3,791 $MTCO_2e$

Emissions Reduction in 2035
8,458 $MTCO_2e$

Co-Benefits
Reduced energy cost to businesses, improved air quality, improved health

Cost to City
Low

Private Cost
Low to Medium

Potential Funding Sources
Private Financing

Ease of Implementation
Easy

Community-wide Energy Measures

Southern California Edison Small and Medium Business Direct Install

Type of Measure
Incentivized

Emissions Reduction in 2020
7,793 $MTCO_2e$

Emissions Reduction in 2035
7,793 $MTCO_2e$

Co-Benefits
Reduced energy cost to businesses, improved air quality, improved health

Cost to City
Low

Private Cost
None

Potential Funding Sources
SCE

Ease of Implementation
Easy

The California Public Utilities Commission authorizes certain energy efficiency programs thru SCE. SCE sends trained energy efficiency contractors to help small businesses, up to 199 kW, identify ways to save electricity. SCE provides free upgrades to customers that may include energy efficient lighting, signage, sensors, refrigeration, sun-block window film, and programmable thermostats. These are provided through the Small and Medium Direct Install program at no cost to the City or to the customer. The current program provides up to $10,000 for business from 0-99 kW and $15,000 for business from 100-199 kW.

These and other utility incentive programs will be promoted through the City's comprehensive CAP Outreach and Education program, as described in Chapter 4.

Property Assessed Clean Energy Financing for Residential Properties

PACE is an energy efficiency financing program operated by private contractors in many communities in California. PACE financing is available for a wide range of energy and water saving measures, and for renewable energy generation. Repayment of loans through the program is made on the property tax bill for the home. Communities must opt into the program, which began in September 2013. The program is estimated to reach 2,905 homes by 2020 and 10,375 homes by 2035. Savings were estimated based on recent Santa Ana program data. Projects included air conditioning and furnace upgrades, air duct sealing, insulation, and small solar installations.

Across the communities statewide that are participating in residential PACE programs, the upgrades financed have produced an emissions reduction of 14,056 $MTCO_2e$, saved residents over $6 million in energy costs, and created 1,600 jobs.

The PACE program will be promoted through the City's comprehensive CAP Outreach and Education program, as described in Chapter 4.

Type of Measure
Incentivized

Emissions Reduction in 2020
1,633 $MTCO_2e$

Emissions Reduction in 2035
5,833 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health

Cost to City
Low

Private Cost
Low to Medium

Potential Funding Sources
Private Financing

Ease of Implementation
Easy

Community-wide Energy Measures

Solar Photovoltaic Systems—New Private Installs

Type of Measure
Incentivized

Emissions Reduction in 2020
4,881 $MTCO_2e$

Emissions Reduction in 2035
4,881 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents and businesses, improved air quality, improved health

Cost to City
Low

Private Cost
Medium

Potential Funding Sources
State

Ease of Implementation
Easy

This measure accounts for the impact of new private installations of solar Photovoltaic (PV) systems in Santa Ana. Rebates or incentive payments for installation of solar PV are available as part of the California Solar Incentive program, which is administered by the California Energy Commission. For a limited time, the City is offering solar incentives which may include permit fee waiver, free plan check services, and free building inspection for solar PV systems.

Solar PV systems can lower energy costs for residents and businesses. In addition, having more PV systems connected to the grid leads to increased electric system reliability during peak demand periods and increased electric price stability. This measure also supports employment with opportunities for solar installers.

These and other utility incentive programs will be promoted through the City's comprehensive CAP Outreach and Education program, as described in Chapter 4.

Southern California Edison and Southern California Gas Company Residential Programs

For residential customers, SCE's efficiency programs include rebates for air conditioner replacement, energy efficient appliances, pool pumps and motors, among others. SCG also offers rebates for energy efficiency upgrades, including furnaces, insulation, and water heaters. These upgrades reduce energy costs for residents, and will increase home comfort.

These and other utility incentive programs will be promoted through the City's comprehensive CAP Outreach and Education program, described in Chapter 4.

Type of Measure
Incentivized

Emissions Reduction in 2020
3,965 $MTCO_2e$

Emissions Reduction in 2035
3,965 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health

Cost to City
Low

Private Cost
Low

Potential Funding Sources
SCE and SCG

Ease of Implementation
Easy

Community-wide Energy Measures

Weatherization

Type of Measure
Incentivized

Emissions Reduction in 2020
3,720 $MTCO_2e$

Emissions Reduction in 2035
3,720 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, reduced water use, improved air quality, improved health

Cost to City
Low

Private Cost
None

Potential Funding Sources
Federal (Community Action Partnership)

Ease of Implementation
Easy

The Weatherization program delivered through the Community Action Partnership and funded through federal grants and local utilities reached 3,291 low-income households in Santa Ana, with weatherization assistance since 2008. Actions taken in homes can include a number of energy savings measures, such as air duct sealing, insulation, window glazing, and tune-up or replacement of air conditioning and heating equipment. The combined electricity and natural gas savings already achieved through this program since 2008 is estimated to result in an emissions reduction of 1,553 $MTCO_2e$/year.

This measure represents the impact of the City increasing promotion of the program so that it reaches 25% more households annually than the program currently does. Over time the additional impact would mean substantial energy cost savings for low-income residents of Santa Ana, and increased home comfort.

The Weatherization program will be promoted through the City's comprehensive CAP Outreach and Education program, described in Chapter 4.

Southern California Gas Company Commercial Programs

For commercial customers, SCG offers rebates for replacement of inefficient equipment, including water heaters, boilers, and food service equipment. These can be major energy users for certain businesses and offer significant savings opportunities.

These and other utility incentive programs will be promoted through the City comprehensive CAP Outreach and Education program, described in Chapter 4.

Type of Measure
Incentivized

Emissions Reduction in 2020
3,280 $MTCO_2e$

Emissions Reduction in 2035
3,280 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health

Cost to City
Low

Private Cost
Low

Potential Funding Sources
SCG

Ease of Implementation
Easy

Community-wide Energy Measures

Streetlight Purchase and Retrofit

Type of Measure
Voluntary

Emissions Reduction in 2020
160 $MTCO_2e$

Emissions Reduction in 2035
2,556 $MTCO_2e$

Co-Benefits
Reduced energy cost to City, improved air quality, improved health

Cost to City
High upfront cost but long-term savings

Private Cost
None

Potential Funding Sources
City funds (bond issue)

Ease of Implementation
Medium

SCE owns and operates over 11,000 streetlights in the City. This measure provides for the City to purchase these streetlights and convert them from high pressure sodium lamps to light emitting diode (LED). The LED lamps significantly reduce energy use and also last longer than the high pressure sodium lamps, reducing maintenance costs. These lamps also give improved light quality, which increases public safety.

The City pays SCE on an ongoing basis for the service of providing, maintaining, and powering these lights. After the purchase, and accounting for the energy and maintenance savings of the LEDs, the City will realize significant annual energy cost savings.

Benchmarking and Retrocommissioning

Benchmarking is tracking the energy performance of commercial buildings on an ongoing basis, and identifies those buildings where performance is less than ideal. The Energy Star Portfolio Manager (Portfolio Manager)[14] is a free tool for benchmarking, and gives an energy performance score between 1 and 100. A score of 75, for example, means that the building performs better than 75% of similar buildings. Retrocommissioning is testing and tuning building systems to ensure they are operating as designed.

For this measure, the City would pass an ordinance requiring that all non-residential buildings larger than 10,000 square feet report their Portfolio Manager results every seven years, and that buildings with a score of less than 75 must complete retrocommissioning. The building owner would be required to submit a Portfolio Manager report and, if needed, a retrocommissioning report to the City every seven years as part of business license renewal. Similar ordinances have been passed by New York City and Washington DC[15] and ordinances are under development by the cities of Los Angeles and Santa Monica.

Retrocommissioning costs range from $0.13 to $2.00/square foot, but the energy savings pay back these costs in a few months to two years. Many of the building owners may be eligible for incentives through SCE.

Type of Measure
City Ordinance

Emissions Reduction in 2020
1,533 $MTCO_2e$

Emissions Reduction in 2035
2,147 $MTCO_2e$

Co-Benefits
Reduced energy cost to businesses, improved air quality, improved health

Cost to City
Low to Medium

Private Cost
Medium

Potential Funding Sources
PACE

Ease of Implementation
Difficult

[14] www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager

[15] www.nyc.gov/html/gbee/html/plan/plan.shtml; http://ddoe.dc.gov/energybenchmarking

Community-wide Energy Measures

Title 24 Energy Efficiency Standards—Commercial

Type of Measure
State Mandate

Emissions Reduction in 2020
490 $MTCO_2e$

Emissions Reduction in 2035
1050 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health

Cost to City
None

Private Cost
Low to Medium

Potential Funding Sources
N/A

Ease of Implementation
Easy

Title 24 is the energy code that establishes the minimum energy efficiency for new construction in California. The code is set by the State and enforced locally by the City of Santa Ana through the building permit review and inspection process. Amended standards went into effect January 1, 2014. This measure reflects the expected savings from those amended standards in projected new commercial construction in the City.

Title 24 Energy Efficiency Standards—Residential

Title 24 is the energy code that establishes the minimum energy efficiency for new construction in California. The code is set by the State and enforced locally by the City of Santa Ana through the building permit review and inspection process. Amended standards went into effect January 1, 2014. This measure reflects the expected savings from those amended standards in projected new residential construction in the City.

Type of Measure
State Mandate

Emissions Reduction in 2020
329 $MTCO_2e$

Emissions Reduction in 2035
705 $MTCO_2e$

Co-Benefits
Reduced energy cost to residents, improved air quality, improved health

Cost to City
None

Private Cost
Low to Medium

Potential Funding Sources
N/A

Ease of Implementation
Easy

Community-wide Energy Measures

Solar Hot Water Heating Systems for Laundromats

Type of Measure
Incentivized

Emissions Reduction in 2020
267 $MTCO_2e$

Emissions Reduction in 2035
267 $MTCO_2e$

Co-Benefits
Reduced energy cost to businesses, improved air quality, improved health

Cost to City
Low

Private Cost
Low to Medium

Potential Funding Sources
SCG

Ease of Implementation
Easy

Laundromats are major users of hot water, and are good candidates for using solar thermal energy to heat that water. There are approximately 35 coin-operated laundromats in Santa Ana. SCG currently offers a rebate for commercial installation of solar hot water heating systems. For this measure, the City will directly contact laundromat owners and encourage them to take advantage of this rebate. Installing solar hot water heating systems will benefit laundromat owners through decreased energy costs.

As an example, Woody's Laundromat in Oakland, CA installed a solar water heating system in 2012.[16] After the California Solar Initiative rebate and federal tax incentives, the system will pay for itself in only four years, and solar hot water on this single business is reducing emissions by 13 $MTCO_2e$/year.

[16] www.freehotwater.com/case-study-california-laundromat-washes-away-high-hot-water-bills-with-solar-water-heating/

Green Business Challenge Program

A Green Business Challenge (Challenge) establishes friendly competition between businesses to improve performance in energy efficiency, water conservation, waste reduction, and other areas. Businesses receive recognition for participating, and the City recognizes those that achieve the largest GHG emissions reduction. The City of Santa Ana will partner with the Chamber of Commerce to launch the Challenge.

In addition to the direct emissions reduction from this measure, the Challenge will be an important channel for promoting SCE and SCG incentive programs and other CAP measures targeted towards businesses. The program benefits participating businesses through reduced costs for energy, water, and waste disposal.

The Port of San Diego and the City of Chula Vista operate similar programs.[17] There is also opportunity to align with and leverage the California Green Business Program developed by the State.[18] A guidebook for starting a Green Business Challenge and sample materials from existing programs are available through ICLEI.[19]

This program can also generate useful information for the City that can be used to identify additional opportunities to reduce energy use among businesses. The Challenge can also be a good complement to commercial benchmarking as a way to engage smaller building owners in energy efficiency.

Type of Measure
Voluntary

Emissions Reduction in 2020
78 $MTCO_2e$

Emissions Reduction in 2035
78 $MTCO_2e$

Co-Benefits
Reduced energy cost to businesses, improved air quality, improved health, reduced water use, reduced waste generation

Cost to City
Low to Medium

Private Cost
Low to Medium

Potential Funding Sources
City Funds, SCE and SCG, Sponsorships

Ease of Implementation
Medium

[17] http://greenportnetwork.org/; www.chulavistaca.gov/Clean/challenge/Default.asp

[18] www.greenbusinessca.org

[19] www.icleiusa.org

Climate Action Plan Measures

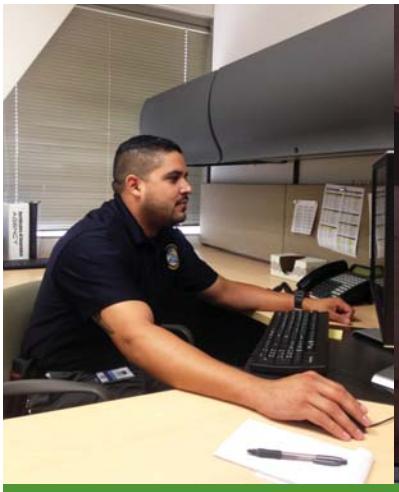
Municipal Operations Energy Measures

The City of Santa Ana municipal operations energy use produced emissions of 17,607 $MTCO_2e$ in 2008. The City is able to manage these emissions more directly than the community emissions. The actions to reduce municipal operations emissions described below serve as an example of City leadership for businesses and residents in the community. These measures also reduce energy costs for the City. Some of these projects have already been implemented and have resulted in energy savings for the City. The CAP municipal operations energy measures are summarized in Table 3.4 and more detailed descriptions are provided on the following pages.

Table 3.4: Municipal Operations Energy Measures Summary

Name	Reduction (kWh/Year) 2020	2035	Reduction ($MTCO_2e$/Year) 2020	2035
Building Energy Efficiency Retrofits*	6,018,300	1,462,500	2,006	1,300
Street Lighting LED Retrofits	6,537,720	6,537,720	1,403	1,403
Retrocommissioning*	1,462,500	0	621	0
Water Pump Retrofits	825,000	825,000	245	245
Solar Photovoltaic Systems	268,480	268,480	185	185
Vending Machine Retrofits	147,200	147,200	43	43
Total	**15,259,200**	**9,240,900**	**4,503**	**3,176**

*Note that emissions reduction for these measures include natural gas savings in addition to electricity.



Building Energy Efficiency Retrofits

The City will continue to make energy efficient improvements at municipal facilities. Building efficiency includes retrofitting major building systems such as HVAC systems, lighting, controls, and potentially the building envelope (e.g., windows and insulation). Financing for certain components of this measure may be available through SCE and SCG on-bill financing programs. Increased incentives as a result of the City Energy Leader Partnership reduce project costs.

Type of Measure
Incentivized

Emissions Reduction in 2020
2,006 $MTCO_2e$

Emissions Reduction in 2035
1,300 $MTCO_2e$

Co-Benefits
Reduced energy cost to City, improved air quality, improved health

Cost to City
High

Potential Funding Sources
SCE and SCG on-bill financing programs, and general fund.

Ease of Implementation
Medium

Municipal Operations Energy Measures

Street Lighting LED Retrofits

Type of Measure
Voluntary

Emissions Reduction in 2020
1,403 $MTCO_2e$

Emissions Reduction in 2035
1,403 $MTCO_2e$

Co-Benefits
Reduced energy cost to City, improved air quality, improved health

Cost to City
High

Potential Funding Sources
SCE On-bill financing

Ease of Implementation
Medium

Public lighting currently represents 24% of municipal operations GHG emissions. Replacing existing fixtures with LED lighting will substantially reduce energy usage and associated emissions. Note that this measure accounts for the impact of completing retrofits of all street lights currently owned by the City. The additional reduction achievable by purchasing and retrofitting lights currently owned by SCE is accounted for separately under the community measure for Streetlight Purchase and Retrofit.

Retrocommissioning

Energy use in buildings and facilities is responsible for 30% of municipal operations emissions. Retrocommissioning is a process that seeks to improve how building equipment and systems function together. Retrocommissioning can often resolve problems that occurred during design or construction, or address problems that have developed throughout the building's life. In all, retrocommissioning improves a building's operations and maintenance procedures to enhance overall building performance. Building optimization can be a relatively low-cost way of reducing energy consumption. Retrocommissioning of City buildings and facilities would reduce emissions by 621 $MTCO_2e$/year by 2020. Retrocommissioning should be institutionalized as an ongoing activity to ensure that savings continue over the long term.

Type of Measure
Voluntary

Emissions Reduction in 2020
621 $MTCO_2e$

Emissions Reduction in 2035
0 $MTCO_2e$

Co-Benefits
Reduced energy cost to City, improved air quality, improved health

Cost to City
Medium

Potential Funding Sources
General Fund

Ease of Implementation
Medium

[20] The analysis assumes an annual energy savings of 1.3 kWh/sq. ft. from CEC. 2005. Options for Energy Efficiency in Existing Buildings. CEC-400-2005-039-CMF.

Municipal Operations Energy Measures

Water Pump Retrofits

Type of Measure
Voluntary

Emissions Reduction in 2020
245 $MTCO_2e$

Emissions Reduction in 2035
245 $MTCO_2e$

Co-Benefits
Reduced energy cost to businesses, improved air quality, improved health

Cost to City
Medium

Potential Funding Sources
City funds

Ease of Implementation
Easy

This measure would continue efficiency retrofits of motors at City water wells, completing conversion of all remaining pumping stations to variable frequency drives. The Santa Ana groundwater wells are known for producing some of the best tasting water in the country, and do so with less environmental impact.

Solar Photovoltaic Systems

Solar PV systems are another way for the City to reduce energy costs and emissions, and to set an example to encourage installation of renewable energy by businesses and residents in the community. This measure assumes the installation of a 160 kW PV system, which could be installed on one City facility, or could represent the total capacity of several systems on different City facilities. If installed as one system, a typical system of this capacity would cover an area approximately 100 feet by 200 feet. Additional study and design will be needed to determine the appropriate size and placement of the system or systems on City facilities.

Type of Measure
Voluntary

Emissions Reduction in 2020
185 $MTCO_2e$

Emissions Reduction in 2035
185 $MTCO_2e$

Co-Benefits
Reduced energy cost to City, improved air quality, improved health

Cost to City
Medium

Potential Funding Sources
California Solar Initiative, General Fund

Ease of Implementation
Medium

Municipal Operations Energy Measures

Vending Machine Retrofits

Type of Measure
Incentivized

Emissions Reduction in 2020
43 $MTCO_2e$

Emissions Reduction in 2035
43 $MTCO_2e$

Co-Benefits
Reduced energy cost to City, improved air quality, improved health

Cost to City
Low

Potential Funding Sources
SCE, General Fund

Ease of Implementation
Easy

The emissions reduction that can be achieved through vending machine retrofits are modest, but this measure is highly cost-effective. Adding a unit that uses a controller and sensor to monitor room occupancy and temperature can power down the vending machine when the surrounding area is vacant. Vending Miser is one company that makes such a control unit.[21] The unit cost is minimal with an estimated payback period of only seven months. SCE also offers incentives for retrofits. The analysis for this measure assumes retrofit of 66 vending machines, which is equal to two per City facility. Implementation of this measure will need to be negotiated with the company operating the vending machines.

[21] www.vendingmiser.com

Climate Action Plan Measures

Solid Waste, Water, and Wastewater Measures

Solid waste, water use, and wastewater together accounted for 6% of community-wide emissions in 2008. Collectively, the measures identified in this section are estimated to reduce those emissions by 9,097 $MTCO_2e$/year by 2020 and 13,811 $MTCO_2e$/year by 2035, as identified in Table 3.5. Detailed descriptions of each measure are provided on the following pages.

Table 3.5: Solid Waste, Water, and Wastewater Measures Summary

Name	Reduction ($MTCO_2e$/Year) 2020	2035
AB 341 Commercial and Multifamily Recycling	8,460	12,663
Food Waste Digestion	605	1,109
Rainwater Harvesting	29	29
Turf Removal	2.5	10
Total	**9,097**	**13,811**

Solid Waste, Water, and Wastewater Measures

AB 341 Commercial and Multifamily Recycling

Type of Measure
Mandate

Emissions Reduction in 2020
8,460 $MTCO_2e$

Emissions Reduction in 2035
12,663 $MTCO_2e$

Co-Benefits
Reduced waste generation

Cost to City
Low to Medium

Private Cost
Low

Potential Funding Sources
General Fund

Ease of Implementation
Medium

AB 341 was adopted as law by the State of California in 2011, and requires recycling by businesses that generate four cubic yards or more of commercial solid waste per week and multifamily residential dwellings of five units or more, starting July 1, 2012. The increased diversion of waste from landfills resulting from this requirement will reduce landfill methane emissions. Recycling programs can also reduce waste disposal costs for businesses and multifamily building owners.

Santa Ana recycles
You make the difference!

Food Waste Digestion

Food waste can be broken down in an anaerobic digester to produce renewable energy. The State mandate under AB 341 requires an increase in the rate of recovery of commercial waste for recycling, and some of this increased recovery will likely be food waste. Initially, this waste may be composted, but through this measure the City will arrange for it to be sent to a digestion facility to allow energy recovery.

The City will need to work with waste haulers and potential digestion facilities to arrange for dedicated treatment of Santa Ana food waste. The waste could go either to dedicated facilities for food waste, or be added to existing anaerobic digesters at wastewater treatment plants that use digester gas for energy. For example, Orange County Sanitation District currently has a pilot digester to which food waste might be added.

The calculation for this measure assumes that by 2020, 75% of the food waste captured through overall diversion will be sent to a digestion facility that captures biogas which is used to generate electricity.[22]

[22] Gas generation of food waste is based on pilot studies performed with the East Bay Municipal Utility District and EPA. End use for the gas was assumed to be electricity and calculated assuming 35% generation efficiency and 15% parasitic loss rate.

Type of Measure
Voluntary

Emissions Reduction in 2020
605 $MTCO_2e$

Emissions Reduction in 2035
1,109 $MTCO_2e$

Co-Benefits
Improved air quality, reduced waste generation

Cost to City
Low to Medium

Private Cost
Low

Potential Funding Sources
General Fund

Ease of Implementation
Medium

Solid Waste, Water, and Wastewater Measures

Rainwater Harvesting

Type of Measure
Incentivized

Emissions Reduction in 2020
29 $MTCO_2e$

Emissions Reduction in 2035
29 $MTCO_2e$

Co-Benefits
Reduced water use

Cost to City
Low

Private Cost
Low

Potential Funding Sources
Water Agencies, General Fund

Ease of Implementation
Easy

Collecting and re-using rainwater from gutters and downspouts for lawns and gardens minimizes the amount of water flowing into storm drains, sewer systems and local waterways. Rainwater harvesting also reduces potable water consumption and electricity consumption from distribution. For this measure, the City may purchase rain barrels in bulk and resell them at cost to residents. Under SoCal Water Smart, rebates are available for rain barrels to reduce the cost to residents.

This calculation is based on 1,000 rain barrels distributed to single-family residences annually from 2015-2020. Initial financing of the purchase of the rain barrels may total $50,000, however all the cost may be recouped through purchases by program participants.

Turf Removal

Turf grass is one of the most water-intensive plants in a landscape. Its high water use and frequent maintenance make it a time-consuming and expensive yard option. The average residential customer spends about 60% of their water on outdoor irrigation. Turf removal and conversion to drought-tolerant landscaping reduces potable water use and associated electricity consumption. Rebates are available through SoCal Water Smart for residents and businesses to convert their lawns to drought tolerant plants or synthetic turf. The City will promote the program. It is estimated that through the program 100 single-family lawns could be converted annually from 2015 to 2035.

Type of Measure
Incentivized

Emissions Reduction in 2020
2.5 $MTCO_2e$

Emissions Reduction in 2035
10 $MTCO_2e$

Co-Benefits
Reduced water use

Cost to City
Low

Private Cost
Low to Medium

Potential Funding Sources
Water agencies, General Fund

Ease of Implementation
Easy

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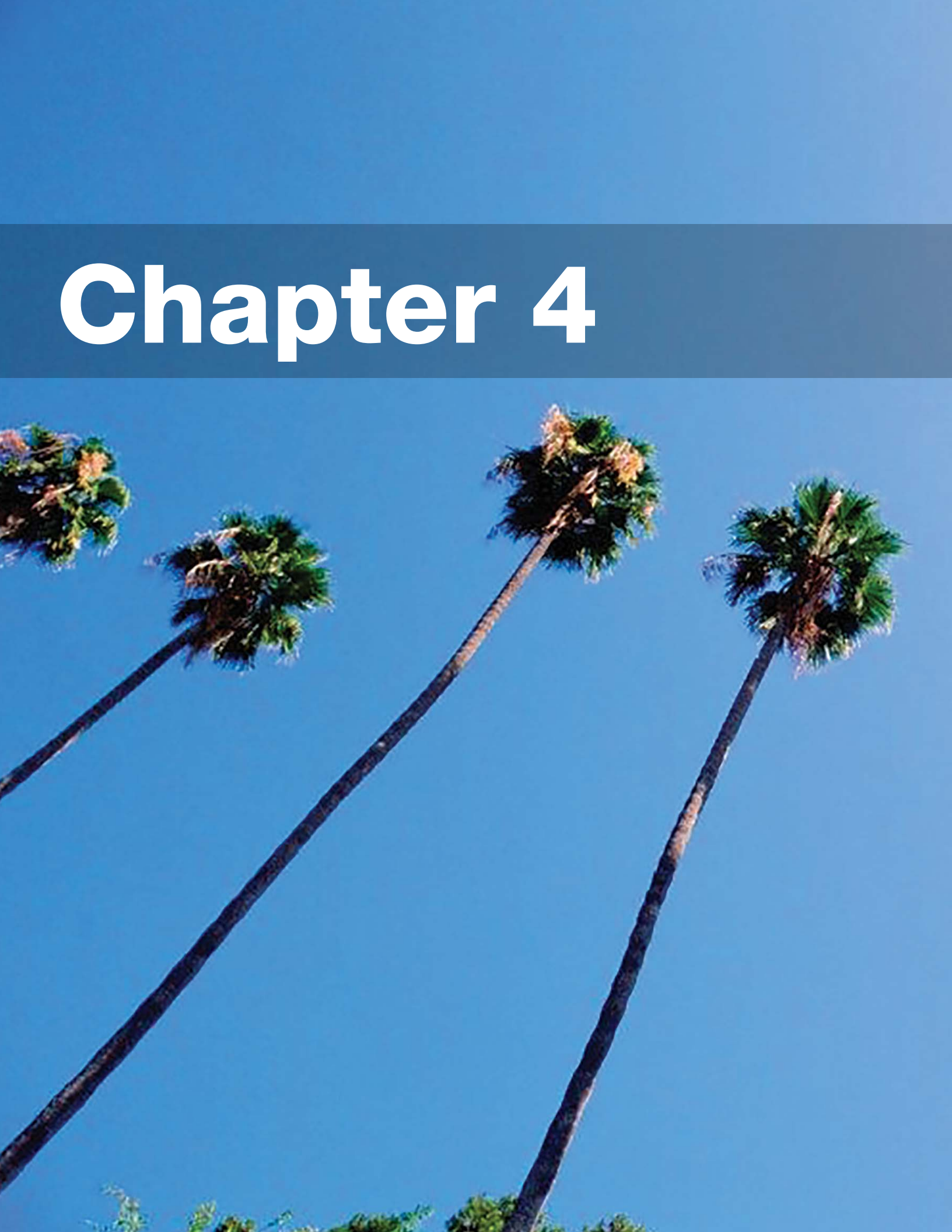
Chapter 4



Implementation and Monitoring Strategy

To achieve the intended emissions reduction and energy savings, this CAP must be effectively implemented. The purpose of this Implementation and Monitoring Strategy is to provide a framework for managing implementation of the CAP, and for monitoring progress in achieving energy savings and reduction in emissions.

Climate Action Plan Implementation

Staffing

To ensure effective implementation of the CAP, the City will set up an interdepartmental team that will meet on a regular basis to coordinate implementation. This team will include Public Works, Planning and Building, Finance and Management Services, and other departments that play a role in implementing the CAP measures. In addition to this team, the City will explore hiring support staff to assist in managing day-to-day coordination of the actions identified in the CAP. These actions will focus on tracking progress, evaluating effectiveness, and identifying and securing new funding opportunities.

Partnerships

Partnerships will also be a critical part of implementing the CAP. In particular, close coordination will be needed with SCE and SCG for effective promotion of utility incentives. City staff members currently participate in monthly partnership meetings with the utilities and plan to continue meeting throughout CAP implementation. Partnership with the Santa Ana Chamber of Commerce will be important for outreach and promotion of business-related measures. Through the stakeholder engagement workshops conducted during development of the CAP, the City has already begun identifying potential new partners, including the Building Industry Association and the US Green Building Council, which will be important partners for any measure affecting new residential construction. Achieving significant energy savings and a significant emissions reduction in Santa Ana will require the community to work together, and the City to act in partnership with other stakeholder groups.

Outreach and Education

The City has a number of communications and outreach activities that can be used to promote and implement the CAP measures. These activities will be enhanced and brought together under a comprehensive outreach and education program.

All residents receive the Santa Ana Green quarterly newsletter, which will continue to be the primary channel for communicating information about energy and water-related incentives and financing options; and solid waste reduction. The Santa Ana Green newsletter presents information in both English and Spanish to reach the diverse Santa Ana population. Additionally, information will be provided at locations where the City interacts with residents and business

owners, such as at the permit counter during the business license process, at community recreation centers, and at community events. Social media, email blasts, and the City website are additional means to communicate the CAP to the public. The Green Business Challenge measure will be an important outreach tool that can support a wide variety of energy conservation related voluntary actions in the community. In partnership, the City of Santa Ana and the Chamber of Commerce will encourage businesses to participate in the Challenge. Businesses will be recognized based on completion of activities. These activities can be aligned with utility incentive programs, financing options, and other programs that the City promotes. Implementation of this program requires a method of collecting emissions reduction data from enrolled businesses. To maximize data collection, this reporting should be designed to give additional weight to those businesses that can demonstrate tangible actions and performance improvement.

Implementation Timeframe

The implementation start dates for each measure are listed in Table 4.1. The municipal operations energy measures in the CAP, and the Streetlight Purchase and Retrofit measure, are one-time implementation measures and action does not need to continue once they are completed. For the remaining community-wide measures, except the Traffic Signal Synchronization Program, active program implementation will need to continue through 2035 to achieve the emissions reduction projected in the CAP. Ongoing implementation is needed to ensure that the emissions reduction does not drop off over time as equipment wears out.

Table 4.1: Implementation Overview

Community-wide Transportation Measures

Measures	Lead Department	Implementation Start Date
Development of Local Retail Service Nodes	Planning and Building	2016
Local Residential Nodes near Retail and Employment	Planning and Building	2016
Traffic Signal Synchronization Program	Public Works	2016
Local Employment Nodes near Residential and Retail Areas	Planning and Building	2016
End of Trip Facilities in New Projects	Planning and Building	2016
Safe Routes to Schools	Public Works	Ongoing
Design Guidelines for External Bike/Pedestrian/Transit Connectivity	Planning and Building	2016
Design Guidelines for Internal Bike/Pedestrian/Transit Connectivity	Planning and Building	2016
Adjust Parking Ratios	Planning and Building	2016
Community-wide Bike Sharing Stations	Public Works	2016

Table 4.1: Implementation Overview (continued)

Community-wide Energy Measures

Measures	Lead Department	Implementation Start Date
Property Assessed Clean Energy (PACE) Financing - Commercial	Public Works	2015
SCE Small and Medium Business Direct Install	Public Works	Ongoing
Property Assessed Clean Energy (PACE) Financing- Residential	Public Works	Ongoing
Solar Photovoltaic Systems–New Private Installs	Public Works	Ongoing
SCE and SCG Residential Programs	Public Works	Ongoing
Weatherization	Public Works	Ongoing
SCG Commercial Programs	Public Works	Ongoing
Streetlight Purchase and Retrofit	Public Works	2019
Benchmarking and Retrocommissioning	Planning and Building / Finance	2016
Solar Hot Water Heating Systems for Laundromats	Public Works	2015
Green Business Challenge	Public Works	2016
Title 24 Energy Efficiency Standards–Commercial	Planning and Building	Ongoing
Title 24 Energy Efficiency Standards–Residential	Planning and Building	Ongoing

Community-wide Solid Waste, Water, and Wastewater Measures

Measures	Lead Department	Implementation Start Date
AB 341Commercial and Multifamily Recycling	Public Works	Ongoing
Food Waste Digestion	Public Works	2016
Rainwater Harvesting	Public Works	2015
Turf Removal	Planning and Building	2015

Municipal Operations Transportation and Land Use Measure

Measure	Lead Department	Implementation Start Date
Alternative Fuel Vehicle Fleet	Public Works	Ongoing

Municipal Operations Energy Measures

Measures	Lead Department	Implementation Start Date
Building Energy Efficiency Retrofits	Finance	Ongoing
Street Lighting LED Retrofits	Public Works	Ongoing
Retrocommissioning	Finance	2016
Water Pump Retrofits	Public Works	Ongoing
Solar Photovoltaic Systems	Finance	2017
Vending Machine Retrofits	Parks and Recreation	2016

Evaluation and Monitoring

There are three components to evaluation and monitoring: 1. tracking the implementation status of individual measures; 2. measurement and estimation of emissions reduction associated with individual measures; and 3. periodic re-inventory of community-wide emissions. Progress reports and re-inventories may show the need to update or revise the CAP. For example, if a measure is not able to be implemented as proposed or if the inventory shows emissions are not decreasing as expected, it may be necessary to introduce new measures to meet emissions reduction goals. CEQA guidelines establish the requirement to "monitor the plan's progress…and to require amendment if the plan is not achieving specified levels."

Tracking Implementation Status

The City will publish a periodic progress report that details the status of each measure in the CAP. For measures that involve passing a new policy, the report will list those that have been passed and, if necessary, describe any challenges encountered with any that have been delayed. For measures such as rebates, incentives, and financing programs, the report will include information such as the number of rebates distributed, the type of work that was performed, and estimated energy and emissions savings calculated by the entity performing the work. This data will need to be provided by SCE, SCG, or the company operating the incentive or financing program. Establishing clear and regular processes for transferring this data from each partner will facilitate inclusion in the progress report. For measures addressing new developments, the report will include information on the number and size of new developments incorporating the measure and related information on the number of vehicle trips impacted.

Measurement and Estimation of Emissions Reduction

The data on energy savings from individual measures collected for the implementation status report described above can also be used to calculate the emissions reduction. Where energy savings data is available, but the emissions reduction is not already calculated by a partner organization, the City will calculate this reduction during the periodic re-inventory process (see below). The Statewide Energy Efficiency Collaborative (SEEC) ClearPath California tool will be utilized to calculate this reduction.

Periodic Re-Inventory

Conducting a periodic re-inventory and comparing the results with past inventories will show how Santa Ana community emissions are changing overall, and whether they are on track to meet the adopted goals. A re-inventory for calendar year 2017 will be completed in 2018. This will allow some time for CAP measures to begin taking effect, but also provide information ahead of the 2020 goal year. After that, a re-inventory will be completed every three to five years through support staff and consultant expertise. Free resources available through the SEEC, including training and the SEEC ClearPath California tool, will assist City staff in completing these inventories.

As part of the re-inventory, the City staff, supported by consultant expertise, will explore looking at changes in residential and commercial energy use normalized for weather and other factors such as energy prices. Features in future versions of the SEEC ClearPath California tool may help with this analysis. Looking at indicators such as energy use per person or per square foot, or vehicle-miles per person will also help explain why emissions are changing.

[23] "State CEQA Guidelines." Section 15183.5 (b) (1) (E).

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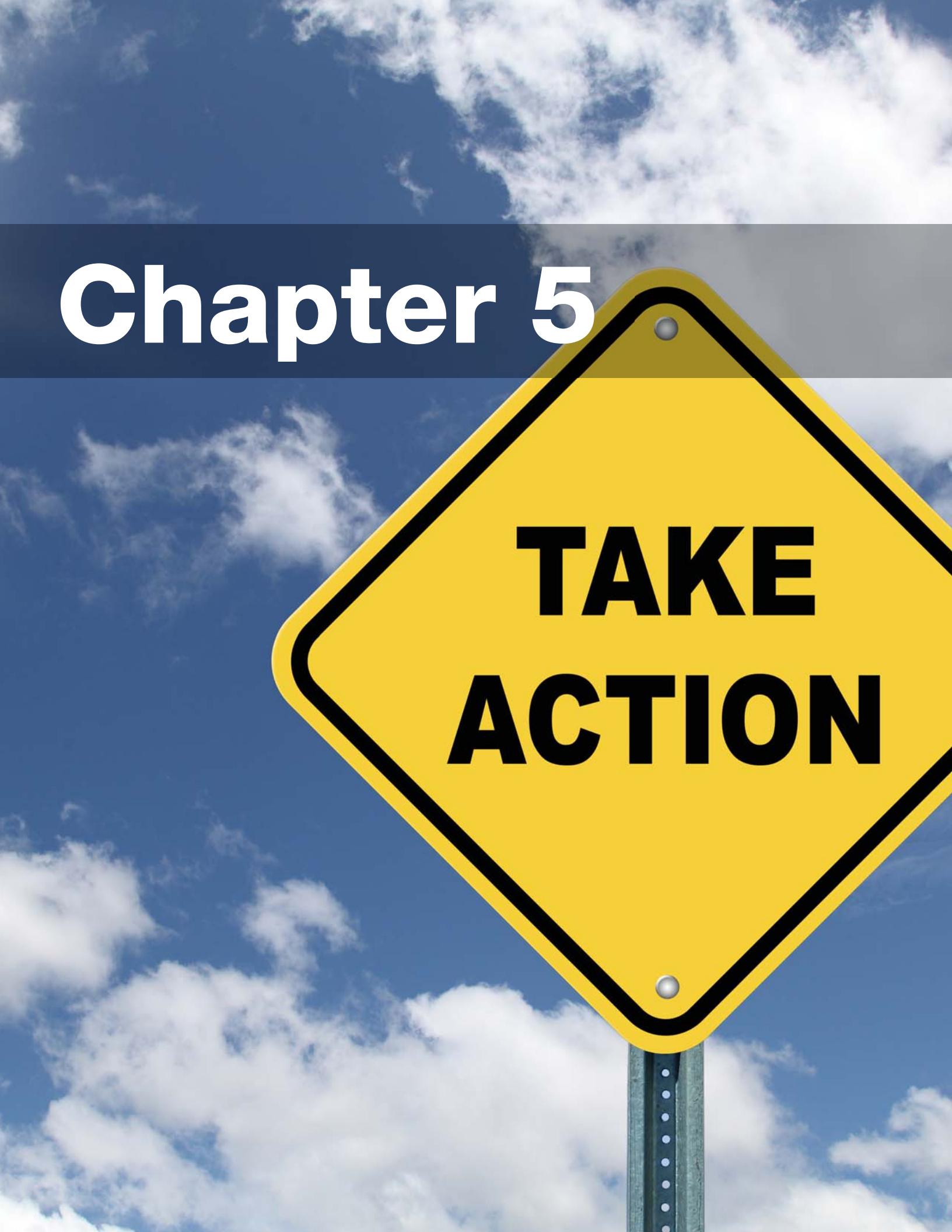
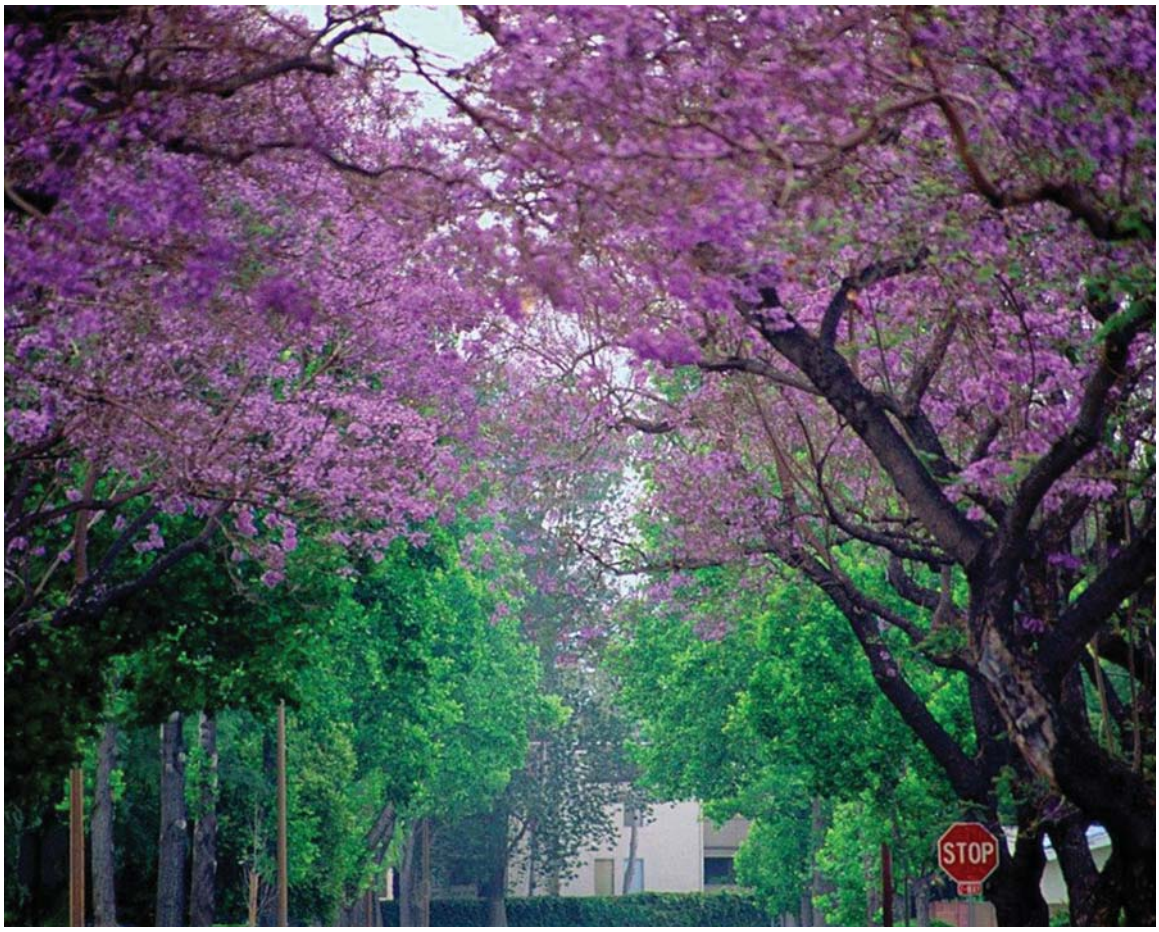
Chapter 5



Take Action: What Can You Do?

The Santa Ana Climate Action Plan identifies many ways the City will encourage residents and businesses to tackle carbon pollution. But to reduce our emissions and make Santa Ana an even better place to live, the entire community will need to work together. You can take action today to use resources more efficiently by considering some of the suggestions below.



At Home

General	**Calculate** your household carbon footprint at: http://coolclimate.berkeley.edu/carboncalculator	
Transportation	**Switch** trips to bicycling, walking or transit when possible. www.octa.net	If purchasing a new vehicle, **choose** the most fuel-efficient one that meets your needs. Compare at: www.fueleconomy.gov Consider an electric vehicle: www.sce.com/wps/portal/home/residential/electric-cars
Energy	**Replace** light bulbs with LEDs **Learn** about rebates that can help you make your home more efficient: www.sce.com/wps/portal/home/residential/rebates-savings	**Learn** about incentives for solar energy on your home: www.sce.com/wps/portal/home/residential/generating-your-own-power/solar-power
Solid Waste	**Take** a free class on home composting: www.fullertonarboretum.com/Classes/ **Learn** how to save money by reducing food waste: www.nrdc.org/living/eatingwell/files/foodwaste_2pgr.pdf	**Consider** borrowing, sharing, swapping or buying used instead of new items: www.shareable.net/how-to-share
Water	**Learn** about available rebates at: www.socalwatersmart.com **Retrofit** plumbing fixtures with low-flow faucets, aerators, and sensor controls: www.epa.gov/watersense/	**Landscape** with native plants: www.bewaterwise.com/Gardensoft/index.aspx www.santa-ana.org/SAwatersmart High-efficiency toilets: www.socalwatersmart.com www.santa-ana.org/waterconservation
Community Engagement	**Participate** in a OneOC day of service on Earth Day or another day: www.oneoc.org/get-involved/days-of-service/	**Join, volunteer** at or **start** a community garden: www.grainproject.org

At Work

General	**Create** a green team that coordinates efforts to green the organization	**Encourage** staff education and innovation in sustainability
Transportation	**Encourage** employees to rideshare or take transit: www.octa.net/Getting-Around/Rideshare/Overview/ **Provide** flexible hours and telecommuting options	**Provide** secure bicycle parking: www.santa-ana.org/bikehuts **Provide** showers for bicycling employees **Install** electric vehicle charging stations: www.sce.com/wps/portal/home/business/electric-cars
Energy	**Review** SCE's Business Energy Guide: www.sce.com/wps/portal/home/business **Monitor** or **benchmark** energy use: www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager **Power down** computers and electronics when not in use	**Get** a lighting audit and **upgrade** lighting to high-efficiency linear fluorescents or LEDs **Install** renewable energy: www.sce.com/wps/portal/home/business/generating-your-own-power
Solid Waste	**Provide** recycling bins at each workstation **Set** printers to print double-sided **Donate** unwanted items to local charities	**Implement** a green purchasing policy **Establish** a policy for circulating documents electronically instead of using paper-based memos or faxes
Water	**Catalog** your water consumption and fixtures **Learn** about available rebates at: www.socalwatersmart.com	**Retrofit** plumbing fixtures with high-efficiency toilets, low-flow faucets, aerators, and sensor controls: www.epa.gov/watersense
Community Engagement	**Participate** in a local Earth Day event **Engage** your customers in your sustainability initiatives through a campaign, event, or another way to participate	**Present** energy- or sustainability-related topics to a K-12, higher education, or professional audience **Establish** an employee volunteerism policy allowing a certain number of hours of volunteer time each month

Appendix A
Total Emissions Reduction

This appendix shows the total emissions reduction from all existing measures and transportation and land use plans, CAP measures, and State mandates. This total emissions reduction is compared in Table 3 against the reduction needed to reach the City's goals for 2020 and 2035.

Table 1. GHG Emissions Reduction of Existing Measures

Measure	Emission Reduction ($MTCO_2e$/Year) 2020	2035
SCE Programs	7,517	7,517
SCG Programs	8,362	8,362
Weatherization	1,533	1,533
Solar	5,751	5,751
Water conservation	1,853	1,853
Reclaimed water	142	142
Increased recycling rate	2,060	2,060
LED street lighting	365	365
City facilities – ARRA funded efficiency	362	362
City water wells – efficient motors	461	461
Transportation and land use initiatives	23,492	48,390
Total	**51,898**	**76,796**

Table 2. GHG Emissions Reduction of CAP Measures and State Mandates

Measures	Reduction in 2020 ($MTCO_2e$/Year)	Reduction in 2035 ($MTCO_2e$/Year)
Transportation and Land Use		
Pavley II	130,308	335,939
Development of Local Retail Service Nodes	916	14,660
Local Residential Nodes near Retail and Employment	916	14,660
Traffic Signal Synchronization Program	2,504	5,864
Local Employment Nodes near Residential and Retail Areas	366	5,864
End of Trip Facilities in New Projects	366	5,864
Safe Routes to Schools	2,129	4,984
Design Guidelines for External Bike/Pedestrian/Transit Connectivity	311	4,984
Design Guidelines for Internal Bike/Pedestrian/Transit Connectivity	311	4,984
Adjust Parking Ratios	311	4,984
Community-wide Bike Sharing Stations	311	4,984
Municipal Operations Measures	709	2,041

Measures	Reduction in 2020 ($MTCO_2e$/Year)	Reduction in 2035 ($MTCO_2e$/Year)
Energy		
CA Renewable Portfolio Standard	182,020	182,762
Property Assessed Clean Energy (PACE) Financing—Commercial	3,791	8,458
SCE Small and Medium Business Direct Install	7,793	7,793
Property Assessed Clean Energy (PACE) Financing—Residential	1,633	5,833
Solar Photovoltaic – New Private Install	4,881	4,881
SCE and SCG Residential Programs	3,965	3,965
Weatherization	3,720	3,720
SCG Commercial Programs	3,280	3,280
Streetlight Purchase and Retrofit	160	2,556
Benchmarking and Retrocommissioning	1,533	2,147
Title 24 Energy Efficiency Standards – Commercial	490	1,050
Title 24 Energy Efficiency Standards – Residential	329	705
Solar Hot Water Heating Systems for Laundromats	267	267
Green Business Challenge	78	78
Municipal Operations Measures	4,503	3,176
Solid Waste, Water, and Wastewater		
AB 341 Commercial and Multifamily Recycling	8,460	12,663
Food Waste Digestion	605	1,109
Rainwater Harvesting	29	29
Turf Removal	2.5	10
Total	**366,998**	**654,294**

Table 3. Total Emissions Reduction and Goals	Reduction in 2020 ($MTCO_2e$/Year)	Reduction in 2035 ($MTCO_2e$/Year)
Existing measures (Table 1 total)	51,898	76,796
CAP measures and state mandates (Table 2 total)	366,998	654,294
Total reduction	**418,896**	**731,090**
Reduction needed to meet goal	**400,000**	**800,000**

Appendix B
Inventory Methodology

Activity Data

Southern California Edison (SCE) provided electricity consumption data in kilowatt-hours (kWh) for 2008; SCE provides all electricity used in Santa Ana except for electricity generated by solar systems. Table 1 includes electricity consumption for the community; Table 2 includes electricity consumption for City municipal operations. SCE includes usage from SCE-supplied electricity as well as direct access electricity. Direct Access electricity refers to electricity purchased directly by industries from power generation facilities, which is then delivered through the transmission lines of a public or private utility, and accounts for 8.8% of the electricity usage reported for Santa Ana.

Table 1. Santa Ana Community-wide Electricity Usage, 2008

Sector	kWh
Residential	378,988,235
Commercial and Industrial	1,398,181,157
Total	**1,777,169,392**

Table 2. Santa Ana Municipal Operations Electricity Usage, 2008

Operations Electricity Usage, 2008 Sector	kWh
Buildings and Facilities	30,096,817
Public Lighting	15,942,280
Water and Wastewater Transport	11,639,798
Total	**57,678,895**

Emissions Factors

Santa Ana receives electricity produced by SCE and through direct access electricity. SCE-produced GHG emissions were quantified using utility-specific emissions factors; these were taken from SCE's 2007 Annual Emissions Report for the California Climate Action Registry. SCE did not report an emissions factor for 2008; therefore, the 2007 emissions factor was used as a proxy. Emissions from electricity supplied by direct access providers through SCE's transmission system were quantified using a California average emissions factor from the Local Government Operations Protocol (LGOP) as specific emissions factors are not available for direct access electricity. Emissions factors for CH_4 and N_2O were obtained from the LGOP, which provides a statewide average emissions factor for electricity. Table 3 summarizes emissions factors used in this analysis.

Table 3. Electricity-related Emissions Factors in Lbs /MWh

SCE CO_2[1]	Direct Access CO_2[2]	CH_4[2]	N_2O[2]
630.89	919.64	0.029	0.01

[1] 2007 Annual Emissions Report available at: http://www.climateregistry.org/carrot/Reports/CREntityEmissionReport.aspx

[2] LGOP Table G.7 California Grid Average Electricity Emission Factors (1990-2007)

Appendix C
Measure Calculation Assumptions

Sector	Measure	Assumptions
Transportation and Land Use	Development of Local Retail Service Nodes	Reduction of 2.5% of 2035 forecast VMT (based on Fehr and Peers analysis showing 1-3%). Assumed to reach 21% of eventual impact by 2020 (based on 4 years of implementation by 2020 out of 19 years total implementation: 4/19 = 0.21).
Transportation and Land Use	Local Residential Nodes near Retail and Employment	Reduction of 2.5% of 2035 forecast VMT (based on Fehr and Peers analysis showing 1-3%). Assumed to reach 21% of eventual impact by 2020.
Transportation and Land Use	Traffic Signal Synchronization Program	Reduction of 1% of 2035 forecast VMT (based on Fehr and Peers analysis). Assumed to reach 42.7% of eventual impact by 2020.
Transportation and Land Use	Local Employment Nodes near Residential and Retail Areas	Reduction of 1% of 2035 forecast VMT (based on Fehr and Peers analysis). Assumed to reach 21% of eventual impact by 2020.
Transportation and Land Use	End of Trip Facilities in New Projects	Reduction of 1% of 2035 forecast VMT (based on Fehr and Peers analysis). Assumed to reach 21% of eventual impact by 2020.
Transportation and Land Use	Safe Routes to Schools	Reduction of 0.85% of 2035 forecast VMT (based on Fehr and Peers analysis showing <1%). Assumed to reach 42.7% of eventual impact by 2020.
Transportation and Land Use	Design Guidelines for External Bike/ Pedestrian/Transit Connectivity	Reduction of 0.85% of 2035 forecast VMT (based on Fehr and Peers analysis showing <1%). Assumed to reach 21% of eventual impact by 2020.
Transportation and Land Use	Design Guidelines for Internal Bike/ Pedestrian/Transit Connectivity	Reduction of 0.85% of 2035 forecast VMT (based on Fehr and Peers analysis showing <1%). Assumed to reach 21% of eventual impact by 2020.
Transportation and Land Use	Adjust Parking Ratios	Reduction of 0.85% of 2035 forecast VMT (based on Fehr and Peers analysis showing <1%). Assumed to reach 21% of eventual impact by 2020.
Transportation and Land Use	Community-wide Bike Share System	Reduction of 0.85% of 2035 forecast VMT (based on Fehr and Peers analysis showing <1%). Assumed to reach 21% of eventual impact by 2020.

Transportation and Land Use–Municipal Operations	Alternative Fuel Vehicle Fleet	Based on vehicle odometers and annual mileage, estimated 418 vehicles retiring by 2020. Assumed these would be replaced with 70% hybrid, 25% electric, 5% hydrogen. For 2035 all fleet vehicles replaced with 40% hybrid, 50% electric, 10% hydrogen. Hybrid assumed to get 35 mpg, electric 85 miles per gallon gasoline equivalent (emissions calculated from electricity use), hydrogen 54 miles per gallon gasoline equivalent; hydrogen assumed produced by electricity, 60.5kWh/kg hydrogen.
Energy	PACE Financing–Commercial	$3 million annual financing, 40% energy efficiency, 40% solar (remainder is water efficiency—not able to quantify emissions reduction from water efficiency). Energy Efficiency: $0.38 initial cost per annual kWh savings, useful life of 9 years (starting in 2016). Solar: $4.9/watt capacity, 1,678 kWh annual generation per kW capacity= $2.92/kWh
Energy	SCE Small and Medium Business Direct Install	Assumes 1.8 million kWh/yr saved from each year's program installations (a conservative estimate based on existing reduction from SCE Business Direct Install Program), 10 year useful life (starting in 2008).
Energy	PACE Financing–Residential	Reaching 2,905 homes by 2020; 10,375 by 2035. 28% include furnace upgrade; 28% include central AC upgrade; 28% duct sealing; 18% general building envelope improvements; 24% solar system (avg size 5kw). For efficiency measures, kWh and therms savings taken from DEER database. Solar based on 1,678 kWh annual generation/kW.
Energy	Solar Photovoltaic – New Private Installs	1,000 kW installed/year (a conservative estimate based on existing installation trends). 1,678 kWh per kW capacity.
Energy	SCE and SCG Residential Programs	700,590 kWh/yr saved from each year's program installations (a conservative estimate based on existing reduction from SCE programs for residents), useful life of 10 years (starting in 2008). 77,239 therms saved from each year's program installations (estimate based on existing program savings), useful life of 10 years (starting in 2008).
Energy	Weatherization	822 homes/year based on existing program level. 271 kWh and 72 therms annual savings per household. Per household savings source: http://www.energy.ca.gov/2005publications/CEC-400-2005-039/CEC-400-2005-039-CMF.PDF Table B11.
Energy	SCG Commercial Programs	245,856 therms saved from each year's program installations (estimate based on existing program savings), 10 year useful life (starting in 2008).
Energy	Streetlight Purchase and Retrofit	11,410 streetlight fixtures to be replaced. Savings per fixture of 1,135 kWh/fixture/year (based on existing measures). Implemented gradually from 2019 through 2035.

Energy	Benchmarking and Retrocommissioning	Santa Ana has 36,334,400 sq.ft. of non-residential space that is 10,000 square feet or greater in size. This measure assumes that each year one seventh of the space (or 5,200,000 sq.ft.) is required to complete an energy audit each year and report the outcomes to the federally administered Energy Star Portfolio Manager. Requirement would continue until all commercial space is audited and upgraded over a seven-year period. Savings source: http://www.energy.ca.gov/2005publications/CEC-400-2005-039/CEC-400-2005-039-CMF.PDF Table B15.
Energy	Title 24 Energy Efficiency Standards–Commercial	163,000 sq.ft. annual commercial construction. 0.003 therms/sq.ft. annual savings; 1.5 kWh/sq.ft. annual savings. Savings based on analysis of average use and energy uses affected by Title 24 updates for Climate Zone 8.
Energy	Title 24 Energy Efficiency Standards–Residential	60,135 sq.ft. annual single family construction. 0.174 kWh/sq.ft. annual savings; 0.014 kWh/sq.ft. annual savings. 125,765 sq.ft. annual multi-family construction. 0.138 kWh/sq.ft. annual savings; 0.004 therms/sq.ft. annual savings. Savings based on analysis of average use and energy uses affected by Title 24 updates for Climate Zone 8.
Energy	Solar Hot Water Heating Systems for Laundromats	Solar installed on 6 laundromats/yr for 5 years (estimated 35 in city). 1,674 therms per laundry per year saved (estimate provided by Sun Light and Power).
Energy	Green Business Challenge Program	30,000 workers in central business district, 200sq. ft. per worker, 20% of potential space participating = 1.2 million sq.ft. Savings of 0.13 kWh/sq.ft./year, 0.002 therms/sq.ft./yr. Savings source: http://www.energy.ca.gov/2005publications/CEC-400-2005-039/CEC-400-2005-039-CMF.PDF Table B13.
Energy–Municipal Operations	Building Energy Efficiency Retrofits	Assumes 20% across-the-board savings from baseline energy consumption of 30.1 million kWh/yr. This would likely be achieved through mechanism such as an energy performance contract, and would involve addressing HVAC, lighting, controls, and potentially building envelope improvements.
Energy–Municipal Operations	Street Lighting LED Retrofits	Savings from four identified projects (LS-2, LS-3, Eastside, SARTC) provided by City of Santa Ana: 1,050,300 kWh. In addition to these projects, estimated 5,275 remaining city-owned lights (based on total street light energy consumption from inventory); applied savings of 259 watts/fixture to these, with lights on 11 hours/day.
Energy–Municipal Operations	Retrocommissioning	1.125 million sq.ft. building space. Savings source: http://www.energy.ca.gov/2005publications/CEC-400-2005-039/CEC-400-2005-039-CMF.PDF Table B15. Completion by 2020.
Energy–Municipal Operations	Water Pump Retrofits	kWh savings estimate based on savings from existing upgrades, and ratio of power of pumps already upgraded to that of pumps still needing upgrades. Existing 1.1 million kWh/yr savings from 2@150 horsepower, 3@200 hp, 1@350hp. 1250 total hp. In progress/future: 6 pumps totaling 675 hp at Northeast and Cambridge stations; 2 pumps at 150 hp each at East station. 975 hp total = 0.78 * existing = 858,000 kWh savings.

Energy–Municipal Operations	Solar Photovoltaic Systems	Based on PV on parking garage about 100ft x 200ft = 20,000 sq.ft. 8-10 watts dc output per sq.ft. is typical, using 8 watts/sq.ft. as a conservative estimate = 160 kw potential for site. Using PV watts (www.nrel.gov/rredc/pvwatts) program gives 236,594 kwh annual AC output.
Energy–Municipal Operations	Vending Machine Retrofits	Estimated 66 vending machines. Savings of 2,231 kWh/vending machine/year (from the Energy Star savings calculator for 500 can capacity vending machines with additional software controls).
Solid Waste	AB 341 Commercial and Multifamily Recycling	Assumes recycling diversion rate increases to 35% by 2020 and 50% by 2035.
Solid Waste	Food Waste Digestion	Total organic waste taken from inventory; residential = 57.8% food waste, commercial =72.8% food waste (percentages of organic waste: source Cal Recycles). 3300 cu.ft. biogas/ton food waste. 1000 BTU/cu.ft. biogas (biogas production and BTU content from East Bay Municipal Utility District 2008. "Anaerobic Digestion of Food Waste."). Combustion turbine with 35% generation efficiency, 85% capacity factor. 3,412kWh/BTU. By 2020 capturing 25% of food waste, by 2035 capturing 75%.
Water and Wastewater	Rainwater Harvesting	2,116 sq.ft. average roof area (estimated with GIS) per home. Annual rainfall 13.63 inches, 50% captured. 11,110 kWh/million gallons water. 1000 rain barrels = 29 $MTCO_2e/yr$
Water and Wastewater	Turf Removal	296 sq.ft. average yard size in Santa Ana (based on sample of 32 yards measured with GIS). Water requirement 0.6 cu.ft./year/sq.ft. (from University of California Agriculture and Natural Resources "Lawn Watering Guide for California.") 500 homes participate by 2020; 2000 by 2035. 2.6 million cu.ft./year water saved. 11,110 kWh/million gallons water.

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