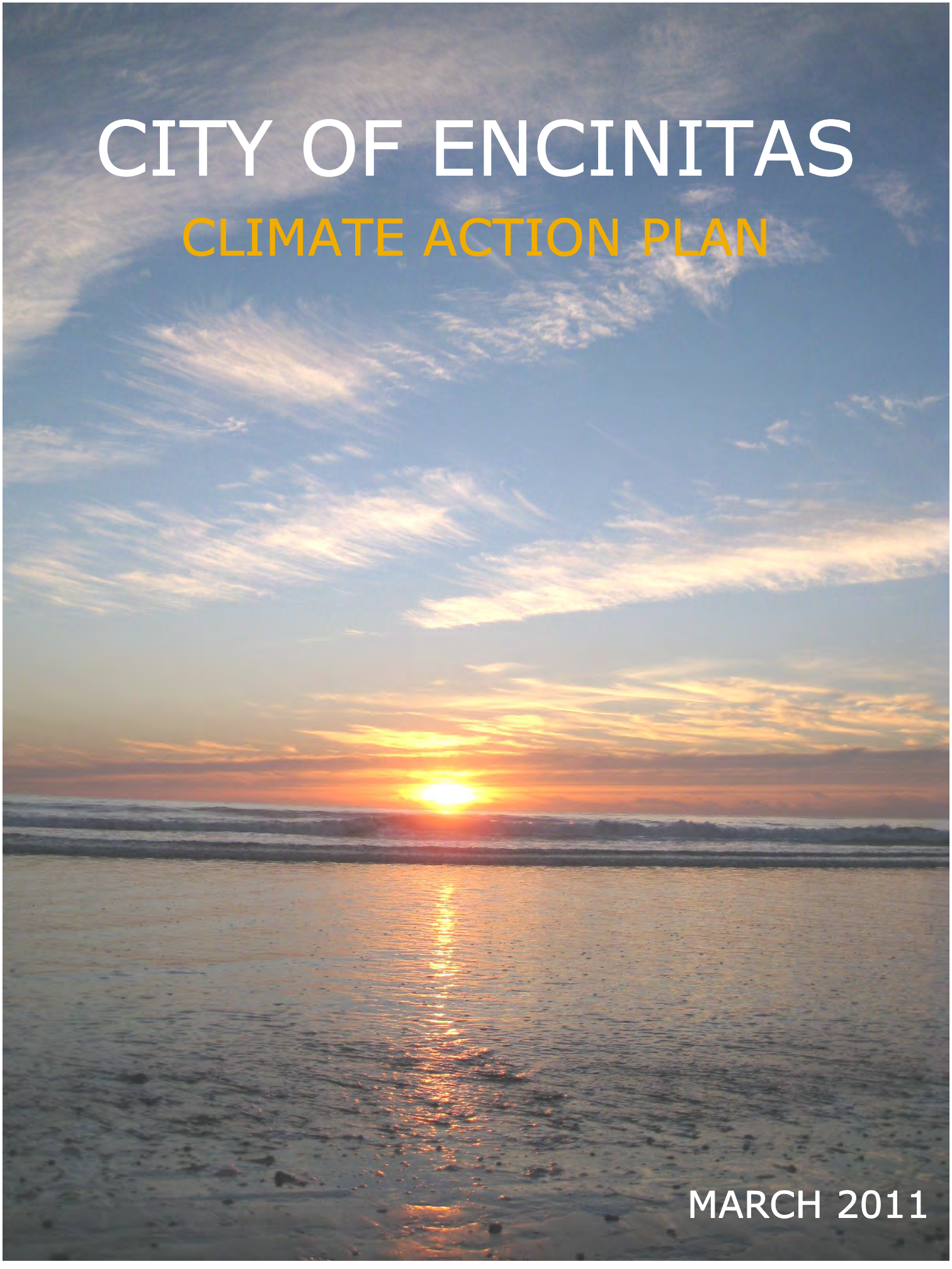

CITY OF ENCINITAS

CLIMATE ACTION PLAN

MARCH 2011

ENCINITAS

CLIMATE ACTION PLAN

MARCH 2011

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Analysis Based on

"City of Encinitas 2005 Greenhouse Gas Emissions Inventory"
By ICLEI – Local Governments for Sustainability

Cover Page Photo Credit

Kristine Rygiel

City of Encinitas

Office of
The Mayor

March 23, 2011

Dear City of Encinitas Residents and Business Owners:

I am proud to present you with the **City of Encinitas' Climate Action Plan (CAP)** which was approved by the City Council on March 9, 2011 with adoption of Resolution No. 2011-11. Designed as a living document, this first edition of the CAP will serve the City of Encinitas as a guiding document and outline a course of action for identifying and implementing strategies to achieve city-wide reductions in greenhouse gas (GHG) emissions for both municipal and community operations. The CAP is designed to:

- Benchmark where the City currently stands relative to statewide emission goals;
- Provide a roadmap for achieving statewide GHG emissions reduction targets;
- Create a plan that meets specific city-wide needs and objectives; and
- Provide guidance for the City to respond and adapt to the impacts of climate change.

The CAP was prepared with funding received from the Energy Efficiency and Conservation Block Grant (EECBG) which is a federal program to assist governmental entities (state and local) in creating and implementing strategies to reduce fossil fuels and energy consumption. Additionally, the 2005 GHG baseline utilized to develop the CAP was conducted as part of a partnership between the San Diego Foundation, ICLEI – Local Government for Sustainability, USA and ten local governments in San Diego County which included Encinitas.

The City will pursue the GHG emission reduction goals for municipal operations through City activities and programs, many of which are already underway. Additionally, the City will work towards achieving GHG emission reductions in community operations by establishing and pursuing various actions and policies as well as incentive-based programs. As we move forward in this endeavor it is understood that where measures require ordinance or zoning code amendments, further evaluation and analysis will be conducted to determine adequacy prior to implementation. The City will also continue to monitor and report its progress towards GHG reductions, which may necessitate adjustments, refinements and/or revisions to the strategies outlined in the CAP.

We hope that all residents and business owners will embrace this program whereby we can have a comprehensive response to climate change. Having each citizen examine his or her own activities and search for ways to reduce personal GHG emissions whether at home, work, school, during their commute and/or within their business environment will help reduce the city's overall carbon footprint. Working together, Encinitas will be able to demonstrate our leadership and set an example in reducing emissions; while at the same time, promote fiscal management, energy efficiency and overall sustainability. As we move forward in the implementation of the CAP, we encourage you to share your ideas and suggestions with us.

Sincerely,

James H. Bond
Mayor

Tel 760/633-2600 FAX 760/633-2627, 505 South Vulcan Avenue, Encinitas, CA 92024 TDD 760/633-2700

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EXECUTIVE SUMMARY

Purpose

Encinitas' Climate Action Plan (CAP) serves as a guiding document and outlines a course of action for community and municipal operations to reduce greenhouse gas emissions and the potential impacts of climate change within the jurisdiction. Specifically, this CAP is designed to:

- Benchmark where the City currently stands relative to statewide emissions goals;
- Provide a roadmap for achieving statewide GHG emissions reduction targets;
- Create a plan that meets specific citywide needs and objectives; and,
- Provide guidance for the City to respond and adapt to the impacts of climate change.

In January 2009, the City of Encinitas' initiated a comprehensive update of its General Plan to address recent court cases or changes in state law. It is anticipated that the Comprehensive General Plan Update (CGPU) will take two years to complete. Some of the key sustainability policies developed through the CGPU process will be used to reevaluate and strengthen action items within the CAP in order to develop a more comprehensive strategy.

Greenhouse Gas Inventory and Projections

In 2009, the City of Encinitas partnered with members of the San Diego Regional Climate Protection Initiative, including the San Diego Foundation; local governments in San Diego County; and ICLEI - Local Governments for Sustainability (ICLEI) to collaboratively discuss how the region was going to address and monitor climate change. This regional partnership resulted in an opportunity to conduct an initial inventory of Encinitas' greenhouse gas emissions from year 2005. The inventory was conducted in order to help the City understand the emissions associated with operations within the City and to establish an emissions baseline from which to compare future emissions. The final report, which presented the City's 2005 government operations and city-at-large baseline emissions, was completed in August 2009 and provided the basis for this Climate Action Plan.

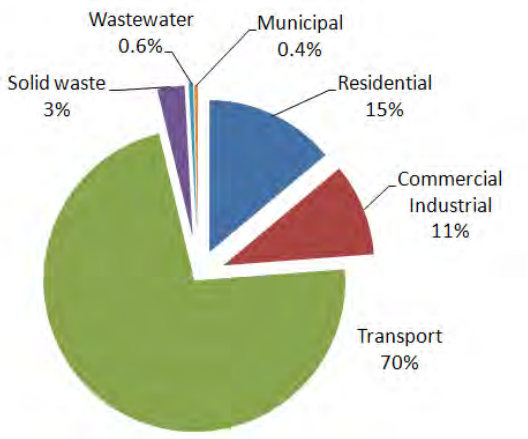


Figure 1: 2005 Encinitas City-wide GHG Inventory

Encinitas' inventory reports emissions from the following major categories: transportation, residential buildings, commercial and industrial buildings, solid waste, wastewater, and municipal operations. Each of these sectors are associated with a variety of emission sources, including direct combustion of fossil fuels, purchased electricity, purchased fuels, and fugitive emissions as shown in Figure 1 above. Overall, Encinitas' 2005 baseline emissions total

548,993 metric tons CO_2 equivalent. This is approximately **8.78 metric tons per capita**. In addition to the baseline GHG inventory, ICLEI also performed a business-as-usual (BAU) forecast for City emissions based on anticipated population and household growth, economic activity, and increases in consumption. The information helps the City frame the challenge ahead for achieving city-wide reduction targets over the next decade. If the City of Encinitas continues with the 2005 pattern of transportation, energy consumption and waste production, ICLEI estimates that Encinitas business-as-usual emissions in 2020 will be **646,947 metric tons CO_2 equivalent** or about **9.5 metric tons CO_2e per capita**. The 2020 sector emissions forecast is similar to sector percentages from the 2005 GHG inventory as illustrated in Figure 1.

Emissions Reduction Strategies

Taking statewide emissions reduction goals into consideration such as those in the California Air Resources Board's Scoping Plan (15 percent), the City of Encinitas has made a commitment to prepare a Climate Action Plan and address and monitor potential impacts of climate change. Based on the strategies outlined in the CAP, the city aims to reduce city-wide emissions by 12 percent relative to current levels. The 2005 baseline emissions inventory and 2020 business-as-usual emissions forecast provide the necessary background for the City to identify and target sectors for public and private reduction potential.

This Climate Action Plan categorizes a list of emission reduction strategies designed to assist the City in reaching its reduction goal. Through the combination of proposed Federal, State, and City level reduction measures presented in this CAP, Encinitas can anticipate emission reductions of approximately 164 thousand metric tons of CO_2 equivalent from their 2020 business-as-usual scenario. This is equivalent to about a 25 percent reduction from 2020 business-as-usual emissions, or a 12 percent reduction from 2005 baseline emissions. Figure 2 shows the relative contribution of Federal, State and City-level reduction strategies to the anticipated emission reductions.

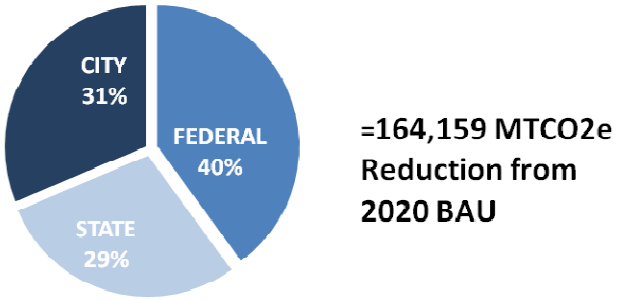


Figure 2: 2020 forecast of Federal, State, and City Level Contribution to City of Encinitas' GHG Emission Reductions

Figure 3 on the next page provides a graphical representation of the 2005 baseline and 2020 BAU, as well as anticipated emission levels as a result of State and Federal Action and implementation of this Climate Action Plan.

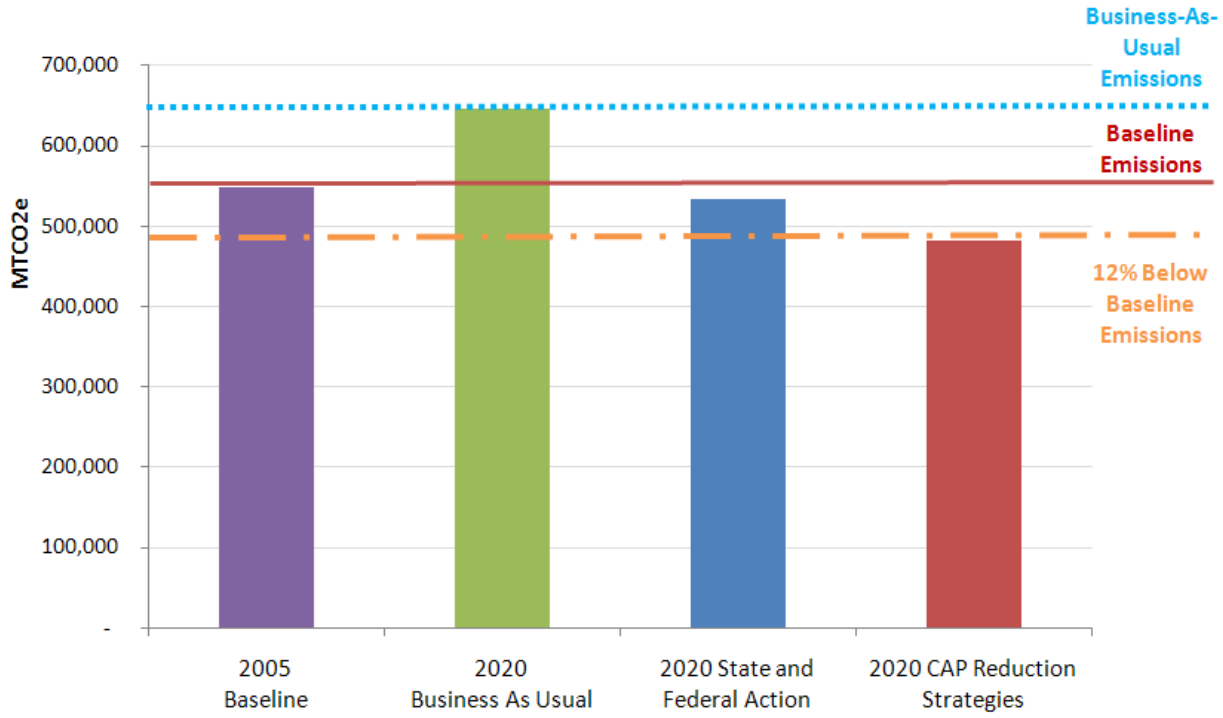
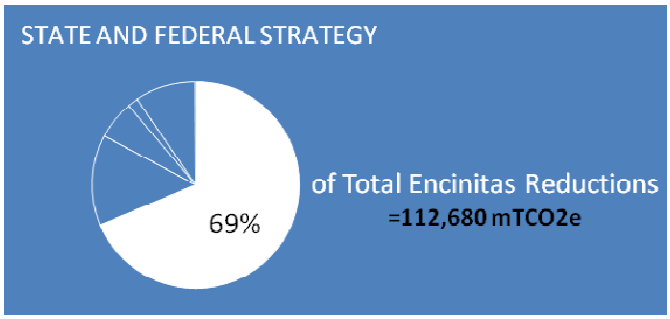


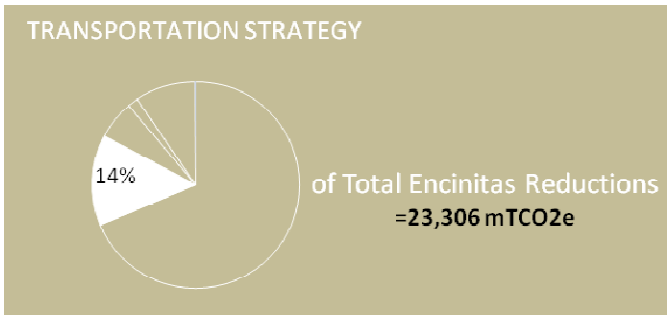
Figure 3: City of Encinitas' emissions and targets. The dotted blue line represents the City's business-as usual scenario while the solid red line represents constant emissions at baseline 2005 emission levels. The dashed orange line represents projected Encinitas emissions with the reductions strategies presented in the CAP.

The following pages provide brief summaries of each of the reduction strategies that will help the City reach its reduction targets. Each strategy represents a combination of measures that together reduce the total City emissions by the percentage shown in the graphs on the following pages. Each strategy and measure is fully described in this report – starting on page 30. As new technologies and advancement in the fields emerge, actions and the reduction amounts may change. The goal however remains the same: to reduce our emissions, encourage energy efficient strategies and embrace for potential change.

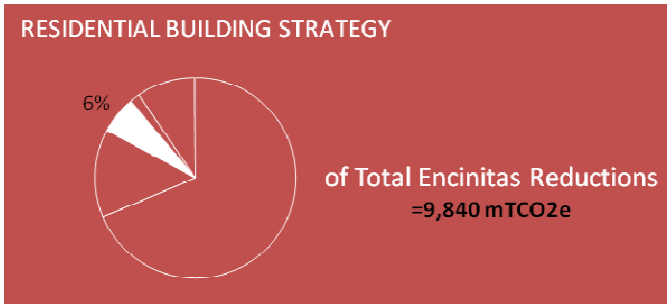
EXECUTIVE SUMMARY



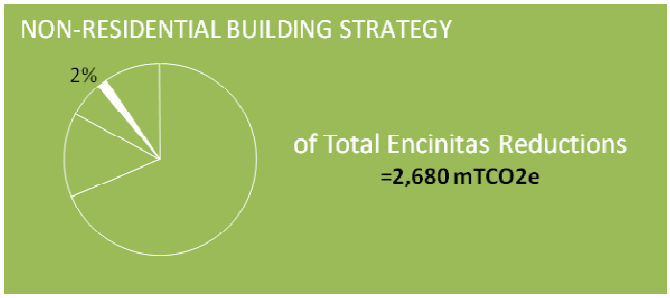
The City of Encinitas will benefit from the policies and standards at the State and Federal level that reduce greenhouse gas emissions, such as increased vehicle standards and fuel efficiencies. While the City does not play a direct role in implementing these strategies, the resulting reductions will contribute significantly to the City's future emissions profile.



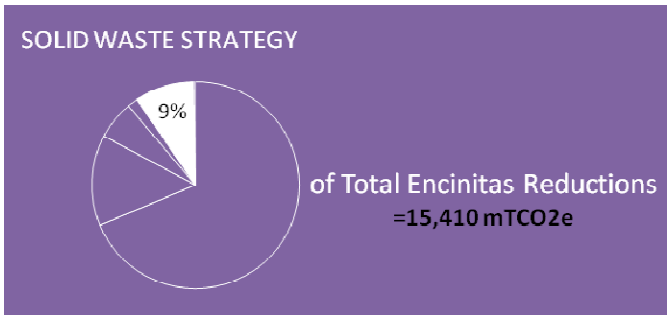
The transportation strategy promotes alternative transportation, reduces congestion, and helps shift residents to more healthy and active lifestyles. Specific implementation involves community design, promoting alternative modes of travel (such as biking and walking), and revising parking standards.



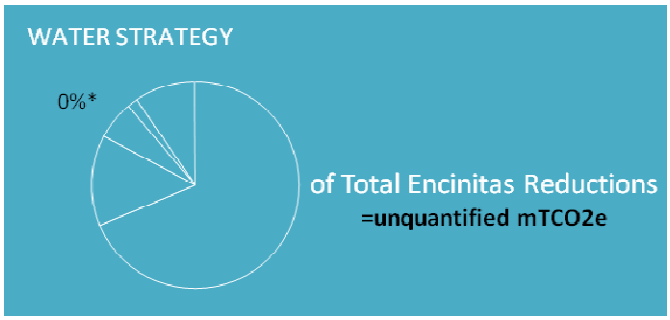
Encinitas' residential building strategy supports the construction of buildings that are energy efficient and incorporate clean, renewable energy sources. This strategy offers opportunities for emission reductions in new development as well as existing structures.



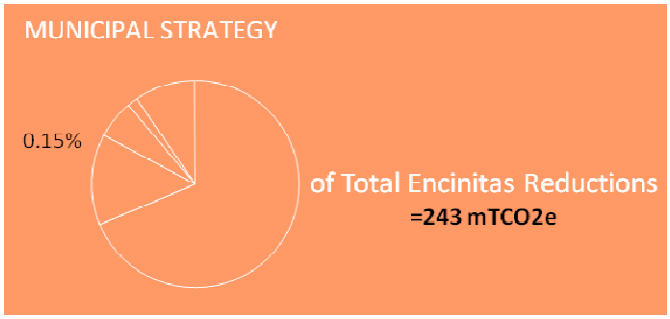
The non-residential building strategy capitalizes on opportunities for emission reductions from design and technological improvements in new and existing non-residential structures. These reduction strategies will consist of a mixture of regulatory mandates and incentives to improve building performance.



Encinitas plans to more closely manage solid waste generation and diversion in order to work towards a zero-waste future. Reducing the generation of solid waste in a community has potential for emission reductions, but will require city-wide policies as well as behavioral changes at the individual level.



Encinitas will cooperatively work with SDWD and OMWD on a water strategy to conserve and protect water resources and promote the community and economic benefits related to the City's coastal and riparian water resources. However, since the embodied emissions associated with water were not quantified as part of Encinitas' emissions inventory, the reductions associated with these strategies are not quantifiable as part of this CAP.



Encinitas plans to reduce the carbon footprint of its own municipal operations and create a local government that serves as a sustainability leader for the City at large. Encinitas is planning measures that the City can take to reduce municipally owned or controlled emissions. These strategies include reductions associated with the City's vehicle fleet, employee commute, water use, and buildings and facilities.

INTRODUCTION

What is a CAP?

In the next century, climate change will not only impact our natural environment, but also potentially threaten our health, quality of life and economic vitality. The extent to which society is impacted by climate change in the future, however, is directly dependent on our actions today. By curbing emissions and adapting our communities to the already changing environment, we can significantly reduce the damages incurred from climate change. Local governments in particular are in a unique position to become climate change leaders by advocating for change and adopting city-wide policies, incentives, and education programs.

Recognizing the important role that cities will play in the transition to a low-carbon economy, Encinitas has prepared this Climate Action Plan (CAP) as a roadmap for achieving city-wide GHG emissions reductions. Encinitas' CAP is a proactive step toward addressing statewide demands while meeting specific city-wide needs. The CAP includes a quantitative inventory and analysis of existing and anticipated GHG emissions. The analysis starts with the established 2005 baseline year and projects business-as-usual emissions for 2020.[1] 2005 was chosen as the baseline year since this year has increasingly becoming the standard for such inventories and a 1990 baseline year would not have accurate or complete datum for all key emission sources. In addition to comparing current emissions, or base year, as well as business-as-usual emissions forecast, the Climate Action Plan identifies a target to reduce GHGs by 2020 and strategies for achieving this target, with an emphasis on improving transportation modes and systems, incorporating energy efficiency standards, increasing the City's renewable energy supply, and devising adaptation measures.

The specific objectives of Encinitas' CAP, developed in a stakeholder Goal Setting Workshop,[2] are to create simple, clear, and enforceable solutions that are:

- *Sustainable, not just "green", upholding economic vitality, equal opportunity, and environmental quality.*
- *Conserve water, reduce waste, and improve recycling.*
- *Encinitas focused, while maintaining regional considerations and alliances.*
- *Embraced by the community.*
- *Promote education and awareness.*
- *Connect with the City's long range plans.*
- *Promote green business and local products.*
- *Realistic and high quality - that produce actual results.*
- *Plan for adaptation.*
- *Provide a transportation balance.*
- *Implement (bio)carbon capture.*
- *Create a well balanced program that can exceed anticipated reductions.*
- *Uphold the "5 C's"; capture, conserve, create, change, and cost efficiency.*
- *Provide funding and financial incentives.*
- *Grounded in science.*
- *Balanced and fair.*
- *Backed by political will.*

[1] Based on the 2005 ICLEI GHG Inventory.

[2] A stakeholder Goal Setting Workshop held in Encinitas on September 24, 2009.

Impacts of Climate Change

INTRODUCTION TO CLIMATE CHANGE

Global climate change refers to changes in average climatic conditions on Earth as a whole, including changes in temperature, wind patterns, precipitation, and storms. Global warming, a related concept, is the observed increase in average temperature of the Earth's surface and atmosphere. One identified cause of global warming is an increase of greenhouse gases (GHGs) in the atmosphere. GHGs are those compounds in the Earth's atmosphere that play a critical role in determining the Earth's surface temperature. Specifically, GHGs allow high-frequency solar radiation to enter the Earth's atmosphere, but trap the low frequency, long wave energy which is radiated back from the Earth to space, resulting in a warming of the atmosphere. The trapping of heat at the earth's surface is known as the "greenhouse effect."

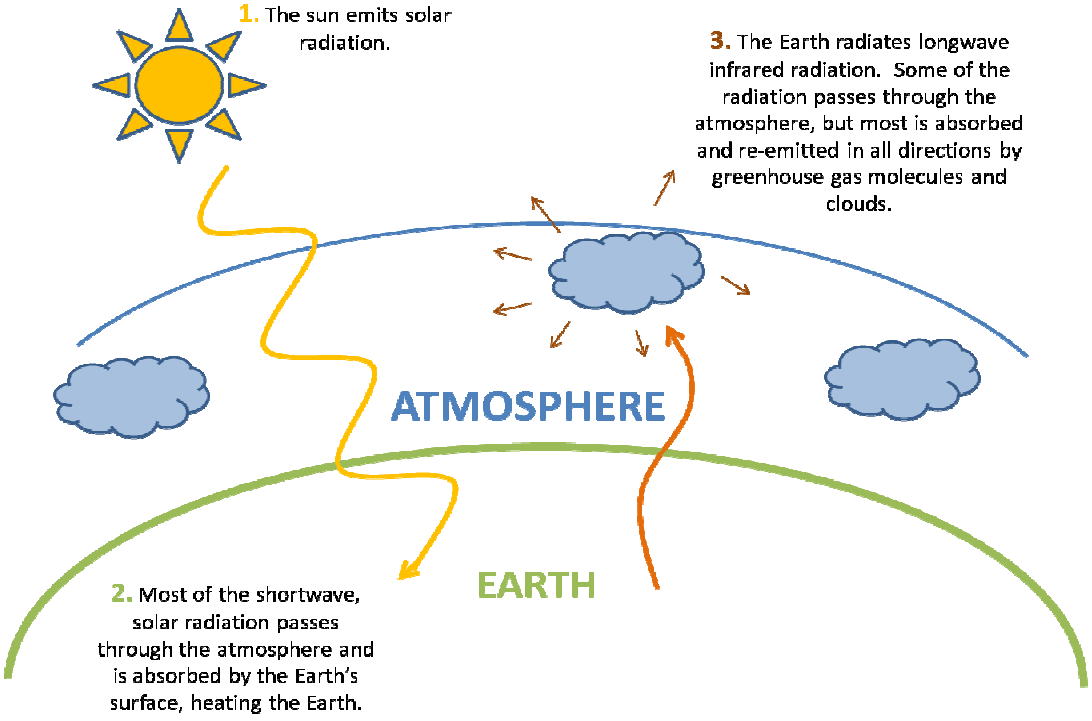


Figure 4: A simplified diagram of the greenhouse effect

Studies indicate that the effects of global climate change may include rising surface temperatures, loss of snow pack, sea level rise, more extreme heat days per year, and more drought years.[3] Scientists' understanding of the fundamental processes responsible for global climate change has improved over the past decade and predictive capabilities are advancing. However, scientific uncertainties remain regarding the response of the Earth's climate system to combinations of changes, particularly at regional and local scales. Consequently, the scientific community has systematically developed a series of scenarios using independent computer simulation models. All of these models predict significant changes in temperature and precipitation patterns. The results of this research demonstrate that our forecasted GHG emission levels may pose risks to our health, quality of life, and economy.

The six most important GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).[4] Each greenhouse gas has a different potential for trapping heat in the atmosphere, called global warming potential ("GWP"). For example, one pound of methane has 21 times more heat capturing potential than one pound of carbon dioxide, nitrous oxide has 310 times more heat capturing potential than one pound of carbon dioxide, and sulfur hexafluoride has 23,900 times more heat capturing potential than one pound of carbon dioxide. As such, GHG emissions typically are measured in metric tons of carbon dioxide equivalent ("CO_2e") units. When dealing with an array of emissions, the gases are converted to their carbon dioxide equivalents for comparison purposes. The GWPs for common GHGs are shown on the next page in Table 1.

GHGs are the result of both natural and anthropogenic activities. Forest fires, decomposition, industrial processes, landfills, and consumption of fossil fuels for power generation, transportation, heating, and cooling are the primary sources of GHG emissions. Without human intervention, the Earth maintains an approximate inter-annual balance between the emission of GHGs into the atmosphere and its storage in oceans and terrestrial ecosystems. Following the industrial revolution, however, increased combustion of fossil fuels (e.g., gasoline, diesel, coal, etc.) and other industrial processes have contributed to the rapid increase in atmospheric levels of GHGs.

[3] Existing climate change models also show that climate warming may result in a variety of impacts on agriculture including loss of microclimates that support specific crops, increased pressure from invasive weeds and diseases, and loss due to changes in water reliability and availability.

[4] California Health & Safety Code § 38505(g) recognizes the six listed gases as greenhouse gases.

Table 1 : Global Warming Potentials (GWP) of Greenhouse Gases[5]

Gas	Atmospheric Lifetime (years)	Global Warming Potential (CO_2e)
Carbon Dioxide	50 - 200	1
Methane	12	21
Nitrous Oxide	120	310
HFC-23	264	11,700
HFC-134a	14.6	1,300
HFC-152a	1.5	140
PFC: Tetrafluoromethane (CF_4)	50,000	6,500
PFC: Hexafluoroethane (C_2F_6)	10,000	9,200
Sulfur Hexafluoride (SF_6)	3,200	23,900

CALIFORNIA'S CONTRIBUTION TO CLIMATE CHANGE

California contributes significantly to anthropogenic greenhouse gas emissions. As reported by the California Energy Commission (CEC), California contributes 1.4 percent of global and 6.2 percent of national GHG emissions.[6] Figure 5 on the next page shows the transportation sector (gasoline, jet fuel, distillate, and other transportation) is the largest source of California's GHG emissions, responsible for 41 percent of the State's total emissions.

[5] Source: EPA 2006. Non CO_2 Gases Economic Analysis and Inventory. December 2006. (http://www.epa.gov/nonco2/econ-inv/table.html)

[6] California Energy Commission (CEC), 2006. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004, CEC-600-2006-013, October 2006. Source: California Air Resources Board (ARB), 2007. Draft California Greenhouse Inventory by IPCC Category, August 2007 (available at http://www.arb.ca.gov/cc/ccei/inventory/tables/rpt_inventory_ipcc_sum_2007-11- 19.pdf).

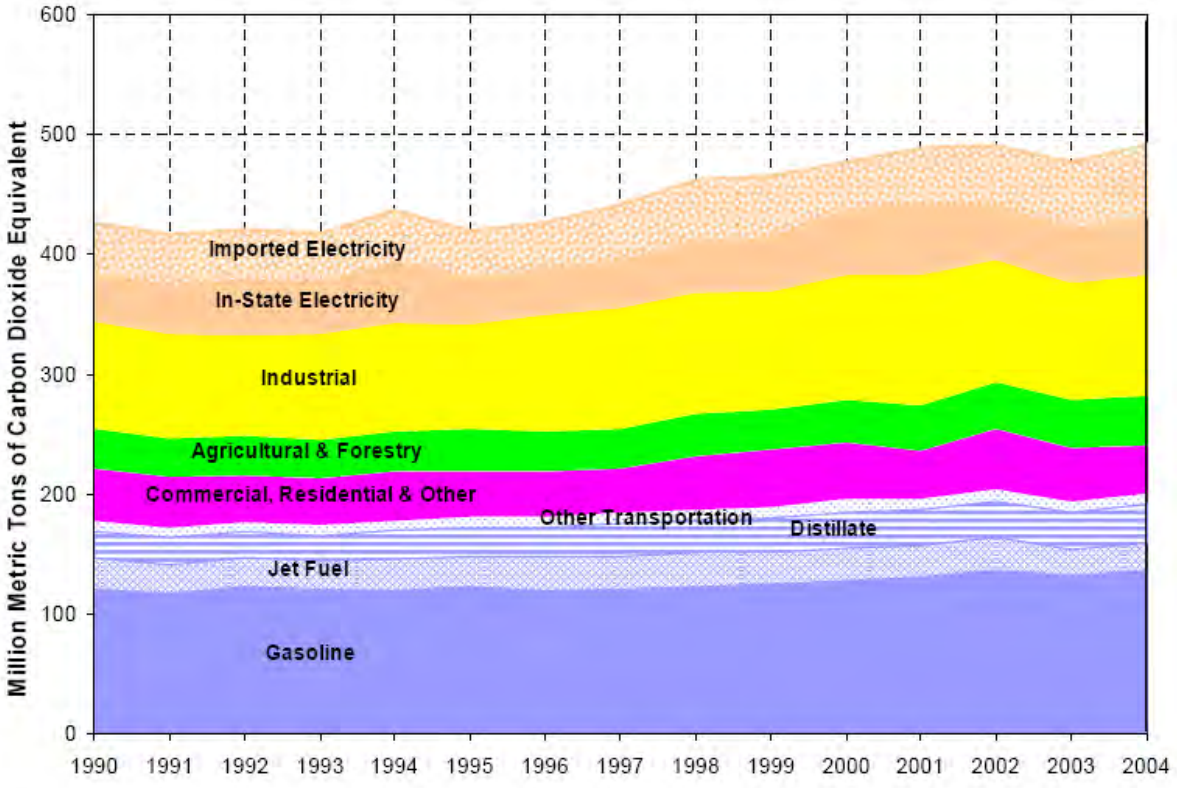


Figure 5: California's Gross GHG Emissions Trends

CLIMATE CHANGE IMPACTS

Global Projections

The warming of the climate system can currently be observed in increases in global average air and ocean temperatures, melting of snow and ice, and rising sea levels.[7] The impacts observed today, however, are expected to intensify in the future. In fact, the Intergovernmental Panel on Climate Change (IPCC) projects a warming of about 0.2 degrees Celsius per decade. Even if greenhouse gas concentrations were able to be immediately stabilized, however, the IPCC projects that climate change impacts would continue for centuries due to global climate processes and feedbacks. Figure 6 on the next page demonstrates several scenarios of climate change projections.

[7] IPCC: Summary for Policymakers. In: Climate Change 2007: The Physical Science Bases. Contribution of Working Group I to the Fourth Assess ment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

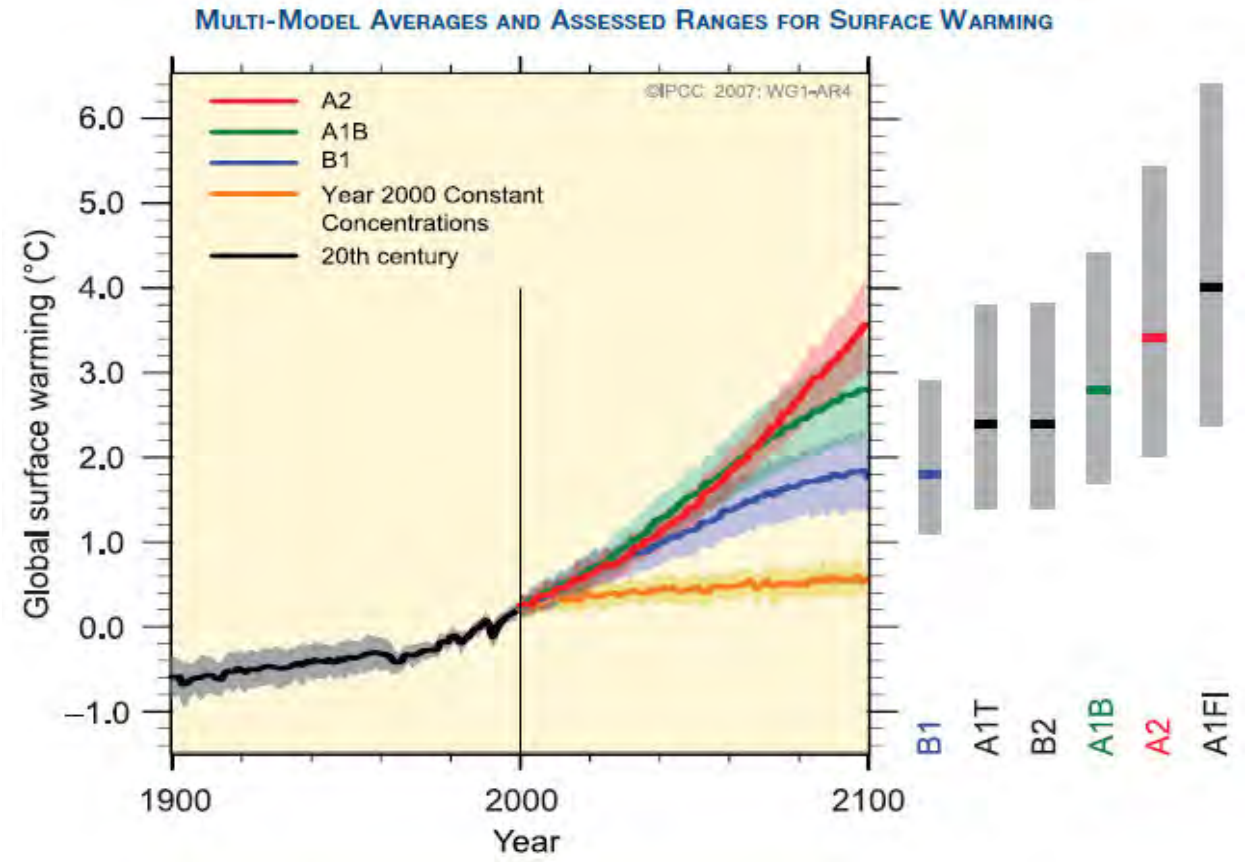


Figure 6: A graph from the *Intergovernmental Panel on Climate Change's 2007 Summary for Policymakers*. The solid lines are multi-model global averages of surface warming for several scenarios. From the top, A2 (red line) represents a scenario with a continuously increasing population and fragmented, slow technological change and economic growth. Below that, A1B (green line) represents a scenario with rapid economic growth, a global population that peaks in mid-century, and a rapid introduction of new and more efficient technologies. Third line from the top, B1 (blue line) represents an intermediate scenario with a continuously increasing global population that is slower than A2 and economic development and technological change that is less rapid than A1. Finally, the bottom orange line is scenario where concentrations are held constant at year 2000 values. Colored shading denotes the standard deviation of individual model annual averages and grey bars indicate the best estimate and likely range for each scenario.

Effects of Climate Change in California

Climate change will impact different regions around the world in various ways. In California, studies predict that conditions will become hotter and drier, with decreased snow levels and accelerating rates of sea-level rise.[8] California should also expect an increase in the intensity of extreme weather events, such as heat waves, wildfires, droughts, and floods. California's extreme warm temperatures, which have historically occurred in July and August, will most likely extend into June and September.[9] The following section details the likely impacts of climate change on California.

Temperature

Temperature increases are the major driver of the range of potential impacts that will result from climate change. For example, increases in temperature directly affect precipitation patterns, snowpack retention, oceanic volume increases and sea level rise, and health impacts.[10] The 2009 California Adaptation Strategy anticipates that California will experience temperature increases of 1.8 to 5.4 degrees Fahrenheit by 2050 and 3.6 to 9 degrees Fahrenheit by 2100. In addition to overall temperature increases, the frequency of heat waves are expected to increase, with individual heat waves also showing a tendency toward becoming longer and extending over a larger area.

Precipitation, Snowpack, and Runoff

Research suggests that in California, climate change is likely to decrease annual precipitation amounts by more than 15 percent by the end of the 21st century.[11] In addition, more of the precipitation that California receives will come in the form of rain rather than snow. This will drastically impact California's water supply, which is highly dependent on snowpack melt runoff to supply water throughout the year. In addition, with more precipitation falling as rain rather than snow, flooding from winter runoff will be an increased risk to Californians.

Weather Patterns, Storms, and Extreme Events

California will likely experience changes in heat waves, storms, and extreme weather events due to climate change. For example, heat waves are likely to become more frequent by the end of the century and storm surges and flooding in coastal storms are likely to impact the coast more severely. In addition, California's wet year and drought year cycles, which are connected to the El Nino Southern Oscillation cycles, are likely to become more intense. These changes can have significant impacts on both property and human health and safety.

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[8] Moser, Susanne, Guido Franco, Sarah Pittiglio, Wendy Chou and Dan Cayan (2008). The Future is Now: An Update on Climate Change Science Impacts and Response Options for California. 2008 Climate Change Impacts Assessment Project, Second Biennial Science Report to the California Climate Action Team, CEC-500-2008-071, Sacra mento, CA.

[9] California Climate Action Team, "Draft Biennial Climate Action Report" March 2009. Available at http://www.energy.ca.gov/2009publications/CAT-1000-2009-003/CAT-1000-2009-003-D.PDF.

[10] California Climate Action Team, "Draft Biennial Climate Action Report" March 2009. Available at http://www.energy.ca.gov/2009publications/CAT-1000-2009-003/CAT-1000-2009-003-D.PDF.

[11] California Climate Action Team, "Draft Biennial Climate Action Report" March 2009. Available at http://www.energy.ca.gov/2009publications/CAT-1000-2009-003/CAT-1000-2009-003-D.PDF.

Sea Level Rise and Flooding

The amount of sea level rise that results from climate change is highly dependent on the melting of sea ice, especially the Greenland Ice Sheet and the West Antarctic Ice Sheet. The IPCC estimates anywhere from .18 to .59 meters (0.6 to 1.9 feet) of sea level rise by the end of the 21st century, depending on different scenarios of economic, population, and technological growth.[12] Other research has also pointed to similar rates of sea level rise. Even under a low GHG emission level scenario, a total sea level rise of up to 30 cm to 45 cm (1 to 1.5 feet) by 2050, and 60 cm to 70 cm (2 to 2.3 feet) by 2100 is anticipated.[13] This implies a greater, potential threat of coastal erosion and other damage.

Water Supply

As discussed above, climate change will affect California's snowpack, precipitation, and, consequently, water supply. There is some uncertainty as to how water supplies will be affected, but even the most conservative models anticipate less stable water supplies and potentially more competition for what are already over-drafted and over-allocated resources.

Water Quality

California's water quality will likely be affected in a variety of ways. For example, changes in precipitation patterns will alter the volume of water in streams, rivers, lakes, and ponds, especially between wet and dry seasons. While during wet periods increased volumes and storm flows may increase erosion and sedimentation, during dryer periods, water bodies may experience increased temperatures due to smaller volumes of water being more drastically influenced by warmer air temperatures.

Wildfires

Many ecosystems in California are naturally fire dependent, and therefore naturally prone to wildfire. As California is likely to experience increased temperatures and reduced precipitation, these factors will likely lead to more frequent and more intense wildfires across the State.

Air Quality

Because the rate of formation of ground-level ozone (smog) is linked with higher temperatures, California will be at risk to experience more high ozone days. Thus, climate change could slow California's progress toward attainment of health-based air quality standards and increase pollution control costs, while harming public health.[14]

Economy

Each of the impacts of climate change discussed above is likely to impose substantial monetary costs to California. In fact, the California

[12] IPCC, 2007: Summary for Policymakers. In: Climate Change 2007: The Physical Science Bases. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.)]. Cambridge Univerity Press, Cambridge, United Kingdom and New York, NY, USA.

[13] City of Encinitas, 2010. Current Conditions Report. Chapter 16, Coastal Conditions.

[14] California Climate Action Team, "Draft Biennial Climate Action Report" March 2009. Available at http://www.energy.ca.gov/2009publications/CAT-1000-2009-003/CAT-1000-2009-003-D.PDF.

Climate Action Team estimates that climate change will cost California tens of billions of dollars annually. If greenhouse gas emissions begin to be reduced, however, these costs could be lowered.[15]

Benefits of Climate Action Planning

Careful planning is needed to manage the complex issue of climate change and to help mitigate the impacts. Fortunately, the reduction of GHG emissions is often associated with many other environmental, social, and economic benefits. In addition to reducing GHG emissions, this CAP will also help the City of Encinitas' and its residents to:

IMPROVE PUBLIC HEALTH & AIR QUALITY

Minimizing GHG emissions will reduce other harmful air pollutants, such as carbon monoxide, sulfur dioxide, and particulate matter, whereby benefiting the health and wellbeing of the community at large. Enabling alternative modes of transportation, such a walking and biking help people get more exercise and live healthier lives.

PROVIDE ENERGY SECURITY AND INDEPENDENCE

Addressing transportation and land use planning by supporting infill development and promoting alternative modes of transportation (e.g., walking, bicycling, and public transit) will reduce demand for imported energy, especially oil. In addition, smarter building design and construction practices, including solar heating and cooling, building orientation, and renewable energy systems, will diminish the need for fossil-fuel based energy.

HELP PEOPLE SAVE MONEY

Energy use is a major operating cost. Reducing energy demand and/or establishing better practices can help lower utility costs for individuals, households, and businesses. Investments in energy efficiency and renewable energy sources yield long-term operations and maintenance savings.

STIMULATE ECONOMIC DEVELOPMENT

Our response to the threat of climate change presents opportunities to create more livable, equitable, self-contained and economically sustainable communities. Reinvestment in local buildings and infrastructure will provide new opportunities for skilled trades and a variety of professional services. Local knowledge institutions, such as the University of California at San Diego, are well positioned to be incubators for emerging technologies and training grounds for the next generation's regional workforce.

Regulatory Context

The State of California has adopted a series of regulations, policies, and programs that are intended to work together to achieve the overall goal of reducing GHGs in the atmosphere by reducing the emissions from public and private activities within the State. The primary framework is established by the California Global Warming Solutions Act of 2006 (AB 32), which directs the California Air Resources Board (CARB) to set reporting requirements for GHG

[15] California Climate Action Team, "Draft Biennial Climate Action Report" March 2009. Available at http://www.energy.ca.gov/2009publications/CAT-1000-2009-003/CAT-1000-2009-003-D.PDF.

emissions and to develop rules and regulations needed to reduce statewide emissions to 1990 levels by 2020. In addition, Executive Order S-3-05 provides a more long-term target for California to reduce emissions to 80 percent below 1990 levels by 2050.

PAVLEY VEHICULAR EMISSIONS CODES

AB 1493 (2002)

In December of 2005, California petitioned the U.S. EPA to allow more stringent vehicular fuel economy standards. On July 1, 2009, the EPA granted California a waiver which enabled the State to enforce stricter tailpipe emissions on new motor vehicles. The standards requested by the State of California were later reinforced at the national level. On April 1, 2010, the EPA and the Department of Transportation's National Highway Safety Administration announced new light-duty vehicle greenhouse gas emissions standards and corporate average fuel economy standards. The new Federal fuel economy standards create new requirements for passenger vehicles and light trucks in model years 2012 through 2016. The standards require these vehicles to meet an average emissions level of 250 grams of carbon dioxide per mile (~34 mpg) in model year 2016, which meets the emissions standards of the Pavley codes.[16]

CALIFORNIA GREEN BUILDING INITIATIVE

EXECUTIVE ORDER S-20-04 (2004)

Executive Order S-20-04 establishes goals to reduce energy use in state-owned buildings by 20 percent from a 2003 baseline by 2015 and encourages private commercial sector buildings to meet the same goal. The initiative places the California Energy Commission in charge of developing a benchmarking system, commissioning and retro-commissioning (i.e. commissioning for existing buildings) guidelines, and developing and refining building energy efficiency standards to meet this goal.[17]

CLIMATE ACTION TEAM & CLIMATE ACTION INITIATIVE

EXECUTIVE ORDER S-3-05 (2005)

In 2005, Governor Schwarzenegger issued Executive Order S-3-05 which directed the California Environmental Protection Agency (CalEPA) to coordinate a Climate Action Team (CAT) comprised of a number of state agencies, boards, and departments. The purpose of the CAT is to coordinate statewide efforts in order to meet the State's GHG reduction targets. In addition, the CAT is responsible for reporting progress towards statewide greenhouse gas targets.[18]

[16] Environmental Protection Agency, Department of Transportation. "Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards; Final Rule." May 2010. Available at: http://www.nhtsa.gov/staticfiles-/rulemaking/pdf/cafe/CAFE-GHG_MY_2012-2016_Final_Rule_FR.pdf

[17] California Energy Commission. "Green Building Initiative: State of California Executive Order S-20-04." Accessed May 21, 2010. Available at http://www.energy.ca.gov/greenbuilding/.

[18] California Climate Change Portal. "Climate Action Team & Climate Action Initiative." Accessed May 21, 2010. Available at: www.climatechange.ca.gov-/climate_action_team/index.html.

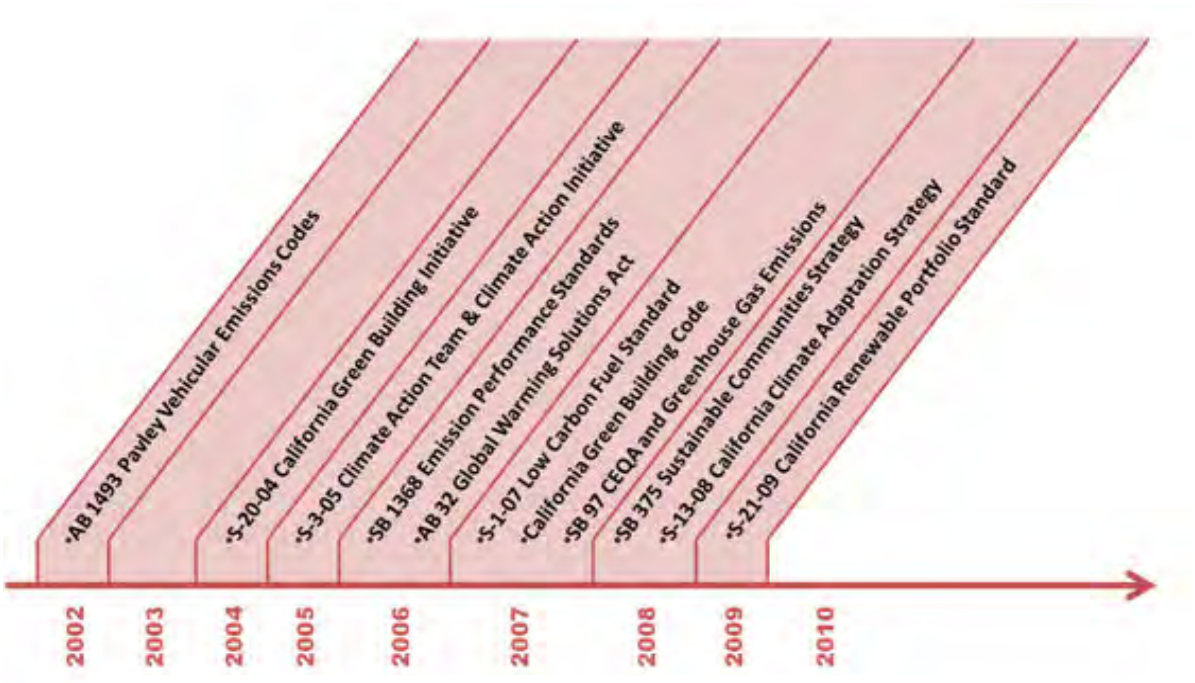


Figure 7: Timeline of California climate change regulation.

THE GLOBAL WARMING SOLUTIONS ACT

AB 32 (2006)

The Global Warming Solutions Act (2006), also known as AB 32, initiated a long term transformation of California's economy from one based on energy derived from fossil fuels to an economy supplied by clean, renewable energy sources.

AB 32 requires the CARB to prepare a roadmap, called the Scoping Plan, for achieving the State's GHG reduction goals. The Scoping Plan outlines a combination of policies, programs, and practices needed to reduce statewide emissions by 15 percent below current levels (the equivalent of 1990 levels) by 2020. Given projected trends, this would be approximately 30 percent below business-as-usual levels anticipated for 2020. Effectively, the Scoping Plan establishes a statewide carbon budget that will allow the State to grow while still meeting its emissions reduction targets.

The CARB is responsible for drafting and implementing AB 32's regulations. CARB is in the process of preparing draft rules to implement the measures described in the Scoping Plan. Rulemaking is expected to be completed by January 1, 2011, with an effective date of January 1, 2012.

CALIFORNIA RENEWABLE PORTFOLIO STANDARD

SENATE BILLS 1078 (2002) AND 107 (2006) AND EXECUTIVE ORDER S-21-09

The California Air Resources Board's (CARB) Adopted Scoping Plan makes it clear that implementation of the Renewable Portfolio Standard (RPS) is a foundational element of the State's emissions reduction plan. In 2002, Senate Bill 1078 established the California RPS program, requiring 20 percent renewable energy by 2017. In 2006, Senate Bill 107 advanced the 20 percent deadline to 2010, a goal which was expanded to 33 percent by 2020 in the 2005 Energy Action Plan II. On September 15, 2009, Governor Arnold Schwarzenegger signed Executive Order S-21-09 directing the CARB to adopt regulations increasing California's Renewable Portfolio Standard (RPS) to 33 percent by 2020. These mandates apply directly to investor-owned utilities, in this case San Diego Gas & Electric (SDG&E/Sempra Utilities).[19]

EMISSION PERFORMANCE STANDARDS

SENATE BILL 1368 (2006)

Senate Bill 1368, signed in 2006, limits California's utilities' long term investment in carbon-intensive electricity generation. Specifically, the bill allows for capital investments in baseload power plants only if their emissions are as low as or lower than emissions from a new, combined-cycle natural gas power plant and ensures that the standards will in no way impact the reliability of California's energy services.[20]

CALIFORNIA GREEN BUILDING CODE *(2007)*

In 2007, Governor Schwarzenegger directed the California Building Standards Commission to work with specified state agencies on the adoption of green building standards for residential, commercial, and public building construction. The resulting "CALGreen Code" is the nation's first statewide green building standards code. The CALGreen Code will take effect January 1, 2011, and will apply to all new construction. The code aims to achieve major reductions in GHG emissions, energy consumption, and water use throughout the State.[21]

LOW CARBON FUEL STANDARD

EXECUTIVE ORDER S-1-07 (2007)

On January 18, 2007, Governor Arnold Schwarzenegger issued Executive Order S-1-07 requiring the establishment of a Low Carbon Fuel Standard (LCFS) for transportation fuels. This statewide goal requires that California's transportation fuels reduce their carbon intensity by at least 10 percent by 2020.[22] Regulatory proceedings and implementation of the LCFS have been directed to CARB. The LCFS has been identified by CARB as a discrete early action item in the Adopted Scoping Plan. CARB expects the LCFS to achieve the minimum 10

[19] SDG&E Renewable Energy (source: http://www.sdge.com/environment/renewableenergy/about.shtml)

[20] California Energy Commission. "SB 1368 Emission Performance Standards." Accessed May 21, 2010. Available at: http://www.energy.ca.gov-/emission_standards/index.html.

[21] California Building Standards Commission. "CAL Green." Accessed May 21, 2010. Available at http://www.bsc.ca.gov/CALGreen/default.htm.

[22] California Low Carbon Fuel Standard (source http://www.arb.ca.gov/fuels/lcfs/lcfs.htm) (last visited 6/8/2009).

percent reduction goal; however, many of the early action items outlined in the Scoping Plan work in tandem with one another. To avoid the potential for double-counting emission reductions associated with AB 1493 (Pavley), the Scoping Plan has modified the aggregate transportation sector reduction expected from the LCFS to 6.7 percent from 2020 BAU.[23]

CEQA AND GREENHOUSE GAS EMISSIONS

SB 97 (2007)

Senate Bill 97, passed in 2007, is designed to work in conjunction with the California Environmental Quality Act (CEQA) as well as AB32. The bill states that greenhouse gas emissions and the effects of GHG emissions are subject to CEQA. Pursuant to SB 97, the Governor's Office of Planning and Research (OPR) developed CEQA guidelines for the mitigation of GHG emissions and the effects of GHG emissions. These guidelines are intended to help lead agencies analyze GHG-related impacts and went into effect January 2010.

SUSTAINABLE COMMUNITIES STRATEGY

SB 375 (2008)

Senate Bill 375 (SB 375), passed in 2008, is designed to help implement AB 32 by targeting GHG emissions from cars and light trucks. SB375 addresses these emissions by connecting land use planning, transportation plans and funding, and regional housing needs allocations. In short, SB 375 aims to curb sprawling land use patterns which require people to drive more, and instead move toward more compact and transit oriented development patterns.

SB 375 requires the CARB to identify GHG reduction targets for each region, and amends the regional transportation planning process by requiring Metropolitan Planning Organizations (MPOs) such as SANDAG to demonstrate through a Sustainable Community Strategy (SCS) how regional GHG targets will be met. If it is not feasible, the MPOs will have to prepare Alternative Planning Strategies (APS) to introduce additional GHG reduction measures and demonstrate how these measures will help meet the regional reduction targets. The CARB is anticipated to adopt final reduction targets by September 30, 2010.

SB 375 also provides streamlined CEQA processing for Transit Priority Projects and residential or mixed-use projects that are consistent with either the SCS or the APS.

CALIFORNIA CLIMATE ADAPTATION STRATEGY

EXECUTIVE ORDER S-13-08 (2008)

Executive Order S-13-08 aims to enhance the State's adaptation to climate change impacts including rising temperatures, changing precipitation patterns, sea level rise, and extreme natural events. This executive order facilitates the development of the State's first climate adaptation strategy and will result in consistent guidance on how to address climate change impacts in California.[24]

[23] Accessed on May 12, 2009. Available at http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm.

[24] California Office of the Governor. "Gov. Schwarzenegger Issues Executive Order Directing State Agencies to Plan for Sea Level Rise and Climate Impacts." November 14, 2008. Available at http://gov.ca.gov/press-release/11035/.

Current City Policies and Programs

The City of Encinitas has implemented various policies, programs, and activities to enhance the community's sustainability and improve energy efficiency. Since the City has already begun to reduce greenhouse gas emissions through its actions, the CAP represents a critical step in a systems approach to reducing the City's emissions and monitoring progress.

The City has adopted an ordinance requiring construction, remodel, or renovation projects greater than 10,000 square feet to prepare a Waste Management Plan and reuse or recycle at least 60 percent of construction and demolition debris.[25] In February 2010, the City adopted a Water Efficient Landscape Ordinance, which requires residential and non-residential projects above a certain size to prepare a Soil Management Report, provide water-efficient landscaping and irrigation in compliance with the City's Landscape Design Manual, demonstrate storm water management best practices, and provide defensible space for fire safety.[26] On January 1, 2010, the Planning and Building Department began administering a Green Building Incentive Program that provides financial incentives (up to $2,000 to complete the green building certification process), priority plan check, and recognition for projects that register and achieve certification through the U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Rating System, or through Build It Green's GreenPoint rating system. In June 2009, the City applied for and subsequently received an Energy Efficiency and Conservation Block Grant from the U.S. Department of Energy for funding of energy efficiency projects, including the development of an Energy Efficiency Strategy; traffic signal yellow light conversion to LED technology; and augmentation of the City's Green Building Incentive Program.

Since 2008, the City has also coordinated an energy "roadmap" program through an energy-efficiency partnership with SDG&E and SANDAG. The program provides energy management plans to local jurisdictions, consisting of outreach, education, planning and technical assistance to help take advantage of energy-saving opportunities in municipal operations and throughout the community.

Other ongoing City department activities that enhance the community's sustainability or improve energy efficiency include the following:

CITY MANAGER'S OFFICE

- Interest and intent to join the CaliforniaFIRST program - The program creates a public-private partnership to establish a Countywide Renewable Energy District to finance opportunities for energy efficiency improvements through property tax assessments.

FINANCE AND CENTRAL SERVICES DEPARTMENT

- City wide default black and white printing for all compatible printers

[25] City of Encinitas, Ordinance 2008-14, codified in Chapter 11.22 of Title 11 of the Encinitas Municipal Code.

[26] City of Encinitas, Ordinance 2010-05, codified in Chapter 23.26 of the Encinitas Municipal Code.

- City wide default double-sided printing for all compatible printers
- Banned the purchase and distribution of Styrofoam coffee cups
- Reduced number of draft budget documents distributed to staff by 33 percent
- Reduced number of published budget documents by 33 percent

FIRE DEPARTMENT

- Energy-efficient design features for Leucadia Fire Station (#3)
- Commitment to LEED for Cardiff Fire Station (#2)

HUMAN RESOURCES DEPARTMENT

- 9/80 work schedule - Civic Center is closed every other Friday promoting energy conservation and transportation demand.
- Public Transportation Commuter Reimbursement Program - Reimbursement is provided to cover a percentage of transit transportation costs to encourage City employees to utilize public transportation options for commuting to work.

INFORMATION TECHNOLOLGY DEPARTMENT

- Asset inventory/work order management program - GIS works with the Clean Water Division and the Streets Maintenance Division to assist with tracking and reporting on inspections and work orders, and to facilitate more efficient ways to affect community sustainability.
- Virtualization of City Servers – Virtual Machine or software manages servers so that the data processing of many partially loaded servers are concentrated onto a few highly loaded servers. Virtualization technology can result in significant energy savings, potentially replacing 31 existing servers with 8 virtualized servers

PARKS AND RECREATION DEPARTMENT

- Weather-sensor irrigation systems - Utilizes Weather Senors Irrigation Systems, which measures the evapotranspiration rate to sense the moisture content in the ground and adjust the watering on a daily basis. If you save water you are also saving energy.
- Electronic publications – The City's quarterly Recreation Guide brochure and Encinitas NOW! Newsletter are both now in digital format. Going digital saves over two-million sheets of paper from being printed and all the energy & waste associated with production.
- Printing on 100 percent post-consumer recycled paper stock using soy-based ink on most major outsourced printing.

PLANNING & BUILDING DEPARTMENT

- Comprehensive General Plan Update - Sustainability and energy efficiency will be heavily addressed with new and/or strengthened goals and policies as part of the update. It is anticipated that this work project will take two years to complete.
- Greenhouse gas emission baseline analysis - Through support provided by the San Diego Foundation and ICLEI USA, a greenhouse gas emission inventory (governmental operations and city-wide) was conducted for the City to serve as a baseline for this Climate Action Plan.

PUBLIC WORKS DEPARTMENT

- Award-winning solar & energy-efficiency upgrades to City Hall - The Civic Center Roof Replacement/Energy Conservation Improvement Project consisted of a new "Cool Roof", construction of a 96 KW photovoltaic solar array, installation of skylights and solar tubes, an upgraded building energy management system, and central plant and thermal energy storage system.
- Pursuit of LEED-EB: operations & maintenance for City Hall - The City is pursuing LEED certification for the Civic Center building. It is anticipated the project will receive LEED-EB O&M "Silver" certification; but the project could attain a LEED rating for "Gold".
- Green design in Encinitas Library - The City library has incorporated green building standards into the facility, including: Thermal Displacement Ventilation; Automatic Daylight Harvesting System; Energy Efficient Equipment; post-consumer recycled content material; etc.
- Tree Policy and development of SOPs for tree protection - Council approved the Tree Policy in March 2009 and developed Standard Operating Procedures for tree protection.
- Replaced bottled water with water-filtration systems in City facilities
- Environmentally Preferable Purchasing Policy - A city-wide organizational policy was developed to promote sustainability in purchasing practices.
- Green Cleaning – A High Performance Cleaning Program is being developed to address cleaning products, practices and equipment.
- Exterior lighting retrofits - Retrofits are being evaluated for City Hall, Public Works Yard and the Community Center.
- Traffic signal lighting retrofits - Replacement of traffic signal incandescent bulbs with energy efficient LED bulb technology.
- Incorporates Green elements as feasible into infrastructure projects - Design and treatment devices include, but not limited to, recycled asphalt for street overlays, roundabouts, reclaimed irrigation, and improving community multi-modal travel (walkways and bikeways).
- Design of a new water/energy efficient sewer pump station

SAN DIEGUITO WATER DISTRICT

- Smart landscape program - The San Dieguito Water District signed an MOU for the Smart Landscape Program with the County Water Authority. The programs are administered through Honeywell and provide incentive opportunities for customers to upgrade to water conserving devices.
- Single-family residential programs - Services include such programs as home surveys, water audits, inspections for irrigation equipment retrofits.

STORM WATER MANAGEMENT DIVISION

Development oversight, inspection and enforcement, and outreach - Develops and administers State mandated storm water management programs to protect, regulate, and enhance surface water quality throughout the City of Encinitas. The administration of the Clean Water Program includes core functions to meet State requirements, and to protect the health, welfare, and safety of the public including water quality monitoring, facility inspection,

development oversight, enforcement and complaint response, watershed management, and community education and outreach activities.

ENVIRONMENTAL ADVISORY COMMISSION

- Developed first City Environmental Policy - This Policy presents a vision and a commitment for the City to move toward innovative energy, water, and resource use; and includes guiding principles such as "Builds, Plans, and Plants Wisely", "Cleans the Air", "Urban Forest Management Program", and "Uses Energy Wisely".
- Provides ongoing "Greening our Community" informational presentations on environmental topics
- Recommended City "Green Team" - Team was established to have various City Departments involved in green issues, programs, education and outreach at City Hall.
- Coordinated reusable bag giveaways and outreach with grocery stores - For several years, the City of Encinitas has been involved in promoting reusable shopping bags through their reusable bag giveaway promotions. As of this writing, an estimated 7,000 bags have been given to residents.
- Developing City-wide Environmental Action Plan - Action plan will be developed to promote a shared vision of environmental sustainability throughout city government and the community.

Photo: City of Encinitas Civic Center

EMISSIONS BASELINE, PROJECTIONS, AND REDUCTIONS TARGET

In 2005, the City of Encinitas partnered with members of the San Diego Regional Climate Protection Initiative, including the San Diego Foundation; local governments in San Diego County; and ICLEI - Local Governments for Sustainability (ICLEI) to conduct an initial inventory of Encinitas' greenhouse gas emissions. The inventory was conducted in order to help the City understand the emissions associated with operations within the City and to establish an emissions baseline from which to compare future emissions. The final report, which presented the City's 2005 baseline emissions as well as 2020 business-as-usual projections, was completed in August 2009 and provided the basis for this Climate Action Plan.

2005 Baseline GHG Emissions Inventory

A greenhouse gas emissions inventory compiles information about energy and emissions related to activities within a defined boundary. The City of Encinitas' inventory quantifies emissions occurring within the City's boundary, as well as those emissions associated with services provided to its citizens such as electricity consumption, wastewater, and solid waste.

The inventory (Appendix A) has been organized by the following major categories, called "sectors," including transportation, residential buildings, commercial and industrial buildings, solid waste, wastewater, and municipal operations. The GHG emissions quantified in each of these sectors are associated with a variety of sources, including direct combustion of fossil fuels, purchased electricity, purchased fuels, and fugitive emissions. These sources and GHG emissions are described in more detail in Appendix B.

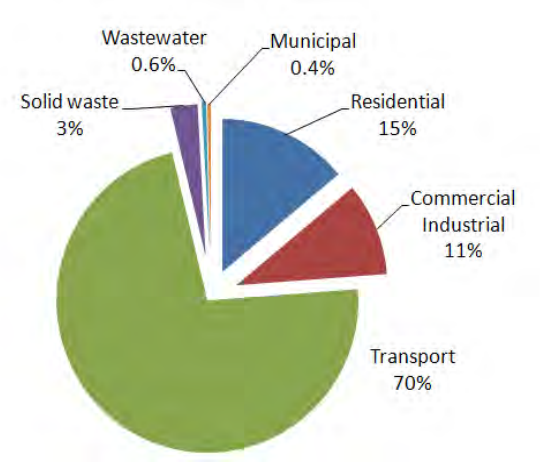


Figure 8. 2005 City of Encinitas' City-wide GHG emissions, totaling 548,993 $MTCO_2e$.

Figure 8 illustrates the baseline inventory developed for the City in collaboration with ICLEI.[27] The ICLEI inventory calculates 2005 City-wide emissions to be 548,993 $MTCO_2e$. Figure 8 graphically represents the "sectors" of emissions and allows the City to quickly pinpoint areas on which to focus attention. These sectors provide the largest opportunities for emissions reductions.

The City prepared two baseline inventories: one for community-wide emissions and one for emissions attributed to municipal operations.

[27] The ICLEI inventory process does not include emissions associated with the supply and delivery of water.

For the purposes of conducting a baseline emissions inventory and forecast, city-wide emissions have been defined as the summation of municipal emissions and community emissions. Both were developed using the ICLEI software tool and included actual utility information for electricity, natural gas, and wastewater treatment. Estimates for vehicle miles traveled (VMT) were calculated using the San Diego Association of Governments' (SANDAG) Regional Transportation Plan 2030. Additional information on the assumptions included in the baseline inventory can be found in Appendix B.

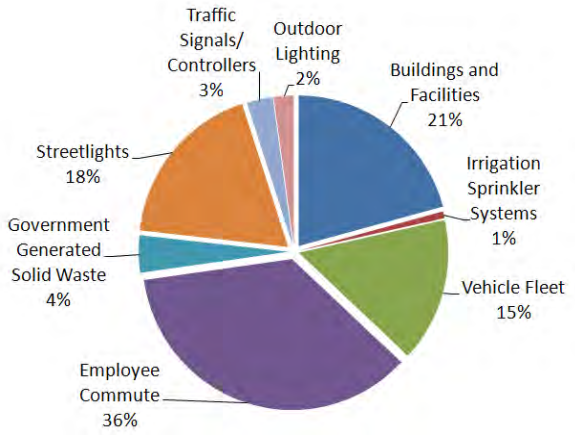


Figure 9. 2005 Encinitas Municipal GHG emissions, totaling 2,425 $MTCO_2e$.

MUNICIPAL OPERATIONS

Emissions associated with municipal operations were calculated to provide additional information for City decision makers. The City of Encinitas' municipal operations, shown in Figure 9, account for less than one percent, about 2,425 $MTCO_2e$, of the City's combined GHG emissions.

While this number may seem relatively insignificant, it is important because it represents an opportunity for the City to take a leadership role by demonstrating how to reduce GHG emissions. City Hall also plays a critical role in setting policies and instituting programs that can reach far into the Encinitas community. People interact with local government on a daily basis, directly and indirectly, by visiting municipal buildings, driving on publicly illuminated streets, frequenting public parks, etc. By implementing best management practices in its municipal operations, the City can positively influence both individual and corporate behavior within the community.

COMMUNITY-WIDE EMISSIONS

Community-wide emissions are those associated with the operation of buildings, land, or other such items not owned and operated by the City of Encinitas such as building-related energy use, transportation, and solid waste. The actual point of emissions release for some activities may be outside of the physical boundaries of the City. However, in each case emissions associated with the activities are within the City's regulatory authority. For example, buildings, which must comply with local codes and regulations, are both points of emission and points of control over remote or indirect emissions. Buildings emit CO_2 when fuel is burned (e.g., for space heating or cooking), and they also consume electricity and generate GHG emissions from remote power plants. Although often categorized differently, both types of emissions have equal impacts on the global atmosphere and represent important opportunities for emissions reduction through actions in the City.

Encinitas' 2005 community-wide emissions were about 546,548 $MTCO_2e$. Since the San Dieguito Water District (SDWD) and Olivenhain Municipal Water District (OMWD) operate water distribution in the City, these sources (supply and delivery of water) are not included in the baseline emissions inventory and forecast.

As shown in Figure 10, GHG emissions associated with the community are dominated by the transportation sector, which comprises 70 percent of total City-wide emissions. The main form of travel within the community is by single-occupant vehicles. The second largest emitter in the community is the residential sector, followed by the commercial/industrial sector. These three sectors account for approximately 96 percent of the City-wide total emissions. Understanding the breakdown of emissions will allow the City to evaluate and assess current policies, plans, and programs in place and provide guidance on potential new approaches and/or improvements to address reducing greenhouse gas emissions.

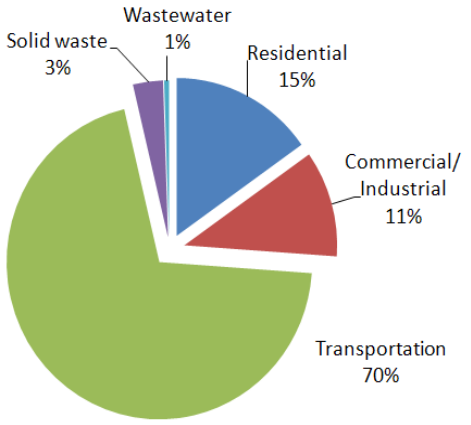


Figure 10. 2005 Encinitas Community-wide GHG emissions, totaling 546,548 $MTCO_2e$.

Encinitas 2020 Forecast & Target Reductions

On a policy level, California has committed to reducing GHG emissions while also accommodating a growing population and encouraging economic growth and prosperity. As discussed previously, the California Air Resources Board (CARB) has adopted the "Scoping Plan" as the State's roadmap for achieving reductions. The Scoping Plan forecasts future GHG emissions using anticipated demographic and economic growth in the State to develop a "business-as-usual" scenario. The basis for this analysis assumes current development patterns, electric grid, fuels, and building and transportation efficiencies remain constant. The business-as-usual (BAU) scenario represents future GHG emissions without implementing any policies or programs to reduce emissions. The Scoping Plan also quantifies the impact of various policy options and programs on reducing emissions. The strategies evaluated work toward reaching the statewide GHG reduction goals highlighted in AB32.

2020 BAU FORECAST GHG INVENTORY

In addition to the baseline GHG inventory, ICLEI also performed a BAU forecast for the City based on anticipated population and household growth and if the City of Encinitas continues with the 2005 pattern of transportation, energy consumption and waste production. The information helps the City frame the challenge ahead with regard to the ease of achieving city-wide reduction targets over the next decade. The inventory forecasts about 18 percent growth in total city emissions from 2005 to 2020, with 2020 emissions reaching 646,947 $MTCO_2e$.

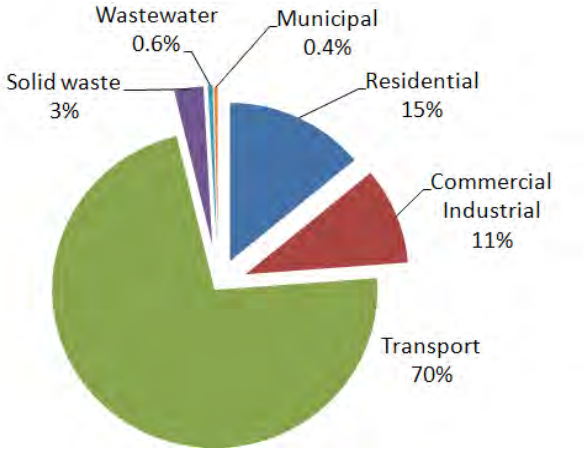


Figure 11. 2020 City of Encinitas' Citywide GHG emissions, forecast to be 646,947 $MTCO_2e$.

Based on the BAU forecast shown in Figure 11, the largest sectors of GHG emitters in 2020 are anticipated to be transportation, residential buildings, and commercial/industrial buildings respectively. Understanding future emissions assists the City in prioritizing emissions reduction strategies and direct resources and efforts more effectively and efficiently.

REDUCTION TARGET

The City of Encinitas has made a commitment to understand the GHG emissions associated with the City's activities. The 2005 baseline emissions inventory and 2020 business-as-usual emissions forecast provide the necessary background for the City to identify and target sectors for reduction potential.

Taking into consideration the recommendation in the CARB Scoping Plan, and based on the reduction strategies outlined in the CAP and implementation thereof, the City can reduce city-wide emissions by 12 percent relative to current levels. This Climate Action Plan categorizes a list of emissions reduction strategies designed to assist the City in reaching its reduction goal.

The City of Encinitas baseline inventory established that 2005 city-wide emissions totaled **548,993** metric tons of CO_2equivalent (CO_2e). Population growth and development planned for the City of Encinitas by 2020 are expected to increase city-wide emissions to **646,947** metric tons of CO_2e, an overall increase of almost 18 percent. As shown in Figure 12 to achieve the 12 percent reduction target from the 2005 baseline, the City must develop and implement strategies that reduce emissions by approximately 164 thousand metric tons of CO_2e in 2020. Given projected trends, this reduction would reduce 2020 emissions to approximately 25.4 percent below 2020 business-as-usual levels (levels anticipated for 2020 in the absence of any local, state, or Federal interventions).

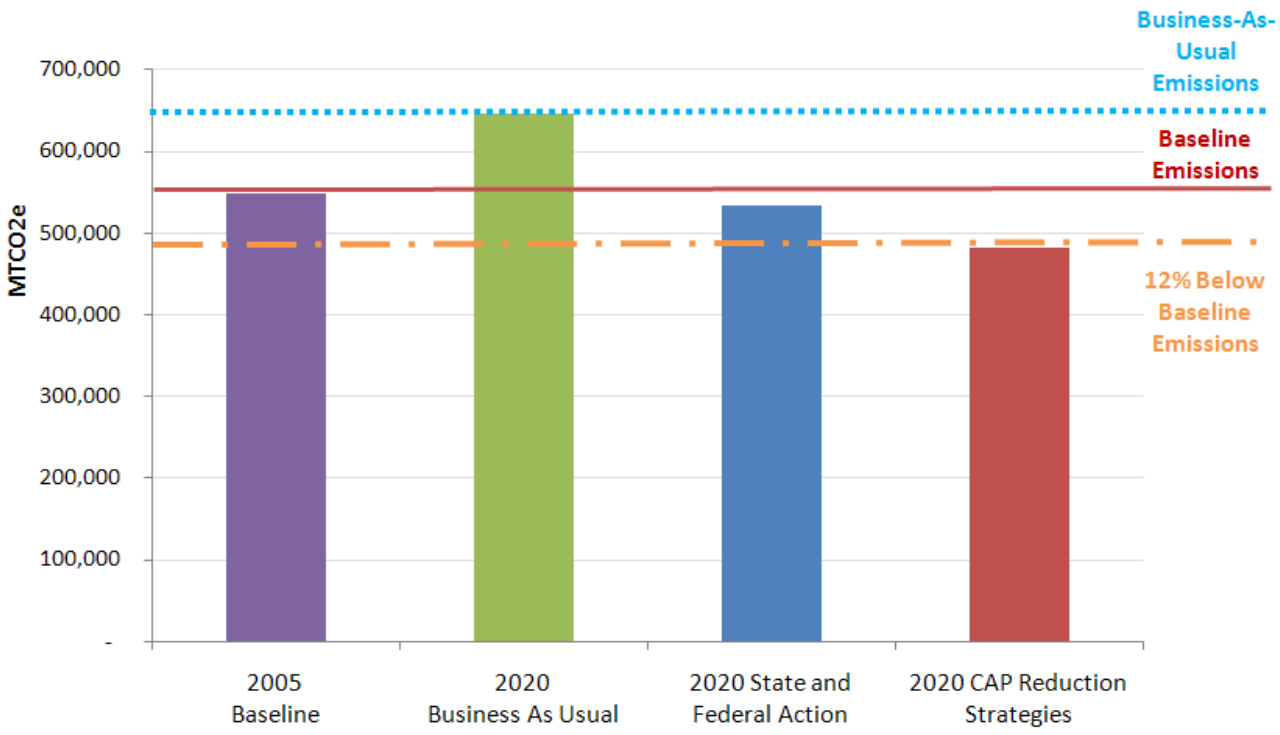


Figure 12: City of Encinitas' emissions and targets. The dotted blue line represents the City's BAU scenario while the solid red line represents constant emissions at baseline 2005 levels. The dashed orange line represents projected Encinitas emissions with the reduction strategies presented in this CAP.

EMISSION REDUCTION OPPORTUNITIES

In order for the City of Encinitas to continue growing while still meeting its GHG reduction targets, broad-based participation is essential; no single sector, organization, or institution can achieve this goal on its own. Everyone who lives, works, shops, or plays in the City contributes to the community's GHG emissions, and everyone will need to be part of the solution. The following section presents GHG reduction strategies for the City of Encinitas that are applicable to every sector within the City. The strategies are arranged in a framework that will provide the City with an efficient pathway for implementing emissions reduction policies.

The reduction strategies focus on actions our community and municipal operations should implement between now and the year 2020. The strategies do not address the ownership of emissions or, in most cases, responsibility for specific emissions reductions. Rather, the CAP views the City as a nexus for many different types of emissions that may ultimately be owned or controlled by a wide-range of stakeholders. Ultimately, federal, state, and local actions will combine to help the City achieve its emissions reduction goal.

Each strategy recommended in this CAP was evaluated and selected with the following criteria in mind:

FEASIBILITY

The extent to which the strategy is achievable based on current constraints

REDUCTION POTENTIAL

Total anticipated greenhouse gas emissions reductions

CONTROLLABILITY

Who has control over measure implementation and the means by which the measure will be implemented, such as a policy, code amendment, or incentive program.

COST

The extent of implementation costs for which either the City or the community would be accountable

OTHER IMPACTS

Other potential positive or negative effects or impacts not considered by other criteria

How the Plan is Built

The reduction strategies are divided into the following major strategies:

STATE AND FEDERAL STRATEGY

Encinitas will benefit from emission reduction strategies implemented by the State of California or Federal Government. While the City does not play any direct role in implementing these strategies, the resulting reductions will contribute significantly to the City's future emissions profile.

TRANSPORTATION

Encinitas' transportation strategy covers a broad range of activities that aim to reduce vehicle miles traveled, improve mobility, and enhance vehicle fuel efficiency. Specific implementation measures involve changing land uses, adopting a new perspective on com-

munity design, promoting alternative modes of travel, and revising antiquated parking standards.

RESIDENTIAL BUILDINGS

Residential buildings offer opportunities for emissions reductions in new development as well as existing structures. Generally, residential building strategies focus on site specific design and innovation and technological improvements that increase energy efficiency and provide renewable energy generation. Because residential property owners, and potentially their respective tenants, have different needs and demands, reduction strategies consist of a mixture of regulatory mandates and incentives to improve building performance.

NON-RESIDENTIAL BUILDINGS

Non-residential buildings offer opportunities for emissions reductions from design and technological improvements in new and existing structures. These reduction strategies consist of a mixture of regulatory mandates and incentives to improve building performance.

SOLID WASTE

Reducing the generation of solid waste in a community has potential for emissions reductions. This will require city-wide policies as well as behavioral changes at the individual level.

WATER

The treatment and transportation of water is associated with GHG emissions; thus installing water-saving appliances and fixtures in buildings, irrigation controllers in irrigated land, and increasing the use of reclaimed water can significantly reduce emissions. However, because the embodied emissions associated with the transportation of water were not quantified as part of Encinitas' inventory, these strategies are not quantifiable as reductions within the CAP. They do remain, however, important strategies for the City to implement.

MUNICIPAL OPERATIONS

This CAP considers strategies and potential policies specific to municipal operations. These are strategies that the City can take to reduce the emissions directly owned or controlled by the City of Encinitas. These strategies include reductions associated with the City's vehicle fleet, employee commute, water use, and buildings and facilities. As an employer, landowner, and regulatory entity, the City of Encinitas can set an example of sustainability practices for the community.

Each strategy described in this CAP contains objectives and measures, providing a framework to implement the goals of the Climate Action Plan.

Strategy A strategy is a high level goal for each of the major categories (State and Federal Transportation, Residential Buildings, Non-Residential Buildings, Solid Waste, Water, and Municipal Operations).

Objectives Objectives refine each strategy into specific focus areas.

Measures Measures define the specific steps that the City will implement over time to accomplish its reduction goals.

Summary of Results

Through a combination of proposed federal, state, and city-level reduction measures, Encinitas can anticipate an emissions reduction of over 164 thousand metric tons of carbon dioxide equivalent from their 2020 business-as-usual scenario as shown in Figure 13. This is approximately equivalent to the total greenhouse gas emissions from 31,388 average US passenger vehicles in one year.[28]

The following pages summarize the strategies, objectives, and measures analyzed in this CAP. When feasible, the potential reduction value of each measure has been quantified and costs (private and city) broadly estimated as 'high', 'medium', or 'low'. These estimates include both capital and administrative costs in implementing such programs, and have been determined based on CTG's prior experience and expertise in the implementation of CAP measures and related sustainability programs. In many cases, measures are not able to be reasonably estimated, in which case it is labeled "not quantified." As with all greenhouse gas projections, the values presented are approximate due to their dependence on unpredictable future variables. Estimating the reduction potentials, however, gives a good sense of the relative magnitude of emissions reductions and presents a good roadmap to help the City prioritize policies in the future.

Photo: Green design in Encinitas' Library with solar and roof-top energy efficiency upgrades to City Hall below.

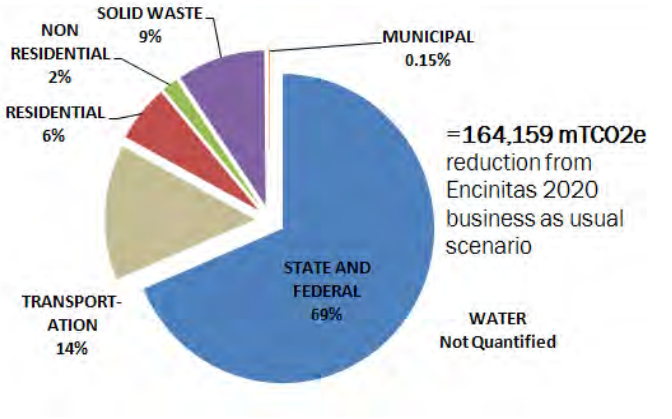
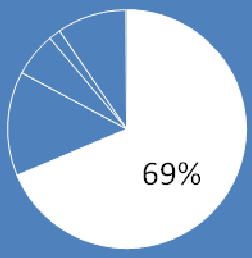


Figure 13: City of Encinitas' emissions reductions from 2020 business-as-usual scenario due to anticipated Federal, State, and City strategies.

[28] Source: U.S. Environmental Protection Agency Greenhouse Gas Equivalencies Calculator. http://www.epa.gov/cleanenergy/energy-resources/calculator.html

REDUCTION STRATEGIES

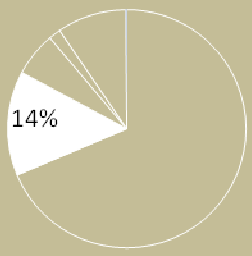
STATE AND FEDERAL STRATEGY



of Total Encinitas Reductions
=112,680 mTCO2e

Measure		$mTCO_2e$ Reduction
OBJECTIVE: STATE AND FEDERAL CODES AND STANDARDS		
S&F- 1	Renewable Portfolio Standard	12,890
S&F- 2	Low Carbon Fuel Standard	31,180
S&F- 3	Corporate Average Fuel Economy	65,590
S&F- 4	Title 24 – Residential Buildings	2,330
S&F- 5	Title 24 – Non-Residential Buildings	690

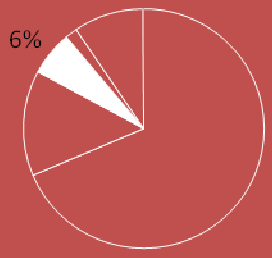
TRANSPORTATION STRATEGY



of Total Encinitas Reductions
=23,306 mTCO2e

Measure		$mTCO_2e$ Reduction
OBJECTIVE: REVISE PARKING STANDARDS AND POLICIES		
T- 1	Parking maximums for new commercial and industrial development	322
T- 2	Parking requirement reductions for new developments close to transit	113
T- 3	Traffic study to identify and implement infrastructure improvements	4,690
OBJECTIVE: PROMOTE BICYCLE USE FOR COMMUTING AND RECREATION		
T- 4	Bikeway Master Plan implementation and action items	141
T- 5	Bicycle lockers, showers, and bike racks on site	1,610
OBJECTIVE: ENCOURAGE ALTERNATIVE COMMUTE MODES		
T- 6	Telework or alternative work schedule programs	13,740
T- 7	Capital project prioritization funding and agency coordination to encourage alternative transportation	Not quantified
T- 8	Complete neighborhood program	1,720
T- 9	Guaranteed ride home program for the community	970

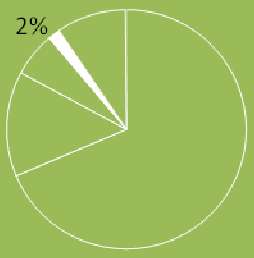
RESIDENTIAL BUILDING STRATEGY



of Total Encinitas Reductions
=9,840 mTCO2e

Measure		$mTCO_2e$ Reduction
OBJECTIVE: INCREASE ENERGY EFFICIENCY OF RESIDENTIAL BUILDINGS		
R- 1	Point-of-sale energy efficiency audits for existing residential buildings	Not quantified
R- 2	New residential buildings to perform 15 percent above Title 24 Code	60
OBJECTIVE: PROMOTE RENEWABLE ENERGY INSTALLATIONS ON RESIDENTIAL BUILDINGS		
R- 3	Solar PV and solar water heating on all new single-family residential building construction	1,620
R- 4	Solar water heating on existing single-family residential buildings	4,250
R- 5	Solar PV on existing single-family residential buildings	3,910
OBJECTIVE: PROMOTE THE CONSTRUCTION OF GREEN BUILDINGS		
R- 6	City of Encinitas' Green Building Incentive Program	Not quantified

NON-RESIDENTIAL BUILDING STRATEGY

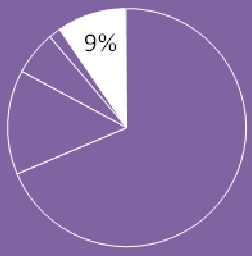


of Total Encinitas Reductions
=2,680 mTCO2e

Measure		$mTCO_2e$ Reduction
OBJECTIVE: PROMOTE THE CONSTRUCTION OF GREEN BUILDINGS		
NR- 1	City of Encinitas' Green Building Incentive Program	Not quantified
NR- 2	Mandatory green building program for new non-residential buildings over 5,000 SF by 2020	Not quantified
OBJECTIVE: INCREASE ENERGY EFFICIENCY OF NON-RESIDENTIAL BUILDINGS		
NR- 3	New non-residential buildings to exceed Title 24 by 15 percent	100
OBJECTIVE: PROMOTE RENEWABLE ENERGY INSTALLATIONS ON NON-RESIDENTIAL BUILDINGS		
NR- 4	Solar PV on new non-residential buildings	190
NR- 5	Solar PV on existing non-residential roof area	2,390

REDUCTION STRATEGIES

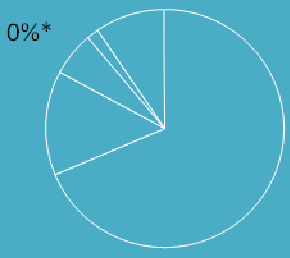
SOLID WASTE STRATEGY



of Total Encinitas Reductions
=15,410 mTCO2e

Measure		$mTCO_2e$ Reduction
OBJECTIVE: REDUCE WASTE FROM CITY, CITIZEN, AND BUSINESS OPERATIONS		
SW- 1	Zero-waste community	15,410

WATER STRATEGY

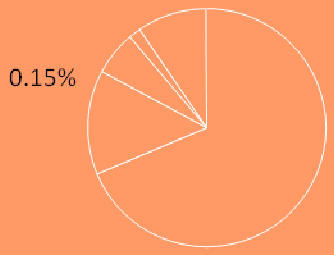


of Total Encinitas Reductions
=unquantified mTCO2e

Measure		$mTCO_2e$ Reduction
OBJECTIVE: CONSERVE WATER RESOURCES		
W- 1	Installation of water efficient appliances in existing and new buildings	Not quantified
W- 2	Reduced water consumption and recycled water use in landscaping	Not quantified

***** The embodied emissions associated with water were not quantified as part of Encinitas' inventory, thus the reductions from these strategies are not quantifiable.

MUNICIPAL STRATEGY



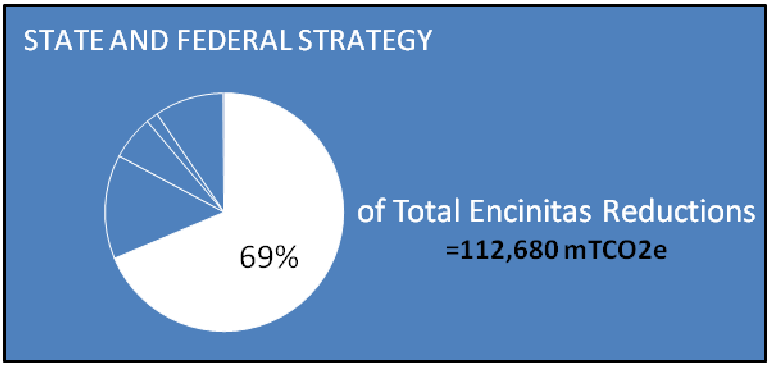
of Total Encinitas Reductions

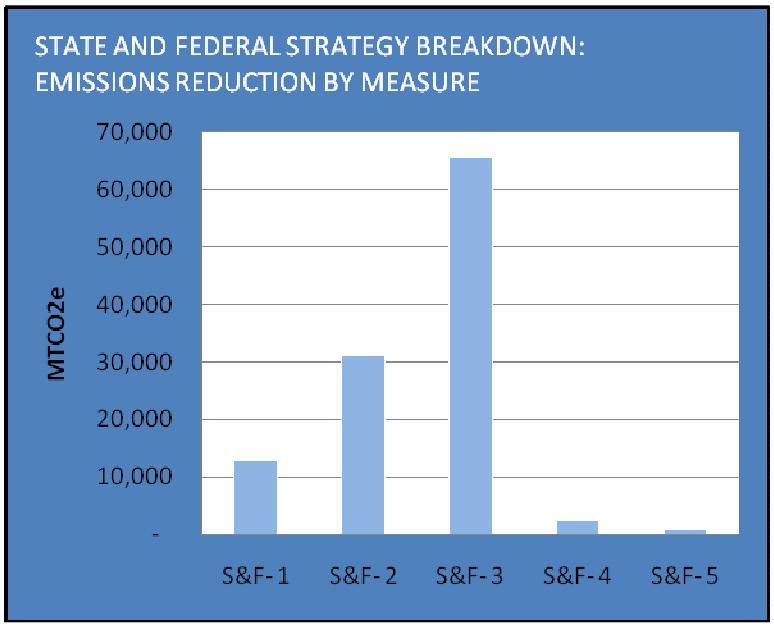
=243 mTCO2e

Measure		$mTCO_2e$ Reduction
OBJECTIVE: REDUCE EMPLOYEE TRANSPORTATION IMPACTS		
M- 1	Alternative and more fuel efficient vehicles	50
M- 2	Car sharing and bicycle sharing programs	10
M- 3	Guaranteed ride home for city employees	3
M- 4	Telework or alternative work schedule programs	30
OBJECTIVE: INCREASE WATER EFFICIENCY AND REUSE		
M- 5	Increase reclaimed water use to all parks and open space	Not quantified
M- 6	Increase water efficiency in all city facilities	Not quantified
OBJECTIVE: INSTITUTIONALIZE GREEN BUILDING PRACTICES		
M- 7	All new municipal buildings over 5,000 SF to achieve LEED silver	Not quantified
M- 8	Existing municipal buildings over 5,000 SF to achieve LEED silver	40
M- 9	Retrofit projects on existing municipal buildings less than 5,000 SF	10
OBJECTIVE: INSTALL RENEWABLE ENERGY SYSTEMS		
M- 10	On-site renewable energy on new municipal buildings	Not quantified
M- 11	On-site renewable energy on existing municipal buildings	100

State and Federal Strategy

Benefit from the policies and standards at the State and Federal level that reduce greenhouse gas emissions city-wide.





REDUCTION MEASURES

S&F- 1: Renewable Portfolio Standards

S&F- 2: Low Carbon Fuel Standards

S&F- 3: Corporate Average Fuel Economy Standards

S&F- 4: Title 24 Residential Codes

S&F- 5: Title 24 Non-Residential Codes

STATE AND FEDERAL CODES AND STANDARDS

S&F - 1: Renewable Portfolio Standards

12,890 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Statewide Standard
Responsibility	California Air Resources Board
Cost to City	Low
Private Cost	Low

Measure Description: The California Air Resources Board's (CARB) Adopted Scoping Plan makes it clear that implementation of the Renewable Portfolio Standard (RPS) is a foundational element of the State's emissions reduction plan. In 2002, Senate Bill 1078 established the California RPS program, requiring 20 percent renewable energy by 2017. In 2006, Senate Bill 107 advanced the 20 percent deadline to 2010, a goal which was expanded to 33 percent by 2020 in the 2005 Energy Action Plan II. On September 15, 2009, Governor Arnold Schwarzenegger signed Executive Order S-21-09 directing the CARB to adopt regulations increasing California's Renewable Portfolio Standard (RPS) to 33 percent by 2020. These mandates apply directly to investor-owned utilities, in this case SDG&E/Sempra Utilities.[29] Consequently, the scenario with 2020 State and Federal actions considered in this analysis assumes that utilities will reduce the carbon intensity of delivered electricity equivalent to meeting the 33 percent RPS goal by 2020.

Estimates and Assumptions: Predicted emissions reductions are based on assumptions presented in California Air Resources Board's Scoping Plan[30]. The Scoping Plan assumes that statewide, RPS will enable approximately 21.3 $MMTCO_2e$ emissions reductions from 2020 BAU (Scoping Plan, Page 46), with 2020 BAU for electricity projected as 139.2 $MMTCO_2e$ (Scoping Plan, Page 13). This 15 percent reduction from 2020 BAU was applied to projected 2020 city-wide electricity emissions for Encinitas.

S&F - 2: Low Carbon Fuel Standards

31,180 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Statewide Standard
Responsibility	California Air Resources Board
Cost to City	Low
Private Cost	Low

Measure Description: On January 18, 2007, Governor Arnold Schwarzenegger issued Executive Order S-1-07 requiring the establishment of a Low Carbon Fuel Standard (LCFS) for transportation fuels. This state-wide goal requires that California's transportation fuels reduce their carbon intensity by at least 10

[29] SDG&E Renewable Energy (source: http://www.sdge.com/environment/renewableenergy/about.shtml)
[30] California Air Resources Board. "Climate Change Scoping Plan." December 2008. Available at http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf.

percent by 2020.[31] Regulatory proceedings and implementation of the LCFS have been directed to CARB. The LCFS has been identified by CARB as a discrete early action item in the Adopted Scoping Plan. CARB expects the LCFS to achieve the minimum 10 percent reduction goal; however, many of the early action items outlined in the Scoping Plan work in tandem with one another. To avoid the potential for double-counting emission reductions associated with AB 1493 (Pavley), the Scoping Plan has modified the aggregate transportation sector reduction expected from the LCFS to 6.7 percent from 2020 BAU.[32] In accordance with the Scoping Plan, this analysis incorporates the modified reduction potential for the LCFS – and applies it to the 2020 city-wide transportation emissions for Encinitas.

Estimates and Assumptions: Predicted emissions reductions are based on assumptions presented in California Air Resources Board's Scoping Plan.[33] The Scoping Plan assumes that statewide, LCFS will enable approximately 15 $MMTCO_2e$ emissions reductions (Scoping Plan, Page 47) from the transportation sector 2020 BAU, with 2020 BAU for transportation projected as 225.4 $MMTCO_2e$ (Scoping Plan, Page 13).

S&F - 3: Corporate Average Fuel Economy Standards

65,590 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Federal Standard
Responsibility	Environmental Protection Agency and Department of Transportation's National Highway Safety Administration
Cost to City	Low
Private Cost	Low

Measure Description: On April 1, 2010, the Environmental Protection Agency (EPA) and the Department of Transportation's National Highway Safety Administration announced new light-duty vehicle greenhouse gas emissions standards and corporate average fuel economy standards. The new Federal standards create new requirements for increases in fleet-wide fuel economy for passenger vehicles and light trucks in model years 2012 through 2016. The standards require these vehicles to meet an average emissions level of 250 grams of carbon dioxide per mile in model year 2016, which is approximately equivalent to 35.5 miles per gallon. The EPA forecasts that these standards, in total, would reduces CO_2

[31] California Low Carbon Fuel Standard (source http://www.arb.ca.gov/fuels/lcfs/lcfs.htm) (last visited 6/8/2009).
[32] Available at http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm (last visited 5/12/2009).
[33] California Air Resources Board. "Climate Change Scoping Plan." December 2008. Available at http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf.

emissions from the U.S. light-duty fleet by approximately 21 percent by 2030 over the level that would occur in the absence of the national program.[34]

Estimates and Assumptions: Predicted emissions reductions for Federal CAFE Standards are based on assumptions presented in California Air Resources Board's Scoping Plan[35] for California Light-Duty Vehicle Greenhouse Gas Standards. According to EPA's Endangerment Finding, the proposed GHG standards would reduce GHG emissions by nearly 950 $MMTCO_2e$ and conserve 1.8 billion barrels of oil over the lifetime of the model year 2012-2016 vehicles.[36] The CARB Scoping Plan assumes that Pavley I and II Standards will account for a 31.7 $MMTCO_2e$ reduction (Scoping Plan, Page 22) in statewide 2020 BAU transportation emissions. This 14 percent reduction was applied to 2020 projected transportation emissions for Encinitas.

S&F - 4: Title 24 Residential Codes

2,330 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	State Building Code
Responsibility	California Energy Commission
Cost to City	Low
Private Cost	Low

Measure Description: California's Title 24 Building Energy Code is updated every three years. Due to the implementation of new Title 24 Codes, there will be a reduction in new residential building emissions.

Estimates and Assumptions: This analysis assumes that new emissions from residential buildings in Encinitas will occur linearly from 2005 to 2020. In addition, the analysis assumes that the residential breakdown of single-family residential and multi-family residential buildings is equivalent to the data for year 2000 reported in San Diego's Association of Governments,[37] which is 74 percent single-family residential and 26 percent multi-family residential by housing unit. For these residential units, this analysis assumes the electricity and natural gas percent emissions breakdown presented for residential buildings in the "City of Encinitas 2005 Greenhouse Gas Emissions Inventory" by ICLEI.

For this first 2005-2009 Title 24 code cycle, the analysis assumes a percent reduction in electricity and natural gas equivalent to savings reported in the "Impact Analysis for 2005 Energy Efficiency

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[34] U.S. Environmental Protection Agency. "EPA and NHTSA Finalize Historic National Program to Reduce Green house Gases and Improve Fuel Economy for Cars and Trucks" (http://www.epa.gov/otaq/climate/regulations/420f10014.htm)

[35] California Air Resources Board. "Climate Change Scoping Plan." December 2008. Available at http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf.

[36] U.S. Environmental Protection Agency. "EPA's Endangerment Finding". (December 12, 2010). Available at http://www.epa.gov/climatechange/endangerment/downloads/EndangermentFinding_LightDutyVehicleProgram

[37] San Diego Association of Governments. "Demographics and Other Data." Accessed May 17, 2010. Available at http://www.sandag.org/index.asp?classid=26&fuseaction=home.classhome.

Standards."[38] For all following code cycles, the analysis assumes a percent reduction in electricity and natural gas equivalent to the savings reported in the "Impact Analysis: 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings" report.[39]

S&F - 5: Title 24 Non-Residential Codes

690 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	State Building Code
Responsibility	California Energy Commission
Cost to City	Low
Private Cost	Low

Measure Description: California's Title 24 Building Energy Code is updated every three years. Due to the implementation of new Title 24 Codes, there will be a reduction in new non-residential building emissions.

Estimates and Assumptions: This analysis assumes that new emissions from non-residential buildings in Encinitas will occur linearly from 2005 to 2020. For these non-residential buildings, this analysis assumes the electricity and natural gas percent emissions breakdown presented for non-residential buildings in the "City of Encinitas' 2005 Greenhouse Gas Emissions Inventory" by ICLEI.

For this first 2005-2009 Title 24 code cycle, the analysis assumes a percent reduction in electricity and natural gas equivalent to savings reported in the "Impact Analysis for 2005 Energy Efficiency Standards."[40] For each subsequent code cycle, the analysis assumes additional equivalent reductions to those presented in the "Impact Analysis: 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings" report.[41]

[38] Eley Associates. "Impact Analysis: 2005 Update to the California Energy Efficiency Standards." June 2003. Pre pared for the California Energy Commission, Contract 400-00-061 & Contract 400-01-023.

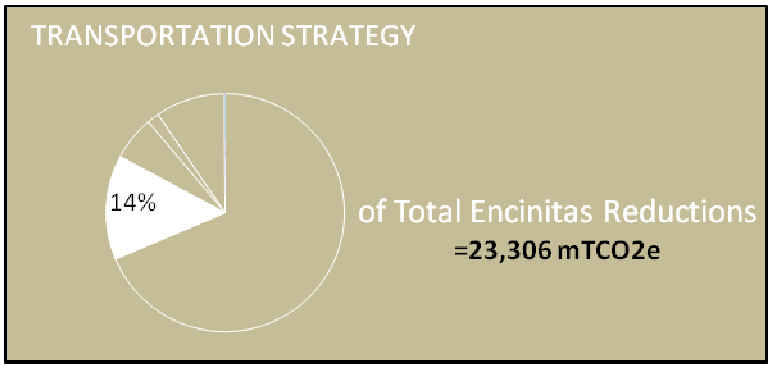
[39] Architectural Energy Corporation, "Impact Analysis: 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings." November 7, 2007. Prepared for the California Energy Commis sion. Available at http://www.energy.ca.gov/title24/2008standards/rulemaking/documents/2007-11-07_IMPACT_ANALYSIS.PDF.

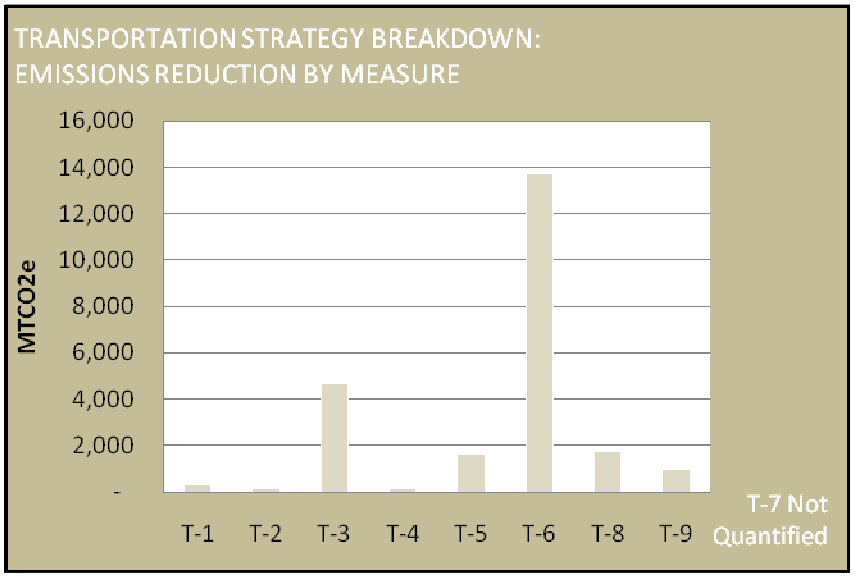
[40] Eley Associates. "Impact Analysis: 2005 Update to the California Energy Efficiency Standards." June 2003. Pre pared for the California Energy Commission, Contract 400-00-061 & Contract 400-01-023.

[41] Architectural Energy Corporation, "Impact Analysis: 2008". November 7, 2007. Available at http://www.energy.ca.gov/title24/2008standards/rulemaking/documents/2007-11-07_IMPACT_ANALYSIS.PDF.

Transportation Strategy

Create a transportation system that promotes alternative transportation, reduces congestion, and helps encourage residents to engage in more healthy and active lifestyles.





REDUCTION MEASURES

T- 1: Parking maximums for new commercial and industrial development

T- 2: Parking requirement reductions for new developments close to transit

T- 3: Traffic study to identify and implement infrastructure improvements

T- 4: Bikeway Master Plan and implementation and action items

T- 5: Bicycle lockers, showers, and bike racks on site

T- 6: Telework or alternative work schedule programs

T- 7: Capital project prioritization funding and agency coordination

T- 8: Complete neighborhood program

T- 9: Guaranteed ride home program for the community

OBJECTIVE: REVISE PARKING STANDARDS AND POLICIES

T- 1: Parking maximums for new commercial and industrial developments

322 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means:	Zoning Code Amendment
Responsibility:	Planning and Building Department
Cost to City:	Low
Private Cost:	Low

Measure Description: This measure establishes parking maximums or reductions of parking standards with implementation incentives. For example, this measure could specify the maximum amount of parking that can be provided instead of a minimum requirement as is often done. These parking maximums should be applied to new commercial, office and industrial developments throughout the City. By reducing the amount of parking in new developments and thus decreasing parking availability, the use of alternative transportation modes will be encouraged and community-wide emissions reduced.

Estimates and Assumptions: This analysis assumes a 1 percent vehicle miles traveled (VMT) reduction for new transportation emissions attributed to commercial, office and industrial development from the implementation year, which is assumed to be 2011. Attribution of new transportation due to commercial, office and industrial development was assumed to be the percent growth of commercial and industrial development as a percentage of the growth of vehicle miles traveled. VMT are assumed to increase approximately 12 percent from 2011 to 2020.

T- 2: Parking requirement reductions for new developments close to transit

113 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means:	Zoning Code Amendment
Responsibility:	Planning and Building Department
Cost to City:	Low
Private Cost:	Low

Measure Description: By reducing parking requirements or providing incentives to reduce parking such as relaxed minimum parking, or shared parking among developments for new residential and non-residential developments located in areas served by frequent transit service (TOD), Encinitas can further encourage the use of transit.[42] Developments included should be those in areas served by the existing and/or proposed shuttles, buses, and the North County Transit District (NCTD) Coaster service at the Encinitas Transit Center.

[42] Richard Willson. "Parking Policy for Transit-Oriented Development: Lessons for Cities, Transit Agencies, and Developers" California State Polytechnic University, Pomona. Available at: http://www.nctr.usf.edu/jpt/pdf/JPT%208-5%20Willson.pdf

Estimates and Assumptions: This analysis assumes 1 percent VMT reduction[43] for new transportation emissions attributed to 50 percent new residential and non-residential development following the implementation year, which is assumed to be 2011. This is assumed to be the percent of new development that will be located near transit. Attribution of new transportation due to development was determined by the percent of growth of commercial, industrial, and residential development as a percentage of the growth of vehicle miles traveled. VMT is assumed to increase approximately 12 percent from 2011 to 2020.

OBJECTIVE: REDUCE CONGESTION

T- 3: Traffic study to identify and implement infrastructure improvements

4,690 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Capital Improvement Program
Responsibility	Engineering Department
Cost to City	Medium
Private Cost	Low

Measure Description: By conducting a study of the City's transportation and vehicular flow network, problem areas can be identified and evaluated. As a result of this assessment, Encinitas will be able to prioritize infrastructure projects at intersections and street segments where improvements are necessary to improve traffic flow, reduce traffic speeds, and/or improve safety. This measure includes traffic signalization, in addition to other traffic devices and treatments. By designing and constructing the identified improvements on a phased plan, Encinitas will be able to reduce idling, allow more free-flowing traffic, and enhance safety and quality of life in its streets.

Estimates and Assumptions: This analysis assumes a 10 percent fuel savings[44&45] applied for an estimated 10 percent of city lighting being retimed throughout the city. Signal retiming is a process that optimizes the operation of signalized intersections, including the development and implementation of new signal timing parameters, phasing sequences, improved control strategies and, occasionally, minor roadway improvements. The signal timing process often includes the training of engineering and maintenance staff to use existing signal control equipment more efficiently and to support new technologies as they become available for implementation. The savings from signal retiming are applied to all transportation emissions projected for 2020. VMT is assumed to increase approximately 12 percent from 2011 to 2020.

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[43] Lund, Hollie M., Robert Cevero, and Richard W. Wilson. "Travel Characteristics of Transit-Oriented Development in California."January 2004. Funded by Caltrans Transportation Grant.

[44] Halkia, John and Michael Schauer. "Red Light, Green Light." Public Roads Journal, U.S. Dot. 2004. Available at http://www.tfhrc.gov/pubrds/04nov/07.htm.

[45] Sunkari, Srinivasa. "The Benefits of Retiming Traffic Signals". Institute of Transportation Engineers. ITE Journal, Apr 2004. Available at http://findarticles.com/p/articles/mi_qa3734/is_200404/ai_n9396857/?tag=content;col1

OBJECTIVE: PROMOTE BICYCLE USE FOR COMMUTING AND RECREATION

T- 4: Bikeway Master Plan implementation and action items

141 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Code Amendment
Responsibility	Planning and Building Department
Cost to City	Low
Private Cost	Low

Measure Description: The City's Bikeway Master Plan, identifies points where the City's bikeway system can be improved. These improvements include connections to the regional bike system, connection with mass transit, and bike facilities retrofits. The City should update the Bikeway Master Plan and prioritize and seek funding for bicycle projects, and by 2015, the City should begin to implement identified bicycle projects. The City should also consider different approaches to increase bike ridership.

Estimates and Assumptions: This analysis assumes a 5 percent increase in bicycle commuters as a result of updating and implementing the Bikeway Master Plan[46] programs and projects, which generates with an approximate .03 percent reduction in VMT by 2020. Current bicycle commuting population is assumed to be .48 percent of the total Encinitas population (City of Encinitas Bikeway Master Plan, Page A-2) and assumed to grow to .51 percent by 2020 as a result of this measure.

[46] KTU+A Landscape Architecture + Planning. "City of Encinitas' Bikeway Master Plan." 2005. Available at http://www.cityofencinitas.org/CE/Templates/InteriorPage_woSideBar.aspx?NRMODE=Published&NRNODEGUID={DB68E1A6-2369-425D-9080- 1BECD956E273}&NRORIGINALURL=/CE/Government/PublicD/BikewayMP-/BikewayMP.htm&NRCACHEHINT=NoModifyGuest

T- 5: Bicycle lockers, showers, and bike racks on site

1,610 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Code Amendment
Responsibility	Planning and Building Department
Cost to City	Low
Private Cost	Medium

Measure Description: Despite improvements to the bikeway system, citizens may still be deterred from biking if there are not places to park or shower once they arrive to their destination. This measure requires amendments to the City's Zoning Code to stipulate that new developments provide bicycle lockers, showers, and bike racks on site in order to incentivize bicycle commuting. By requiring these facilities, citizens will be encouraged to bicycle rather than drive, thus lowering the City's emissions.

The 2010 California Green Building Standards Code, which the City is currently implementing, requires long term bicycle parking equal to 5 percent of vehicle parking capacity. Per the new code, facilities may include lockers, lockable enclosures, and anchored bike racks.

Estimates and Assumptions: This analysis assumes a 5 percent [47&48] reduction in VMT by 2020, which is the low end of study results. This anticipated VMT reduction is applied to new transportation emissions attributable to new commercial and industrial developments throughout the city occurring after 2011. This assumption is based on new transportation due to new commercial and industrial development.

OBJECTIVE: REDUCE VEHICLE MILES TRAVELED

T- 6: Telework or alternative work schedule programs

13,740 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	City Education and Incentive Programs
Responsibility	Planning and Building Department
Cost to City	Low
Private Cost	Low

Measure Description: Emissions due to employee commuting make up a large portion of transportation emissions. By encouraging employers to institute telework or alternative work schedule programs, the emissions due to employee commuting can be vastly reduced. The City can encourage telework or alternative work schedules by first providing education on the programs, and then by encouraging programs through incentive programs. One specific example found to be effective is to incentivize employers to allow a compressed workweek for employees that carpool at least two

[47] United States Environmental Protection Agency; Transportation Air Quality Center. "Transportation Control Measures: Bicycle and Pedestrian Programs." July 1998. EPA 420-S-98-002.

[48] Macket, Roger L. "How to Reduce the Number of Short Trips by Car." September 2000. Paper presented at the European Transport Conference.

days per week.[49] As part of this measure, the City should aim to implement educational outreach about telework and alternative work schedule programs and implement an incentive program by 2015.

For example, the City currently implements a 9/80 work schedule whereby employees work 9 days and 80 hours over a two-week period. The 9/80 work schedule program can be considered Transportation Demand Management in that it provides one less day of commuting per 10 business days.

Estimates and Assumptions: This analysis assumes a 7 percent[50] reduction in VMT by 2020 applied to transportation emissions attributable to commercial and industrial development. Attribution of transportation due to commercial and industrial development is assumed to be equivalent to the percentage of commercial and industrial emissions in 2020 as a part of the sum of commercial, industrial, and residential emissions in 2020.

T- 7: Capital Project Prioritization Funding and agency coordination to encourage alternative transportation

NOT QUANTIFIED	
Implementation Means	Public investments
Responsibility	Planning and Building Department
Cost to City	High
Private Cost	Low

Measure Description: This measure expands on the City's smart growth efforts in order to reduce vehicle travel. As part of the process, the City will develop capital project prioritization criteria that promotes and encourages alternative transportation. By coordinating Encinitas' public investments, the City will be able to provide low carbon, alternative transportation options to residents such as walking, biking, and public transit. The City will also coordinate with the NCTD to increase and improve public transit schedules and services to better support the use of transit.

Estimates and Assumptions: Because the public investments of this measure are not yet defined, it is too speculative to estimate the reductions that are likely to result from this measure.

[49] CUTR (1998), A Market Based Approach to Cost-Effective Trip Reduction Program Design, Center for Urban Transportation Research, for Florida DOT.

[50] Winters, P.L. and F. Cleland. "A Market Based Approach to Cost-Effective Trip Reduction Program Design." 1998. Center for Urban Transportation Research.

T- 8: Complete neighborhood program

1,720 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Policy
Responsibility	Planning and Building Department
Cost to City	Medium
Private Cost	Medium

Measure Description: A complete neighborhood program sets guidelines for developing smart growth in new development and established focus areas. The primary goal of the program is to reduce vehicle miles traveled and enhance quality of life within Encinitas' neighborhoods and communities. This is done by designing neighborhoods and communities in which the majority of basic daily needs are safely accessible by foot or bicycle and in which public transit service is accessible, reliable and convenient.

Estimates and Assumptions: This measure assumes a 9 percent reduction in VMT to transportation emissions attributable to new residential development, assuming a 100 percent improvement in land use mix for all new developments that occur after 2011. Attribution of new transportation emissions due to residential development assumed to be the percent growth of residential units as a percentage of growth of transportation.

T- 9: Guaranteed ride home program for the community

970 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Program Implementation
Responsibility	Planning and Building Department and P.W.
Cost to City	Medium
Private Cost	Medium

Measure Description: A major deterrent for commuters to use alternative modes of transit is a ride home in the event of a change in schedule or personal emergency. This measure ensures that any commuters in Encinitas who regularly carpool, bike, walk, or take transit to work will be provided a ride home in these situations. In order to implement this program the City may need to coordinate this effort with other agencies such as SANDAG,[51] or NCTD

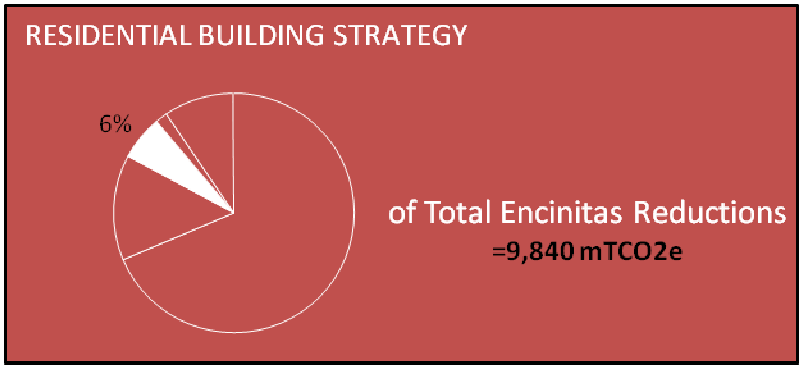
Estimates and Assumptions: This measure applies to 98.4 percent of total city-wide VMT, which is the fraction of transportation attributable to community activities, excluding municipal transportation activities. The analysis assumes a 1 percent VMT reduction[52] applied to transportation emissions attributable to one third of commercial and industrial development, assuming that guaranteed ride home is applied to one third of commercial and industrial businesses.

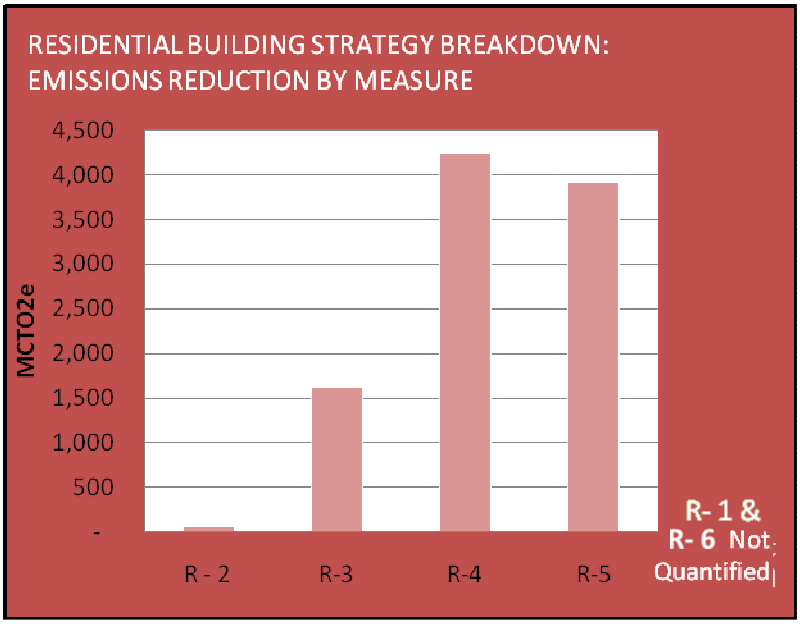
[51] SANDAG Guaranteed Ride Home Program. (http://www.icommutesd.com/Commuters/GuaranteedRideHome.aspx)

[52] K.T. Analytics. "TDM Status Report; Guaranteed Ride Home." 1992. Prepared for Federal Transit Administration, USDOT.

Residential Building Strategy

Support the construction of residences that are energy efficient and incorporate clean, renewable energy sources.





REDUCTION MEASURES

R- 1: Point-of-sale energy efficiency audits for existing residential buildings

R- 2: New residential buildings to perform 15 percent above Title 24 Code

R- 3: Solar PV and solar water heating on all new single-family residential building construction

R- 4: Solar water heating on existing single-family residential buildings

R- 5: Solar PV on existing single family residential buildings

R- 6: City of Encinitas Green Building Incentive Program

OBJECTIVE: INCREASE ENERGY EFFICIENCY OF RESIDENTIAL BUILDINGS

R- 1: Point-of-sale energy efficiency audits for existing residential buildings

NOT QUANTIFIED	
Implementation Means	City Ordinance
Responsibility	Planning and Building Department
Cost to City	Medium
Private Cost	Low

Measure Description: This measure promotes energy audits for existing residential buildings. The City will consider the need for and/or ways to provide funding opportunities for audits on residential buildings going through the escrow or sale process. This will help identify energy inefficiencies and encourage efficiency retrofits, including lighting upgrades, high-efficiency insulation and windows, and equipment upgrades for existing residential buildings.

Estimates and Assumptions: Because the energy efficiency retrofits that will result from the point-of-sale audits cannot be accurately anticipated, this measure was not quantified.

R- 2: New residential buildings to perform 15 percent above Title 24 Code

60 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	City Ordinance
Responsibility	Planning and Building Department
Cost to City	Low
Private Cost	Medium

Measure Description: This measure requires all new residential buildings to exceed Title 24 Energy code by 15 percent beginning in 2015. Because the stringency of future Title 24 Codes cannot be determined at this point, this measure should be reassessed when Title 24 Energy Codes are revised. If Title 24 Energy Code is revised in order to attempt to meet residential zero net energy buildings goals by 2020, this measure will no longer be necessary.

Estimates and Assumptions: This analysis assumes that new emissions from residential buildings in Encinitas will occur linearly from 2005 to 2020, and that all new residential buildings built after 2015 will perform 15 percent better than Title 24 code cycles. This analysis also assumes that all reductions below Title 24 code cycles are due to electricity reductions.

OBJECTIVE: PROMOTE RENEWABLE ENERGY INSTALLATIONS ON RESIDENTIAL BUILDINGS

R- 3: Solar photovoltaic (PV) and solar water heating on all new single-family residential building construction

1,620 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Code amendments
Responsibility	Planning and Building Department, Home-owner Associations
Cost to City	Medium
Private Cost	Medium

Measure Description: Encinitas will target the incorporation of solar PV or solar thermal hot water on all new residential building construction. As part of this measure, the City should aim to revise zoning policies such as building height standards, as well as address homeowner association CC&Rs and other codes to remove hindrances and promote installation of PV on existing single-family residences by 2015. Following these code revisions, the City should begin to require solar PV and solar water heaters on all new residential construction. The scope and application of this measure should also include or consider incentives like exempting solar facilities from height standards.

Estimates and Assumptions: This analysis assumes that new emissions from residential buildings in Encinitas will occur linearly from 2005 to 2020. In addition, the analysis assumes that the residential breakdown of single-family residential and multi-family residential buildings is equivalent to the data for year 2000 reported by SANDAG,[53] which is 74 percent single-family residential. For these residential units, this analysis assumes the electricity and natural gas percent emissions breakdown presented for residential buildings in the "City of Encinitas 2005 Greenhouse Gas Emissions Inventory" by ICLEI. The analysis assumes that all new single-family residences built after 2011 use solar thermal systems and PV systems. It assumes that solar thermal systems will reduce gas use by 50 percent and each PV system is an average 2.5 kW, 1400 kWh/kW system which reduces electricity use by 53 percent.

[53] San Diego Association of Governments. "Demographics and Other Data." Accessed May 17, 2010. Available at http://www.sandag.org/index.asp?classid=26&fuseaction=home.classhome.

R- 4: Solar water heating on existing single-family residential buildings

4,250 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Code amendments
Responsibility	Planning and Building Department, Home-owner Associations
Cost to City	Low
Private Cost	Medium

Measure Description: This measure promotes the installation of solar water heating on existing residential buildings. By significantly reducing the amount of natural gas used to heat water for single-family residences, this measure can significantly reduce emissions from the City at large. Encinitas will target the incorporation of solar water heating on 25 percent of existing residential buildings by 2020.

As part of this measure, by 2015, the City should aim to revise the zoning code such as building height standards, as well as address homeowner association CC&Rs and other codes to remove hindrances from installing renewable energy systems. In addition, a whole building energy audit should be performed before installing solar water heating. Potential funding for this measure can be provided by participating in a statewide program, such as an AB 811 tax district financing program.

Estimates and Assumptions: This analysis assumes that new emissions from residential buildings in Encinitas will occur linearly from 2005 to 2020. In addition, the analysis assumes that the residential breakdown of single-family residential and multi-family residential buildings is equivalent to the data for year 2000 reported by SANDAG,[54] which is 74 percent single-family residential. For these residential units, this analysis assumes the electricity and natural gas percent emissions breakdown presented for residential buildings in the "City of Encinitas 2005 Greenhouse Gas Emissions Inventory" by ICLEI. This analysis assumes that 25 percent of existing single-family residences install solar thermal systems that reduce building gas use by 50 percent.

[54] San Diego Association of Governments. "Demographics and Other Data." Accessed May 17, 2010. Available at http://www.sandag.org/index.asp?classid=26&fuseaction=home.classhome.

R- 5: Install solar photovoltaic (PV) on existing single-family residential buildings

3,910 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Code amendments
Responsibility	Planning and Building Department, Homeowner Associations
Cost to City	Low
Private Cost	Medium

Measure Description: This measure promotes the installation of solar PV on existing residential buildings. PV arrays can supply a large portion of single-family electricity demand with renewable power and their incorporation on existing residences will significantly reduce city-wide emissions. Encinitas will target the incorporation of solar PV on 25 percent of existing residential buildings by 2020. As part of this measure, by 2015, the City should aim to revise zoning code such as building height standards, as well as address homeowner association CC&Rs and other codes to remove hindrances from installing renewable energy systems In addition, a whole building energy audit should be performed before installing solar PV. Potential funding for this measure can be provided by participating in a statewide program, such as an AB 811 tax district financing program.

Estimates and Assumptions: This analysis assumes that new emissions from residential buildings in Encinitas will occur linearly from 2005 to 2020. In addition, the analysis assumes that the residential breakdown of single-family residential and multi-family residential buildings is equivalent to the data for year 2000 reported in San Diego's Association of Governments,[55] which is 74 percent single-family residential. For these residential units, this analysis assumes the electricity and natural gas percent emissions breakdown presented for residential buildings in the "City of Encinitas 2005 Greenhouse Gas Emissions Inventory" by ICLEI. This analysis assumes that 25 percent of existing single-family residences install solar PV systems that are on average 2.5 kW, 1400 kWh/kW systems that reduce electricity use by about 53 percent.

[55] San Diego Association of Governments. "Demographics and Other Data." Accessed May 17, 2010. Available at http://www.sandag.org/index.asp?classid=26&fuseaction=home.classhome

OBJECTIVE: PROMOTE THE CONSTRUCTION OF GREEN BUILDINGS

R- 6: City of Encinitas Green Building Incentive Program

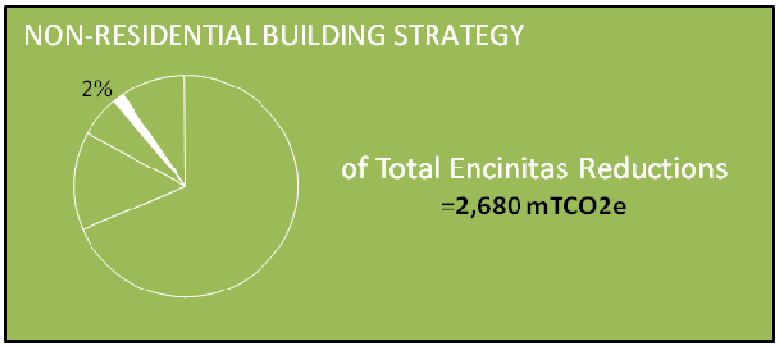
NOT QUANTIFIED	
Implementation Means	Policy
Responsibility	Planning and Building Department
Cost to City	Medium
Private Cost	Low

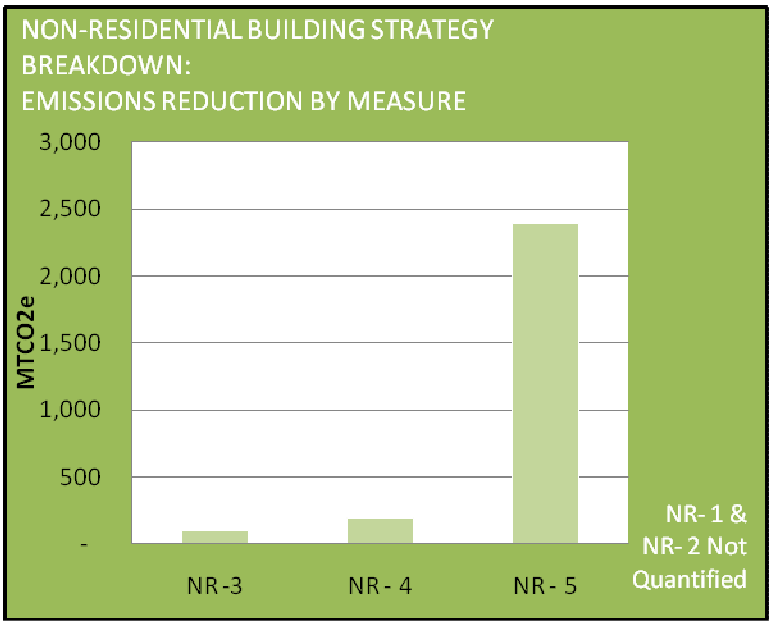
Measure Description: In 2009, the City of Encinitas' developed a Green Building Incentive Program as a voluntary program to encourage "green" construction techniques by providing funds to assist applicants with the associated additional costs of providing energy efficient measures in construction projects and building "green". As part of the program, projects that provide energy efficient measures and propose and achieve certification through the Build It Green GreenPoint Rated program for residential projects or the US Green Building Council's LEED program for residential or commercial projects would be provided up to $2,000 per application to assist with the costs of providing energy efficient measures in design and construction. Green building practices do not focus solely on energy and carbon reduction strategies, but on a broader set of sustainability strategies. It is difficult to measure the precise carbon savings benefits from implementing such a program, and therefore its reduction potential has not been quantified.

Estimates and Assumptions: Because the actual building performance impact of the incentive program cannot be accurately anticipated, this measure was not quantified.

Non-Residential Building Strategy

Support the construction of buildings that are energy efficient and incorporate clean, renewable energy sources.





REDUCTION MEASURES

NR-1: City of Encinitas Green Building Incentive Program

NR-2: Mandatory green building program for new non-residential buildings over 5,000 SF by 2020

NR-3: New non-residential buildings to exceed Title 24 by 15%

NR-4: Solar PV on new-non-residential buildings

NR-5: Solar PV on existing non-residential roof area

OBJECTIVE: PROMOTE THE CONSTRUCTION OF GREEN BUILDINGS

NR- 1: City of Encinitas Green Building Incentive Program

NOT QUANTIFIED	
Implementation Means	Policy
Responsibility	Planning and Building Department
Cost to City	Medium
Private Cost	Low

Measure Description: In 2009, the City of Encinitas' developed a Green Building Incentive Program as a voluntary program to encourage "green" construction techniques by providing funds to assist applicants with the associated additional costs of providing energy efficient measures in construction projects and building "green". As part of the program, projects that provide energy efficient measures and propose and achieve certification through the Build It Green GreenPoint Rated program for residential projects or the US Green Building Council's LEED program for residential or commercial projects would be provided up to $2,000 per application to assist with the costs of providing energy efficient measures in design and construction. Green building practices do not focus solely on energy and carbon reduction strategies, but on a broader set of sustainability strategies. It is difficult to measure the precise carbon savings benefits from implementing such a program, and therefore its reduction potential has not been quantified.

Estimates and Assumptions: Because the actual building performance impact of the incentive program cannot be accurately anticipated, this measure was not quantified.

NR- 2: Mandatory green building program for new non-residential buildings over 5,000 SF by 2020

NOT QUANTIFIED	
Implementation Means	Policy
Responsibility	Planning and Building Department
Cost to City	Medium
Private Cost	Low

Measure Description: In addition to incentive programs and education awareness, the City of Encinitas will implement a mandatory green building program for private developers beginning in 2020. The City will begin to require all new buildings or major renovations over 5,000 SF to achieve a LEED Silver certification or carbon reduction equivalent. Green building practices do not focus solely on energy and carbon reduction strategies, but on a broader set of sustainability strategies. It is difficult to measure the precise carbon savings benefits from implementing such a program, and therefore its reduction potential has not been quantified.

Estimates and Assumptions: Because the implementation year for this measure is 2020, there will not be reductions from 2020 BAU as a result of this measure; emissions reductions will occur after 2020.

OBJECTIVE: INCREASE ENERGY EFFICIENCY OF NON-RESIDENTIAL BUILDINGS

NR- 3: New non-residential buildings to exceed Title 24 by 15 percent

100 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Ordinance
Responsibility	Planning and Building Department
Cost to City	Low
Private Cost	Medium

Measure Description: This measure requires that by 2015, all new non-residential buildings will be required to exceed Title 24 Energy Code by 15 percent. Because the stringency of future Title 24 Codes cannot be determined at this point, this measure will be reassessed when Title 24 Energy Codes are revised. If Title 24 Energy Code cycles are revised to meet the goal of new commercial zero net energy buildings goals by 2030, this measure is no longer necessary.

Estimates and Assumptions: This analysis assumes that new emissions from non-residential buildings in Encinitas will occur linearly from 2005 to 2020, and that all new non-residential buildings built after 2015 will perform 15 percent better than Title 24 code cycles. This analysis also assumes that all reductions below Title 24 code cycles are due to electricity reductions.

OBJECTIVE: PROMOTE RENEWABLE ENERGY INSTALLATIONS ON NON-RESIDENTIAL BUILDINGS

NR- 4: Solar PV on new non-residential buildings

190 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Zoning Code Amendment, Policy
Responsibility	Planning and Building Department
Cost to City	Medium
Private Cost	Medium

Measure Description: The City will develop programs and incentives to promote the incorporation of solar PV on new non-residential buildings. As a first action item, by 2015, this measure will aim to revise local zoning codes, homeowner association CC&Rs, and other codes to remove hindrances from installing renewable energy systems. Additionally, a whole building energy audit should be performed prior to solar installations. In order to achieve projected reductions, the City should target installation of solar PV on approximately 50 percent of new non-residential buildings by 2020.

Estimates and Assumptions: This analysis assumes that all non-residential buildings are two story buildings on average, and that an average of 50 percent of non-residential roof space is usable for PVs. It is assumed that PV systems are on average 10 watts per square foot, and 1400 kWh/kW. These assumptions were applied to 50 percent of the non-residential buildings built after 2011.

NR- 5: Install solar PV on existing non-residential roof area

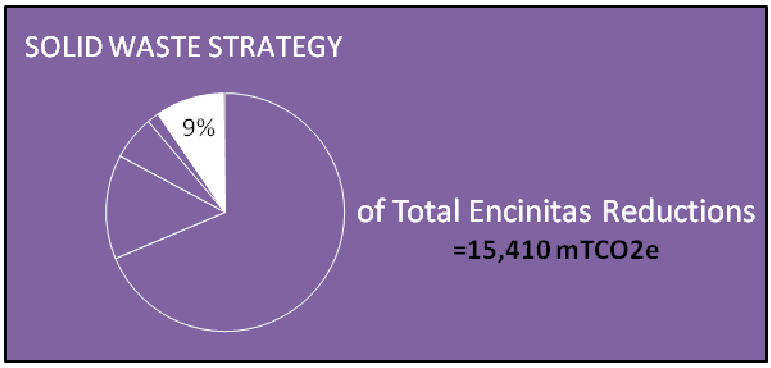
2,390 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Zoning Code Amendment, Policy
Responsibility	Planning and Building Department
Cost to City	Medium
Private Cost	Medium

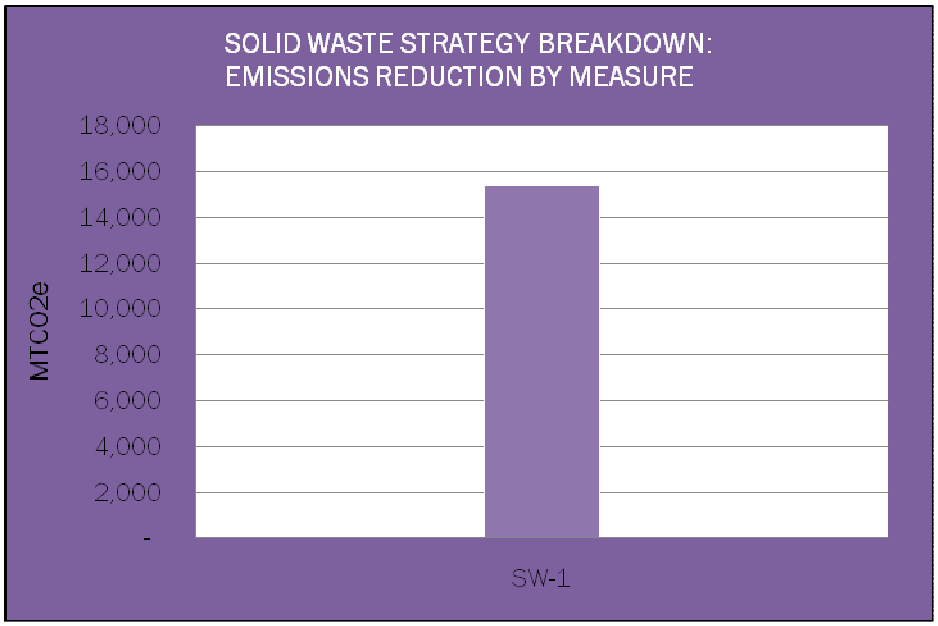
Measure Description: Because Encinitas is already developed to a large degree, a significant percent of the City's reduction potential lies in the existing building stock. This measure involves developing programs and incentives to incorporate solar PV on existing non-residential rooftops. As a first action item, by 2015, this measure will aim to revise local zoning codes, homeowner association CC&Rs and other codes to remove hindrances from installing renewable energy systems. Additionally, a whole building energy audit should be performed prior to solar installations. The City should strive to achieve solar PV installation on approximately 25 percent of existing non-residential structures.

Estimates and Assumptions: This analysis assumes that all non-residential buildings are two story buildings on average, and that an average of 50 percent of non-residential roof space is usable for PVs. It is assumed that PV systems are on average 10 watts per square foot, and 1400 kWh/kW. These PV assumptions were applied to 25 percent of non-residential buildings that will be existing in 2011.

Solid Waste Strategy

Manage solid waste generation and diversion in order to achieve a zero-waste future.





REDUCTION MEASURES

SW- 1: Zero-waste community

OBJECTIVE: REDUCE WASTE FROM CITY, CITIZEN, AND BUSINESS OPERATIONS

SW- 1: Zero-waste community[56]

15,410 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Code Amendments, Ordinances, Policies
Responsibility	Public Works and Planning and Building Departments
Cost to City	Medium
Private Cost	Low

Measure Description: Solid waste reduction measures have immense potential for greenhouse gas reductions. The decomposition of solid waste in landfills emits methane, a potent greenhouse gas. Decreasing the amount of solid waste that is sent to landfills reduces these emissions. This can be done in many ways including: reducing the amount of materials consumed before they become waste, increasing the amount of waste that is recycled rather than disposed of, and increasing the reuse of materials.

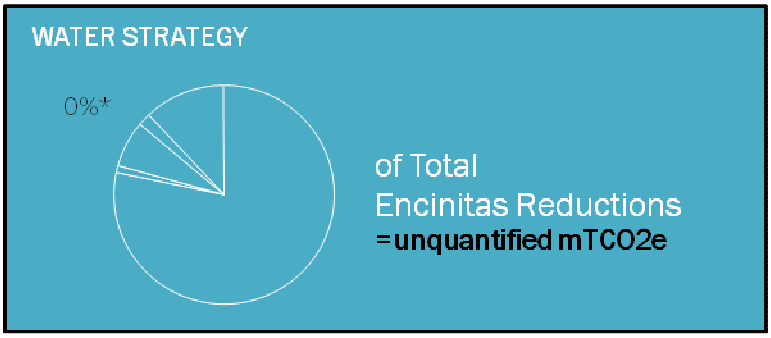
As part of this measure, the City of Encinitas plans to work toward becoming a zero-waste community by 2020. This goal will be achieved by promoting food scrap composting, extended producer responsibility and zero waste events, as well as expanding existing programs to reduce solid waste generation and increase solid waste diversion from landfills. The City will update its recycling ordinance and facilitate increased recycling and composting opportunities throughout Encinitas. In addition, the City will create ordinances to reduce the amount of waste that is generated. Overall, however, the success of this measure is dependent on inducing change in the waste management practices of each citizen in the community.

Estimates and Assumptions: The "City of Encinitas 2005 Greenhouse Gas Emissions Inventory" by ICLEI calculates solid waste emissions as a combination of "waste-in-place" emissions and "community-generated" future emissions, which are the emissions in the 100+ year life cycle decomposition of waste deposited in the base year. This analysis assumes that becoming a zero-waste community means that at least 90 percent of waste is diverted, which means that there are no "community-generated" emissions. This analysis also assumes that the emissions due to waste-in-place remain, and that those emissions are equivalent to the waste-in-place emissions calculated for the 2005 inventory (1,648 $MTCO_2e$).

[56] This analysis assumes that a zero waste community is one that achieves over 90 percent diversion of waste from landfills and incinerators through strategies that maximize recycling, minimize waste, reduce consumption and encourage the development of products that are made to be reused, repaired or recycled back into nature or the marketplace.

Water Strategy

Conserve and protect water resources and promote the community and economic benefits related to the City's coastal and riparian water resources.



REDUCTION MEASURES

W- 1: Installation of water efficient appliances in existing and new buildings

W- 2: Reduced water consumption and recycled water use in landscaping

* The embodied emissions associated with transportation of water were not quantified as part of Encinitas' inventory, thus these strategies are not quantifiable.

OBJECTIVE: CONSERVE WATER RESOURCES

W- 1: Water efficient appliances in existing and new buildings

NOT QUANTIFIED	
Implementation Means	Incentive Program, Policy
Responsibility	Planning and Building Department
Cost to City	Low
Private Cost	Low

Measure Description: Providing water to residences and businesses in Encinitas requires large amounts of energy to pump, treat, and distribute the water. However the 2005 baseline inventory, only considers the emissions due to the treatment of wastewater. Therefore conserving water resources, and thus reducing the emissions from pumping, treating, and distributing water, could not be quantified. However, reducing water consumption remains a crucial component of the City's climate action strategy.

Due to water supply conditions and future water supply concerns, in addition to this conservation measure local water districts are required by state mandate (SB X7 7) to achieve a 10 percent reduction in per capita water use by 2015 and at least 20 percent by 2020.

As part of this measure, beginning in 2015, the City in conjunction with the San Dieguito Water District (SDWD) and Olivenhain Muncipal Water District (OMWD) will continue to create incentives to encourage the use of dual flush toilets, low-flow fixtures, and water efficient appliances in existing and new buildings throughout the City. The City will continue to encourage and support both SDWD and OMWD with water conserving water rate structures.

Estimates and Assumptions: Providing water to residences and businesses in Encinitas requires large amounts of energy to pump, treat, and distribute the water. However, since the "City of Encinitas 2005 Greenhouse Gas Emissions Inventory" only considers emissions due to wastewater, this measure is not quantifiable.

W- 2: Reduced water consumption and recycled water use in landscaping

NOT QUANTIFIED	
Implementation Means	Policy, Outreach Programs
Responsibility	Planning and Building Department, San Dieguito Water District
Cost to City	Medium
Private Cost	Low

Measure Description: This measure focuses on reducing the City's greenhouse gas emissions due to landscape irrigation. Irrigation water requires large amounts of energy to pump, treat, and distribute. These emissions can be reduced by conserving irrigation water use and by using recycled water to irrigate landscaping, which requires less energy than potable water to treat. Although these emissions are not quantified in the City's inventory, however, they are an important component of a comprehensive Climate Action Plan.

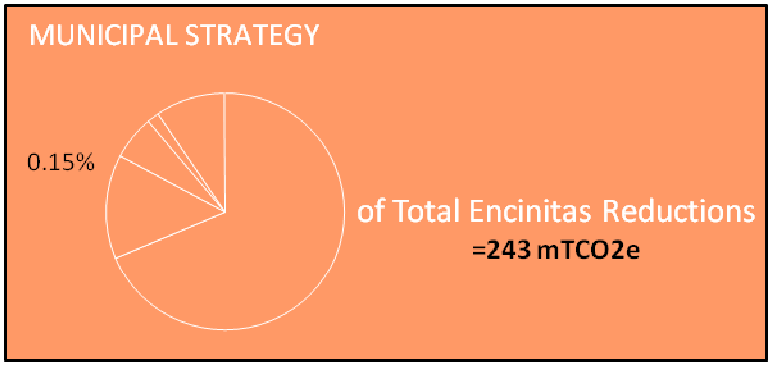
Due to water supply conditions and future water supply concerns, in addition to this conservation measure local water districts are required by state mandate (SB X7 7) to achieve a 10 percent reduction in per capita water use by 2015 and at least 20 percent by 2020.

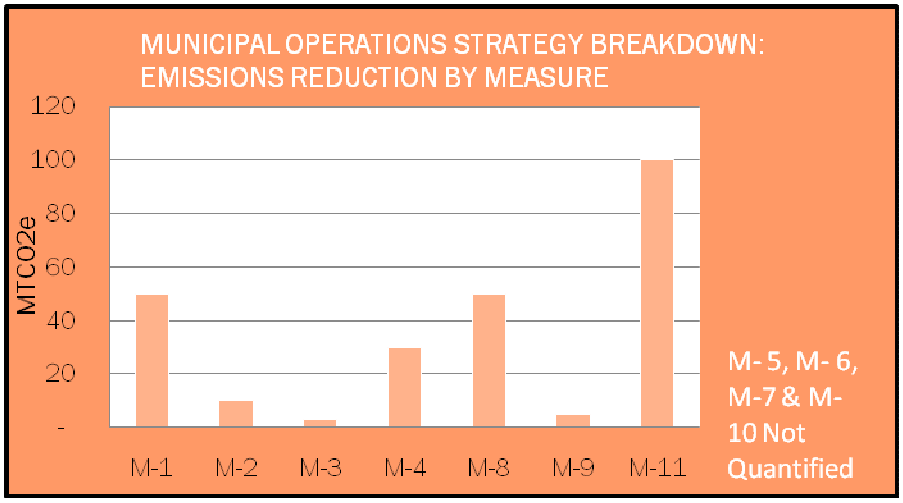
In order to reduce landscape irrigation emissions, the City will work cooperatively with the San Dieguito Water District (SDWD) and Olivenhain Municipal Water District (OMWD) on implementing programs to educate and incentivize the community on water conservation practices for landscaping. Examples of such programs are an incentivized rain barrel program, workshops on sustainable landscapes and water catchment, and a hotline to report water waste. In addition, the City in cooperation with SDWD and OMWD will develop regulations to reduce water consumption and increase the use of recycled water for landscaping, irrigation and other acceptable purposes on existing and new sites. These regulations include revising landscaping codes to promote water conservation and greywater systems.

Estimates and Assumptions: The "City of Encinitas 2005 Greenhouse Gas Emissions Inventory," on which the quantification of these reduction measures is based, however, only considers the emissions due to the treatment of wastewater. Therefore the emissions from pumping, treating, and distributing water that would be achieved with this measure could not be quantified.

Municipal Operations Strategy

Reduce the carbon footprint for municipal operations and create a local government that serves as a sustainability leader in the City at large.





REDUCTION MEASURES

M- 1: Alternative and more fuel efficient fleet vehicles

M- 2: Car sharing and bicycle sharing programs

M- 3: Guaranteed ride home for city employees

M- 4: Telework or alternative work schedules

M-5: Reclaimed water use to all parks and open space

M- 6: Water efficiency in all city facilities

M- 7: All new municipal buildings over 5,000 SF to achieve LEED silver

M- 8: Existing municipal buildings over 5,000 SF to achieve LEED EB Silver

M- 9: Retrofit projects on existing municipal buildings less than 5,000 SF

M- 10: On-site renewable energy on new municipal buildings

M- 11: On-site renewable energy on existing municipal buildings

OBJECTIVE: REDUCE EMPLOYEE TRANSPORTATION IMPACTS

M- 1: Alternative and more fuel efficient fleet vehicles

50 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Policy
Responsibility	Public Works
Cost to City	High
Private Cost	Low

Measure Description: As with most municipal government operations, a large percentage of Encinitas' municipal emissions are related to transportation. This measure aims to reduce emissions associated with Encinitas' vehicle fleet. Encinitas will continue to convert existing municipal fleet vehicles to hybrid or electric vehicles. This conversion should occur by replacing retired vehicles with hybrid or electric vehicles wherever feasible. The Public Works staff believes that the city could feasibly convert up to half of its fleet to hybrid or electric vehicles.

Estimates and Assumptions: This analysis assumes that 50 percent of the municipal vehicle fleet is converted to parallel hybrid vehicles with small battery for power assist and regenerative braking, but no plug-in capability and no all-electric range. This conversion to hybrid vehicles is assumed to result in approximately 28 percent emission reductions compared to a conventional vehicle.[57]

M- 2: Car sharing and bicycle sharing programs

10 MTCO2E REDUCTION FROM 2020 BAU	
Implementation Means	Policy
Responsibility	Public Works
Cost to City	Medium
Private Cost	Low

Measure Description: Municipal car sharing and bicycle sharing programs are a strategy to reduce municipal transportation emissions. Car sharing and bicycle sharing programs are ones in which the City maintains a fleet of vehicles and bicycles that can be borrowed for use for business purposes. This program reduces the need for employees to use personal vehicles for business travel and encourages the use of alternative transportation during the workday, such as the use of bicycles during lunch breaks.

Estimates and Assumptions: This analysis assumes that the measure will result in a 40 percent reduction[58] in driving by those who participate, and that a reduction in driving directly correlates to a

[57] EPRI. "Comparing the Benefits and Impacts of Hybrid Electric Vehicle Options." July 2001. Accessed May 17, 2010. Available at http://mydocs.epri.com/docs/public/000000000001000349.pdf.

[58] Transit Cooperative Research Program. "Car-Sharing: Where and How It Succeeds." 2005. TCRP Report 108. Sponsored by the Federal Transit Administration.

reduction in emissions. Based on U.S. market potential studies, it is assumed that car sharing replaces the need for additional vehicles and vehicle use by about 4 percent.

M- 3: Guaranteed ride home for city employees

3 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Policy
Responsibility	Public Works
Cost to City	Low
Private Cost	Low

Measure Description: A major deterrent for commuters is a ride home in the event of a change in work schedule or a personal emergency**.** This measure ensures that all municipal employees who regularly carpool, bike, walk, or take transit to work will be provided a ride home for personal emergencies and/or a mandatory change in work schedule.

Estimates and Assumptions: This analysis assumes a 1 percent VMT reduction[59] applied to a 0 percent increase in VMT associated with municipal employee commutes for years 2011-2020. This reduction only applies to 0.2 percent of total city-wide VMT in 2020 which is the portion attributed to municipal employee commute.

M- 4: Telework or alternative work schedule programs

30 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Policy
Responsibility	City Manager
Cost to City	Low
Private Cost	Low

Measure Description: Emissions due to employees commuting make up a significant portion of municipal transportation emissions. By encouraging City employers to institute telework or alternative work schedule programs such as 9/80 work week schedule, the emissions due to City employee commuting or vehicle miles traveled (VMT) can be vastly reduced.

Estimates and Assumptions: This analysis assumes a 10 percent VMT reduction applied to a 0 percent increase in VMT associated with municipal employee commutes for years 2011-2020. This reduction only applies to 0.2 percent of total city-wide VMT in 2020 which is the portion attributed to municipal employee commutes.

[59] K.T. Analytics. "TDM Status Report; Guaranteed Ride Home." 1992. Prepared for Federal Transit Administration, USDOT.

OBJECTIVE: INCREASE WATER EFFICIENCY AND REUSE

M- 5: Reclaimed water use to all parks and open space

Measure Description: Reclaimed water is non-potable water that reduces the amount of energy used to treat and deliver water, and thus reduces the amount of greenhouse gas emissions associated with water consumption. It is currently estimated that only 28 percent of the City uses reclaimed water for irrigation of parks and other public landscapes.

NOT QUANTIFIED	
Implementation Means	Policy
Responsibility	Parks & Recreation, SDWD, OMWD, San Elijo Joint Powers Authority
Cost to City	High
Private Cost	Low

This measure encourages the City to review current landscaping practices and coordinate with San Elijo Joint Powers Authority on installing infrastructure for the use of recycled water throughout the City, where technically and financially feasible. As part of this measure, the City aims to maximize the use of reclaimed irrigation water for landscaping in parks and open space throughout the City.

Estimates and Assumptions: Providing water to residences and businesses in Encinitas requires large amounts of energy to pump, treat, and distribute the water. However, since the "City of Encinitas 2005 Greenhouse Gas Emissions Inventory" only considers municipal water emissions due to the operation of irrigation and sprinkler systems, and not the upstream treatment and distribution process, this measure is not quantifiable.[60]

M- 6: Water efficiency in all City facilities

Measure Description: In order to increase the water efficiency in all municipal facilities, the City will continue to perform water audits on its facilities. The result of these audits will be specific plans to retrofit water fixtures such as installing dual flush toilets, low-flow fixtures, and high efficiency appliances.

NOT QUANTIFIED	
Implementation Means	Renovation
Responsibility	Public Works
Cost to City	Medium
Private Cost	Low

[60] ICLEI – Local Governments for Sustainability. "City of Encinitas' 2005 Greenhouse Gas Emissions Inventory."

Estimates and Assumptions: Providing water to residences and businesses in Encinitas requires large amounts of energy to pump, treat, and distribute the water. However, since the "City of Encinitas 2005 Greenhouse Gas Emissions Inventory" only considers municipal water emissions due to the operation of irrigation and sprinkler systems, and not the upstream treatment and distribution processes, this measure is not quantifiable.[61]

OBJECTIVE: INSTITUTIONALIZE GREEN BUILDING PRACTICES

M- 7: All new municipal buildings over 5,000 SF to achieve LEED silver

NOT QUANTIFIED	
Implementation Means	Policy
Responsibility	Planning and Building Department, Public Works
Cost to City	High
Private Cost	Low

Measure Description: Encinitas' municipal government will continue to serve as a sustainability model for the City at large. Even though this has been standard practice, the City will formalize its policy to require all of its new municipal buildings or major renovations over 5,000 SF to achieve a LEED Silver certification or carbon reduction equivalent. This measure will not only reduce future greenhouse gas emissions from municipal operations, but it will encourage the institutionalization of green building practices city-wide.

Estimates and Assumptions: Because this analysis assumes no growth in municipal facilities, this measure is not quantifiable.

M- 8: Existing municipal buildings over 5,000 SF to achieve LEED EB Silver

40 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Policy
Responsibility	Public Works
Cost to City	High
Private Cost	Low

Measure Description: Since the City of Encinitas is not expecting significant growth in its municipal facilities, it will be important to focus on existing building operations. This measure targets LEED EB Silver certification or carbon reduction equivalent for all municipal buildings over 5,000 SF by 2030. Certifying the City's buildings will help establish the City as a sustainability leader in the community. As part of this measure, the City will strive to achieve

[61] ICLEI – Local Governments for Sustainability. "City of Encinitas' 2005 Greenhouse Gas Emissions Inventory."

LEED EB Silver certification or a carbon reduction equivalent in 50 percent of existing municipal buildings by 2020, and work towards 100 percent of all existing municipal buildings by 2030.

Estimates and Assumptions: This analysis assumes a 20 percent reduction in energy use due to the implementation of best practices and cost effective retrofits during the LEED certification process. This analysis also assumes that the Community Center, Civic Center, and Fire Station #1, #4, #5, and the Public Works Yard Buildings A and B are the only municipal buildings over 5,000 SF and that the percentage emissions of all facilities are directly correlated with square footage of all municipal facilities.

M- 9: Retrofit projects on existing municipal buildings less than 5,000 SF

Measure Description: This measure focuses on the City's existing municipal buildings less than 5,000 SF, which makes up a large portion of the City's facilities. The City will target the implementation of cost-effective retrofit projects on existing municipal buildings less than 5,000 SF by 2020.

10 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Policy
Responsibility	Public Works
Cost to City	Medium
Private Cost	Low

Estimates and Assumptions: This analysis assumes that a 12 percent reduction[62] is possible for all cost effective retrofits and that the percentage emissions of all facilities are directly correlated with the square footage of all municipal facilities to determine percentage of municipal facilities under 5,000 SF.

OBJECTIVE: INSTALL RENEWABLE ENERGY SYSTEMS

M- 10: On-site renewable energy on new municipal buildings

Measure Description: Going forward, all new municipal buildings built by the City should be designed with green building practices in mind. The City will target to supply one-third of new municipal building's energy with on-site renewable energy by 2020. This measure should

NOT QUANTIFIED	
Implementation Means	Policy
Responsibility	Public Works
Cost to City	High
Private Cost	Low

[62] Itron, Inc. "California Energy Efficiency Potential Study: Volume 1." May 24, 2006. CALMAC Study ID: PGE0211.01. Accessed May 17, 2010. Available at http://www.calmac.org/publications/PGE_PotentialStudy_Vol1_05242006.pdf.

be encouraged by first establishing a policy that requires designs to be consistent, to the extent practicable, with the existing building as determined at a staff level. Power Purchase Agreements,[63] Utility On-Bill financing,[64] and other financing mechanisms may be used to finance the installations.

Estimates and Assumptions: Because this analysis assumes no growth in municipal facilities, this measure is not quantifiable.

M- 11: On-site renewable energy on existing municipal buildings

100 $MTCO_2E$ REDUCTION FROM 2020 BAU	
Implementation Means	Policy
Responsibility	Public Works
Cost to City	High
Private Cost	Low

Measure Description: By 2020, the City will strive to cover approximately 50 percent of all existing municipal roof space and available parking deck space with installed on-site renewable energy. This measure should be encouraged by first establishing a policy that requires designs to be consistent, to the extent practicable, with the existing building as determined at a staff level. In addition, Power Purchase Agreements and other financing mechanisms may be used to finance the installations.

Estimates and Assumptions: This analysis assumes that on average, municipal buildings are one story and approximately 50 percent of roof space is usable for PV systems. It also assumes that on average 10 watts per square foot, 1400 kWh/kW systems are installed.

[63] A Power Purchase Agreement (PPA) is a financial arrangement in which a third-party developer owns, operates, and maintains the photovoltaic (PV) system on a host customer's property. The host customer, in this case the City, purchases the system's electric output from the solar services provider for a predetermined period. This arrangement allows the host customer to receive stable, and sometimes lower cost electricity, while the solar services provider receives valuable financial benefits such as tax credits and income generated from the sale of electricity to the host customer or other customers.

[64] On-Bill Financing Option. http://www.sdge.com/business/rebatesincentives/programs/onbillfinancing.shtml

ADAPTATION STRATEGIES

Introduction

Local governments across the country have begun to recognize that they will be on the frontlines of efforts to prepare and respond to changing climatic conditions. There has been wide-spread recognition that climate change has consequences for:[65]

- Provision of safe and reliable public services;
- Ensuring environmental quality and compliance;
- Economic development;
- Land use planning and zoning;
- Fiscal responsibility and risk management;
- Capital investments;
- Emergency response;
- Water resources management;
- Public health;
- Coastal zone management;
- Port management;
- Ecosystem management; and
- Transportation infrastructure.

The elements of adaptive action by local government include:[66]

1. Conducting a climate resiliency study
2. Prioritizing areas for action
3. Establish goals
4. Developing a climate resilient action plan[67]
5. Plan implementation
6. Monitoring and assessment

These steps provide a systematic process to create a more climate resilient community that anticipates and prepares for changing conditions.

Public Health

Higher temperatures and more severe and sustained heat waves ("heat storms") increase risks of heat-related illness for vulnerable populations. Studies show that lower-income groups, the elderly, young children and infants are most at risk of increased incidence of heat exhaustion, heat stroke, and respiratory-related problems.

Adaptation strategies to promote public health under changing climatic conditions include:

PASSIVE DESIGN STRATEGIES

Promote the design of buildings, public areas, and infrastructure that reduce the reliance on mechanical cooling, such as thermal mass and shading. These "fail-safe" systems are more resilient to rising temperatures.

INFORMATION SYSTEMS

Develop and implement heat emergency warning systems.

OUTREACH AND EDUCATION

Develop outreach programs designed to inform the public on how they can take preventive measures in reducing their and their children's

[65] The Climate Impacts Group. 2007. A Guidebook for Local, Regional, and State Governments. King County, Washington, 186 pages

[66] http://www.icleiusa.org/programs/climate/-Climate_Adaptation/five-milestones-for-climate-adaptation

[67] A climate resilience action plan will be a separate document and is not a part of the current CAP. This document will be drafted by the City at a future date as a regulatory compliance mechanism.

risk to heat related illness. Programs should also educate the public on recognizing heat stroke symptoms, etc. Education and outreach efforts should target vulnerable populations, including seniors and children at retirement homes and schools, respectively.

Wildfire

Hotter, drier conditions are likely to increase the frequency and severity of wildfires across Southern California. These changes will exacerbate existing wildfire risks to public health and property.

Adaptation strategies to address wildfire include:

PLANNING AND ZONING

- Considering increased wildlife risk in planning decisions; and
- Encouraging fire-retardant plants in landscape design.

BUILDING STANDARDS

- Requirements for fire resistant roofing.

ENFORCEMENT

- Increased attention to compliance with State and local fire and life safety requirements, such as the Fire Master Plan for Commercial & Residential Development.

Water Supply

The combination of rising temperatures and changes in seasonal precipitation patterns are likely to increase stress on public water supplies. These changes will require further attention to already high-priority issues surrounding water efficiency and conservation measures.

Adaptation strategies to address water supply challenges include:

PLANNING AND ZONING

- Limit the approved plant offerings in the landscape ordinance to only drought tolerant species.
- Reduce water use associated with landscape irrigation and ensure compliance with Encinitas Municipal Code Section 23.26. This would be achieved by setting a maximum amount of water to be applied to landscaping and designing, installing, and maintaining water efficient landscapes consistent with the water allowance, with an emphasis in planting native plant species adapted to the local environment and other drought-tolerant plant species.
- Develop and maintain a landscape design manual to provide general guidance and education to the public on water efficiency in landscaping and to serve as a resource for water efficient landscape design and installation, including lists of recommended site appropriate native and drought-tolerant plant species.

BUILDING STANDARDS

- Require dual-piping where feasible in all new commercial and industrial development; and
- Encourage residential greywater use for landscaping and irrigation as appropriate.

Energy Demand

Rising temperatures, particularly peak summer temperatures, are likely to increase energy demand and undermine assumptions used in the planning, design, and operation of buildings and infrastructure. For example, many homes are designed based on historic climatic conditions, including temperature extremes. This information is used in the specifications of materials and cooling equipment. Increases in the duration or severity of temperature conditions, such as "heat storms", can cause dramatic increases in energy demand.

These increases in demand can directly increase costs, GHG emissions, and criteria air pollutants. They may also lead to disruptions in energy supply, which could be particularly serious consequences for low-income populations and the elderly.

Climate change will make these previous extreme events more common. It is prudent and timely for the City to consider strategies to prepare for these conditions to reduce impacts on people and the environment.

Adaptation strategies include:

- Improving building energy efficiency, particularly through passive strategies like thermal mass, overhangs, and shading. These features help keep homes safe for residents during power disruptions;
- Promote strategies that reduce urban heat islands and provide thermal refuge. This includes reflective materials on roof tops and hardscape, as well as canopy shade around buildings and open space;
- Encourage new buildings to consider warming temperatures during the design of cooling systems. This includes modifying the weather data used in building energy simulation models and other design tools; and
- Plan for temporary shelters to provide refuge for residents.

Stormwater

Stormwater runoff is a major challenge for surface water quality. Degraded water quality contributes to public health and economic impacts associated with beach closures. In some cases, this also has implications for sensitive and endangered species. Changes in the timing and intensity of precipitation can alter the effectiveness of stormwater management strategies. Stormwater management structures, such as detention basins or swales, are typically engineered to accommodate specific design storms. Changes in precipitation patterns are likely to alter the frequency of storm events and make these design storms less representative of future conditions. This could mean that stormwater structures may be less effective than anticipated.

Adaptation strategies for stormwater include:

- Evaluate the sensitivity of stormwater control strategies to changes in precipitation regimes; and
- Encourage project teams to design stormwater structures to accommodate future precipitation regimes.

IMPLEMENTATION & NEXT STEPS

In order for the City to prepare for future climate change conditions that may be significantly different from those observed over the last century, conscientious planning and implementation is critical. As part of its overall climate change strategy, the City of Encinitas needs to anticipate and prepare for changing climatic conditions. The most pressing issues for the City include changes in peak summer temperatures, sea level rise, wildfire, storm frequency and severity, and water supply, which create risks to public health and the environment. The City can take action to anticipate these changes and incorporate information about changing conditions into its planning and policy-making processes.

The CAP provides a high-level road map to begin the community's transition to a low-carbon future. It provides a critical foundation for action, but it is only a first step. Moving forward, the City will need to take specific steps to advance and monitor the CAP's implementation. These include:

1. ASSIGN RESPONSIBILITY FOR THE CITY'S CARBON BUDGET.

Designate a city-wide climate change champion or staff liaison to coordinate and implement the CAP and associated measures.

2. EMPOWER CITY STAFF WITH THE RESOURCES AND AUTHORITY NEEDED TO IMPLEMENT THE CAP.

Allocate resources (such as funding and staff) to assist with implementing and ensuring that climate change-related considerations are included as requirements in all relevant decision making processes (e.g., the entitlement process).

Amend the applicable municipal codes to create the regulatory compliance mechanisms to implement the CAP.

Create a CAP implementation checklist to ensure that the steps that must be taken for different projects are clearly articulated.

3. CREATE THRESHOLDS TO ASSESS PLAN AND PROJECT CONSISTENCY DURING CEQA PROCESSES.

Consider creating thresholds, including GHG thresholds based on the carbon budget presented in the CAP.

4. STUDY THE COSTS AND BENEFITS OF SPECIFIC IMPLEMENTATION STRATEGIES.

Conduct a formal cost estimation study for the most effective emission reduction strategies identified in the CAP.

5. DEVELOP AND IMPLEMENT A SYSTEMATIC PERFORMANCE MONITORING PROCESS.

To ensure the community stays on course to meet GHG reduction targets, it is ultimately necessary to track progress by conducting regular inventories and monitoring procedures.

6. COMMUNICATION AND COLLABORATION

Work with energy utilities to create durable and interoperable exchanges of city-wide energy performance data. The City should also partner with local, regional, and state agencies to

ensure collaboration and achieve future reduction goals.

7. DEVELOP AND IMPLEMENT SYSTEMATIC REPORTING PROCESSES TO INFORM DECISION MAKERS AND THE PUBLIC.

Deploy a city-wide GHG "dashboard" (performance management system) and an annual progress report for policy makers. The "dashboard" enables the measurement, monitoring and management of key activities. This type of performance monitoring will be a valuable tool and can assist staff and policy makers, make objective decisions regarding climate action plan implementation.

8. FOLLOW ICLEI'S RESILIENT COMMUNITIES PROCESS TO DEVELOP A CLIMATE RESILIENCY STUDY AND A RESILIENCY ACTION PLAN.

The first two actions may ultimately be the most important. It is critical that the City clearly assign responsibility for the City's carbon budget and implementation of the CAP roadmap to achieve the goals for 2020. Training and support will be required to ensure city staff has the necessary skills and expertise to understand and manage emissions within and between sectors to support a break from business-as-usual for municipal and community-wide practices.

APPENDICES

APPENDIX A: GLOSSARY

AB – Assembly Bill

Absolute Emissions – The total quantity of emissions, not expressed in relative terms or as a ratio – in contrast to measures such as Emissions Intensity and CO_2e.

California Air Resources Board (CARB) – California's Legislature established the Air Resources Board (CARB) in 1967 to attain and maintain healthy air quality, conduct research into the causes of and solutions to air pollution, and to systematically attack the serious problems caused by motor vehicles.

Alternative Planning Strategies (APS) – If the CARB determines that a region's Sustainable Communities Strategy will not achieve the GHG emission reduction targets (related to SB 375), a Metropolitan Planning Organization (MPO) must prepare an Alternative Planning Strategy (APS), separate from the RTP, identifying alternative development patterns, transportation projects or transportation policies needed to achieve the targets.

Baseline – An imaginary line or standard by which things are measured or compared, e.g., "the established baseline for the budget."

Biological Carbon Capture and Storage (CCS) – the capture and storage of the atmospheric greenhouse gas carbon dioxide by a biological process to help mitigate the contribution of fossil fuel emissions to global warming. This may be by increased photosynthesis (through practices such as reforestation / preventing deforestation and genetic engineering); by enhanced soil carbon trapping in agriculture; or by the use of algal bio sequestration (see algae bioreactor) to absorb the carbon dioxide emissions from coal, oil or gas-fired electricity generation.

Business-as-usual (BAU) – The scenario in which policies to reduce emissions are not enacted. The business-as-usual scenario assumes growth will occur following existing policies and regulations.

Break from BAU – The difference between the business-as-usual and the outcome of a proposed development scenario.

California Climate Action Registry (CCAR) - A private non-profit organization originally formed by the State of California. The California Registry serves as a voluntary greenhouse gas (GHG) registry to protect and promote early actions to reduce GHG emissions by organizations.

California Energy Commission (CEC) – The CEC is California's primary energy policy and planning agency. It is responsible for promoting energy efficiency and renewable energy.

California Environmental Quality Act (CEQA) – Adopted in 1970 and incorporated in the Public Resources Code §§21000-21177. Its basic purposes are to: inform governmental decision makers and the public about the potential significant environmental effects of proposed activities; identify ways that

environmental damage can be avoided or significantly reduced; require changes in projects through the use of alternatives or mitigation measures when feasible; and disclose to the public the reasons why a project was approved if significant environmental effects are involved.

Climate Action Plan (CAP) – A planning document developed for or by a governmental body aimed to reduce greenhouse gas emissions within its jurisdiction. A CAP typically provides an inventory, sets benchmark goals, and provides policymakers with a set of recommendations.

Corporate Average Fuel Economy (CAFE) – CAFE are a set of federal regulations intended to improve the fuel economy of cars and light trucks in the US. It sets a minimum sales-weighted average fuel economy, in miles-per-gallon, of cars and trucks with a gross vehicle weight rating of 8,500 pounds or less.

Carbon Budget – Is the sum of the total quantity of GHGs that can be emitted by a sector or organization

Carbon Intensity – Carbon intensity of a given activity sector (or energy supply) defined as the amount of carbon emitted per unit.

CH_4 - Methane, a greenhouse gas.

City – "City" refers to buildings, land, and other such items within the geographic boundary of the City of Encinitas'. City is comprised of the "community" and "municipal" portions.

CO_2 – Carbon Dioxide, a greenhouse gas.

CO_2e – The universal unit of measurement used to indicate the global warming potential (GWP) of each, or a combination of greenhouse gases. It is used to evaluate the impacts of releasing (or avoiding the release of) different greenhouse gases.

CO_2e per-capita – The ratio of carbon-equivalent emissions to population.

Community –"Community" refers to buildings, land, or other such items not owned or operated by the City of Encinitas'.

DU – Dwelling Unit

EIR – Environmental Impact Report

Embodied Energy – The amount of energy consumed over the lifecycle of a material – including energy used in the manufacturing or extraction, delivery, and the disposal or recycling of the material.

Emissions Intensity – The ratio of greenhouse gas emissions to a unit of relevant measurement. It measures the polluting level of a given activity.

Environmental Protection Agency (EPA) – An agency of the federal government with the mission to protect human health and the environment by writing and enforcing regulations.

General Reporting Protocol (GRP) – A collection of procedures and guidelines for calculating and reporting GHG emissions from a number of general and industry-specific categories. It was developed and is maintained by CCAR.

GHG – Greenhouse gas.

GHG Intensity – See "Emissions Intensity."

Greenhouse Gas Inventory – An accounting of the amount of greenhouse gases discharged into that atmosphere, usually within a given jurisdiction.

Global Warming Potential (GWP) – The index used to translate the level of emissions of various gases into a common measure in order to compare the relative radiative forcing of different gases without directly calculating the changes in atmospheric concentrations. GWPs are calculated as the ratio of the radiative forcing that would result from the emissions of one kilogram of a greenhouse gas to that from emission of one kilogram of carbon dioxide over a period of time (usually 100 years).

ICLEI (Local Governments for Sustainability) – An international association of local governments and local government organizations that have made a commitment to sustainable development.

IPCC – Intergovernmental Panel on Climate Change

Kilowatt (kW) – One thousand watts.

Kilowatt-hour (kWh) – One thousand watt-hours.

Leadership in Energy and Environmental Design (LEED) – a family of green building rating systems maintained by the US Green Building Council (USGBC). This includes (among others) LEED-NC, or LEED for New Construction; LEED-EB, LEED for Existing Buildings; and LEED-CS, LEED for Core and Shell.

Low Carbon Fuel Standard (LCFS) – The LCFS is a rule enacted by California in 2007 to reduce the carbon intensity of transportation fuels, as compared with traditional gasoline and diesel. Criteria were set by the Air Resources Board in April 2009, but the rule will not take effect until 2011.

Low Carbon Economy - A Low-Carbon Economy (LCE) is one which has a minimal output of greenhouse gas (GHG) emissions into the biosphere, but specifically refers to the greenhouse gas carbon dioxide.

Megawatt-hour (MWh) – One million watt-hours.

Metropolitan Planning Organization (MPO) – The body that carries out and puts forth Regional Transportation Plans. They were created by the 1962 Federal-Aid Highway Act and are required for any urban area with a population greater than 50,000.

$MTCO_2e$ – Metric Tons Carbon Dioxide Equivalent

$MMTCO_2e$ – Million Metric Tons Carbon Dioxide Equivalent

Municipal – "Municipal" refers to buildings, land, or other such items owned and operated by the City of Encinitas'

N_20 – Nitrous Oxide, a greenhouse gas.

Office of Planning and Research (OPR) – Encompassing five main units, (The State Clearinghouse, The Legislative Unit, The Policy and Research Unit, The Office of Small Business Advocate, Advisory for Military Affairs, the OPR is tasked to develop draft CEQA guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions. The OPR plays a critical role in the Governor's Administration, providing legislative and policy research support for the Governor's office.

PV – A photovoltaic is an array of cells containing material that converts solar radiation into electricity.

Reclaimed/Recycled Water – Wastewater that has been treated to remove impurities, and then allowed to recharge an aquifer. This is typically done by using the reclaimed water for irrigation. Typically, reclaimed water is intended only for non-potable uses such as landscaping maintenance.

Regional Transportation Plan (RTP) – A Regional Transportation Plan is a long-term blueprint of a region's transportation system (related to SB 375).

Renewable Portfolio Standard (RPS) – State of California regulation requiring that publicly-owned utilities produce 33 percent of their electricity using renewable energy sources. Three California publicly-owned utilities are Southern California Edison (SCE), San Diego Gas & Electric (SDG&E), and Pacific Gas & Electric (PG&E)

SB – Senate Bill

San Diego Association of Governments (SANDAG) – The designated Metropolitan Planning Organization (MPO) for San Diego County.

Southern California Edison (SCE) – California publicly-owned utility providing electricity large areas of Southern California, including the City of Encinitas'.

SF – Square feet.

Sustainable Communities Strategy (SCS) – As part of their Regional Transportation Plans (RTPs), Metropolitan Planning Organizations (MPOs) will have to prepare an SCS that demonstrates how regional GHG targets will be met (related to SB 375).

TCRP – Transportation Cooperative Research Program

TDM – Transportation Demand Management

Title-24 – Title-24 is the portion of the California Energy Code that regulates building envelopes and building energy efficiency.

TMA – Transportation Management Agency

TOD – Transit Oriented Development

TRB – Transportation Research Board

ULI – Urban Land Institute

United States Green Building Council (USGBC) – A non-profit trade organization headquartered in Washington, DC, dedicated to promoting green building practices.

VMT – Vehicle Miles Traveled

Watt – A unit of power, or a rate of electrical flow; it is equal to one joule of energy per second. It is used typically to describe electricity capacity or peak consumption. When expressed over a length of time (as in a watt-hour), it is a unit of energy.

Zero Net Energy (ZNE) – An entity that produces as much energy as it consumes. This often refers to a building, or group of buildings.

Zero Waste Community - Communities that achieve over 90 percent diversion of waste from landfills and incinerators through strategies that maximize recycling, minimize waste, reduce consumption and encourage the development of products that are made to be reused, repaired or recycled back into nature or the marketplace.

APPENDIX B: 2005 INVENTORY CALCULATION AND 2020 GREENHOUSE GAS BUSINESS-AS-USUAL PROJECTION TECHNICAL ASSUMPTIONS

The 2005 inventory and 2020 business-as-usual projections presented in this CAP are provided in the "City of Encinitas 2005 Greenhouse Gas Emissions Inventory" prepared by ICLEI. This inventory includes government operations and community emissions sources. The CAP assumes that the difference between the 2020 business-as-usual projections and the 2005 inventory are new emissions sources which grow linearly from 2005 to 2020. Government operations emissions are assumed to stay constant from 2005 to 2020. The ICLEI inventory is presented in the following pages.

City of Encinitas
2005 Greenhouse Gas Emissions Inventory

Prepared by ICLEI - Local Governments for Sustainability USA.

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This report was prepared by Shaina Brown, Climate Fellow, and Brian Holland, Program Officer, at ICLEI-Local Governments for Sustainability USA, with the generous assistance of Noel Crisostomo, SDG&E. The authors gratefully acknowledge the dedication of the staff of the City of Encinitas, which provided much of the insight and local information necessary for the completion of this report. Thanks also to The San Diego Foundation, which supported the preparation of this inventory.

The San Diego Foundation

Bob Kelly, President and Chief Executive Officer

With a dynamic mix of leadership, grantmaking, and civic engagement, The San Diego Foundation makes the San Diego region a better place to live. Founded in 1975, The Foundation addresses evolving issues facing our region by convening community leaders, providing research and expertise on topics important to our citizens, and partnering with nonprofit organizations to meet urgent and changing needs. By working with individuals, families and organizations to carry out their giving plans, The San Diego Foundation utilizes charitable dollars toward the ultimate goal of improving the quality of life in the greater San Diego region, now and for generations to come.

www.sdfoundation.org

The San Diego Foundation launched its **Climate Initiative** in 2006, to raise public awareness about the local implications of climate change and catalyze more comprehensive regional action on global warming. The initiative represents a multi-year effort to bring government, business, the research community, and nonprofits together to tackle one of the greatest challenges of our time.

Over the next few years, The San Diego Foundation will work in partnership with ICLEI to engage local governments and public agencies to develop local climate action plans to reduce emissions and vulnerabilities to climate change in our region, bring more resources to support model programs to promote "green" economic growth and build a more sustainable region, and build public awareness and support for climate action.

ICLEI-Local Governments for Sustainability USA

Jeb Brugmann, Interim Executive Director

ICLEI-Local Governments for Sustainability USA (ICLEI) is a membership association of more than 1,000 local governments worldwide—more than 600 in the United States as of this writing—committed to advancing climate protection and sustainability. Through technical expertise, direct network engagement, and the innovation and evolution of tools, ICLEI strives to empower local governments to set and achieve their emissions reduction and sustainability goals.

http://www.icleiusa.org

City of Encinitas

Office of
The Mayor

August 19, 2009

Dear City of Encinitas Residents:

Maggie Houlihan
Mayor

I am proud to present you with the **City of Encinitas' Greenhouse Gas Emissions Inventory Report** for the baseline year 2005. This report, which presents the emissions from Encinitas' government operations, represents the culmination of concerted efforts by our staff in concert with ICLEI-Local Governments for Sustainability USA.

Don Dalager
Deputy Mayor

This report represents a subset of our broader community-wide report and is an important first step in the process of reducing emissions from local government operations. The information from this report will help us to identify the sources of our emissions and will serve as the benchmark from which we can gauge our progress toward reducing those emissions. While we have made strides in addressing our impact on the environment, climate change remains a significant challenge for our community. Meeting our environmental goals means making changes in all areas of our government operations – from mobile emissions to energy use in buildings, streetlights, and water pump stations. As we reduce greenhouse gas emissions from our operations, we will be providing leadership to our community, increasing the efficiency of our operations, and saving scarce resources.

Teresa Barth
Council Member

In addition to our individual actions, the City is proud to participate in collaborative regional initiatives in the San Diego region. This inventory, for example, was conducted as part of a partnership between the San Diego Foundation, ICLEI, and ten local governments in San Diego County. We will continue to engage in this and other partnerships in the future as we seek to improve the sustainability and livability of our communities and our region.

James Bond
Council Member

Moving forward, we will continue to examine our policies and operations to identify areas where further emissions reductions can be implemented. However, to have a more comprehensive response to climate change, we need the involvement of everyone in our community. Having each citizen examine his or her own activities and search for ways to reduce personal greenhouse gas emissions at home, work, school, and while commuting will help reduce the city's overall footprint. Working together, Encinitas will be able to demonstrate our leadership in reducing emissions and be an inspiration for others in the region, state and across the country.

Jerome Stocks
Council Member

For additional resources and information, please visit the California Center for Sustainable Energy (CCSE) website, www.energycenter.org. We also encourage you to share your ideas and suggestions with us. Send email to GreenCommunity@cityofencinitas.org, or come to City Hall and speak during oral communications at one of our public meetings. Encinitas City Council meets on the second, third and fourth Wednesday of each month at 6:00 p.m. The City's Environmental Commission meets on the second Thursday of each month at 4:30 p.m.

Phil Cotton
City Manager

Sincerely,

Maggie Houlihan

Maggie Houlihan, Mayor
City of Encinitas

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Executive Summary

The City of Encinitas understands that there is a significant body of data that climate change exists, with potentially disruptive effects to the City's residents and businesses. The City of Encinitas recognizes that local governments play a leading role in both reducing greenhouse gas emissions and adapting to the potential impacts of climate change. Local governments can dramatically reduce emissions from their government operations through such measures as increasing energy efficiency in facilities and vehicle fleets, utilizing renewable energy sources, enacting sustainable purchasing policies, reducing waste, and supporting alternative modes of transportation for employees. The co-benefits of these measures may include lower energy bills, improved air quality, and more efficient government operations.

Encinitas has begun its efforts to address the causes and effects of climate change with the assistance of the partners in the San Diego Regional Climate Protection Initiative. These partners include the San Diego Foundation; local governments in San Diego County; and ICLEI.

This greenhouse gas emissions inventory is an important first step in Encinitas's climate protection initiative. As advised by ICLEI, it is essential to first quantify emissions to establish:

- A baseline emissions inventory, against which to measure future progress.
- An understanding of the scale of emissions from the various sources.

Presented here are estimates of greenhouse gas emissions in 2005 resulting from the City of Encinitas's government operations and from the Encinitas community-at-large. With one exception,[1] all government operations emissions estimates in this report refer to emissions generated from sources over which the City has direct operational control,

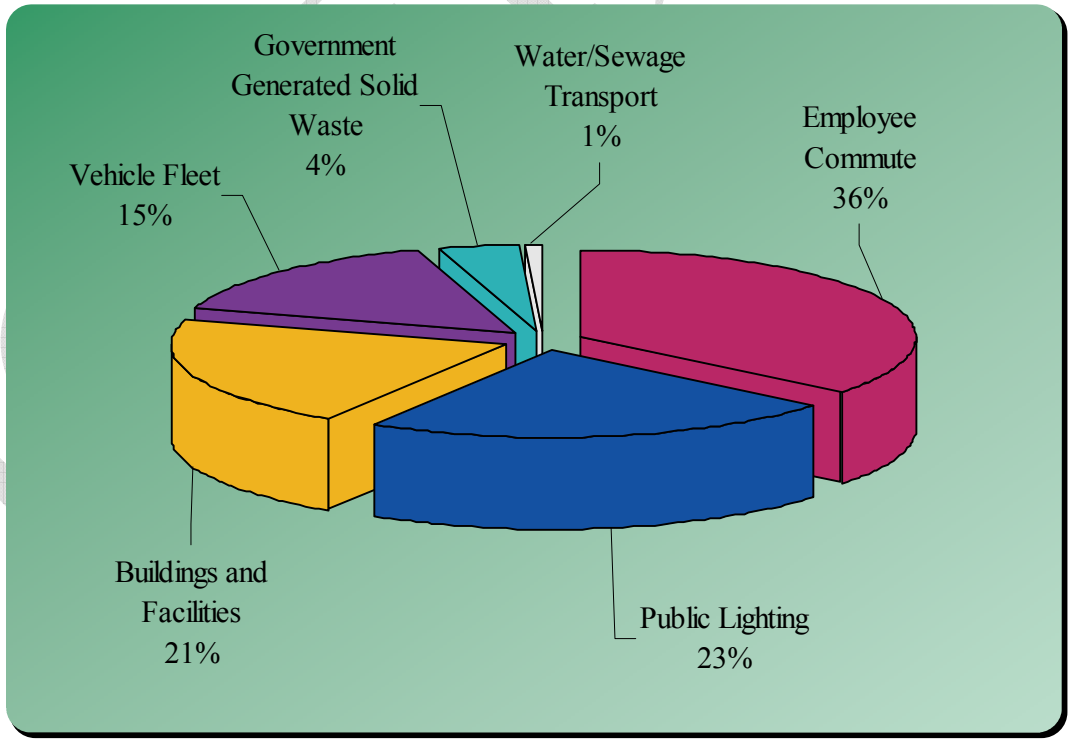
1 The exception is emissions from employee-owned vehicles that are used by employees during commuting.

exclusive of physical location.[2] This includes all government-operated facilities, streetlights, and other stationary sources; the on-road vehicle fleet and off-road equipment; and waste generated by government operations. The inventory also estimates emissions from the community-at-large. Community-scale emissions are reported by five primary sectors: residential, commercial/industrial, transportation, waste, and wastewater.

Like all emissions inventories, this document must rely on the best available data and calculation methodologies. Emissions estimates are subject to change as better data and calculation methodologies become available in the future. Nevertheless, the findings of this analysis provide a solid basis upon which Encinitas can begin planning and taking action to reduce its greenhouse gas emissions.

This inventory is one of the first inventories to use a new national standard developed and adopted by the California Air Resources Board (CARB) in conjunction with ICLEI, the California Climate Action Registry, and The Climate Registry. This standard, called the Local Government Operations Protocol (LGOP), provides standard accounting principles, boundaries, quantification methods, and procedures for reporting greenhouse gas emissions from local government operations. The LGOP represents a strong step forward in standardizing how inventories are conducted and reported, providing a common national framework for all local governments to establish their emissions baseline.

Figure ES.1 2005 Encinitas Government Operations Emissions by Sector



2 Facilities, vehicles, or other operations wholly or partially owned by, but not operated by, the City of Encinitas are not included in this inventory. See Appendix A for more details on the boundaries of the inventory.

Government Operations Inventory Results

In 2005, the City of Encinitas' operational greenhouse gas emissions totaled 2,480 metric tons of CO_2e (carbon dioxide equivalent—a unit of measurement that converts greenhouse gases to the global warming impact of carbon dioxide).[3] Of the total emissions accounted for in this inventory, emissions from the City's employee commute were the largest (36 % as shown in Figure ES.1 and Table ES.1).

Cumulatively, Encinitas spent approximately $696,000 on energy (electricity, natural gas, gasoline, and diesel) for government operations[4]. Of this total, 82 percent of these energy expenses ($574,000) resulted from electricity consumption, and nearly 5 percent ($34,000) from natural gas purchases from SDG&E. Fuel purchases (gasoline and diesel) for the vehicle fleet, and mobile equipment totaled $89,000, or 13 percent of total costs included in this inventory. According to survey results, the median employee commute cost per week was $20. These figures demonstrate the potential for significantly reducing energy costs while also mitigating climate change impacts and helping to stimulate green job development and economic recovery.

Table ES.1 2005 City of Encinitas Government Operations Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Employee Commute	887
Public Lighting	576
Buildings and Facilities	515
Vehicle Fleet	384
Government Generated Solid Waste	99
Water/Sewage Transport	18

Community Inventory Results

In 2005, the Encinitas community emitted approximately 546,569 metric tons of CO_2e. As shown in Figure ES.2 and Table ES.2 below, the transportation sector was by far the largest source of emissions, generating approximately 383,566 metric tons of CO_2e, or 70 percent of total 2005 emissions. Transportation sector emissions are the result of diesel and gasoline combustion in vehicles traveling on both local roads, and state highways that pass through the jurisdictional boundaries of Encinitas. Electricity and natural gas use in Encinitas' residential sector produced the second highest amount of emissions (82,975 metric tons CO_2e), 15 percent of total community emissions. Electricity and natural gas consumption within the commercial / industrial sector, the third greatest

[3] This number represents a "roll-up" of emissions, and is not intended to represent a complete picture of emissions from the City of Encinitas's operations. This roll-up number should not be used for comparison with other local government roll-up numbers without a detailed analysis of the basis for this total. Please refer to Section 2.3.2—Double Counting and Rolling Up Scopes—for more information on "roll-up" figures.

[4] Cost data was estimated using more-recent 2007 SDG&E data as a proxy for 2005.

source of 2005 emissions, generated 59,793 metric tons CO_2e, or 11 percent of the total. The remaining 4 percent are the estimated future methane emissions that will result from the decomposition of waste that was generated by the Encinitas community during 2005, as well as the emissions from wastewater produced by the community.

Based on growth in population, households, and jobs, it is anticipated that Encinitas community emissions under a business-as-usual scenario will grow by 18 percent by 2020.

Figure ES.2 2005 City of Encinitas Community Emissions by Sector

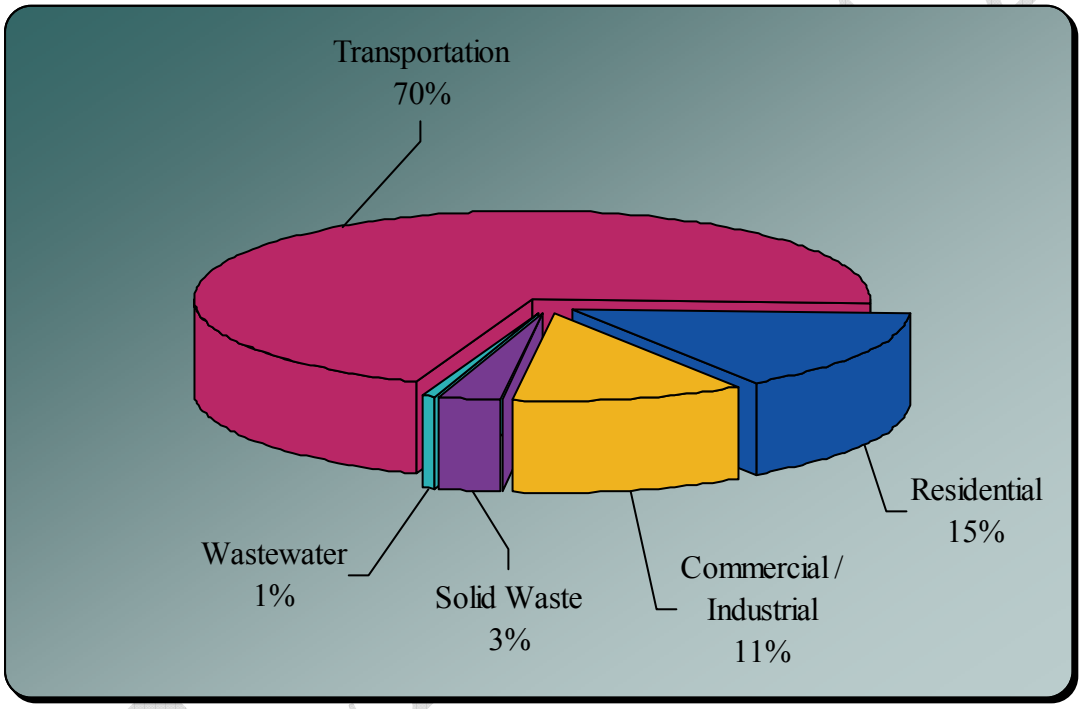


Table ES.2 2005 City of Encinitas Community Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Transportation	383,566
Residential	82,975
Commercial / Industrial	59,793
Solid Waste	17,333
Wastewater	2,901

Section One: Introduction

Introduction

Local governments play a fundamental role in addressing the causes and effects of human-induced climate change through their actions at both the community and government operations levels. While local governments cannot solve the problems of climate change by themselves, their policies can dramatically reduce greenhouse gas emissions from a range of sources and can prepare their communities for the potential impacts of climate change.

Within the context of government operations, local governments have direct control over their emissions-generating activities. They can reduce energy consumption in buildings and facilities, reduce fuel consumption by fleet vehicles and equipment, reduce the amount of government-generated solid waste that is sent to a landfill, and increase the amount of energy that is obtained through alternative energy sources. By quantifying the emissions coming from government operations, this report will assist policymakers and stakeholders in addressing the City of Encinitas' institutional contribution to climate change.

Local jurisdictions in California also have broad influence over activities in the community that generate greenhouse gas emissions, such as new construction, the operation of buildings and transportation, and solid waste disposal. That influence may be exercised directly through the jurisdiction's authority over local land use planning and building standards, and indirectly through programs that encourage sustainable behavior among local residents and businesses. The community inventory provides a starting point for addressing how the City can impact emissions within its jurisdictional boundaries.

1.1 Climate Change Background and Potential Impacts

In the phenomenon known as the greenhouse effect, naturally-occurring atmospheric gases help regulate global climate by trapping solar radiation within the Earth's atmosphere. Scientific evidence suggests that modern human activity is artificially intensifying the greenhouse effect, causing global average surface temperatures to rise. This

intensification is caused by activities that release carbon dioxide and other greenhouse gases into the atmosphere—most notably the burning of fossil fuels for transportation, electricity, and heating.

Rising temperatures affect local and global climate patterns, and these changes are forecasted to manifest themselves in a number of ways that may impact the San Diego region. In 2008, a vulnerability assessment entitled the *San Diego Regional Focus 2050 Study* (Focus 2050) was prepared by the Scripps Institution of Oceanography, SAIC, and the Environmental and Sustainability Initiative at University of California, San Diego, and was published by the San Diego Foundation. Focus 2050 explored what the San Diego Region may look like in 2050 if current climate trends continue. Potential impacts were forecasted by scientists at the Scripps Institute of Oceanography using three Intergovernmental Panel on Climate Change (IPCC) climate models and two emissions scenarios.

The models predicted warming in San Diego County of between 1.5°F and 4.5°F by 2050. Rising temperatures, along with a growing population, will likely create a variety of challenges for the San Diego Region. For example, Focus 2050 determined that heat waves are likely to increase in frequency, magnitude, and duration, thereby increasing energy demand and bringing about public health threats in the process. Extended drought conditions were forecasted to lead to longer fire seasons and an increased likelihood of large wildfires. The study indicated that warmer temperatures also increase the formation of ground level ozone and may heighten exposure levels to vector born diseases, such as West Nile Virus.

Focus 2050 also examined how climate change will impact water supply and water quality. The study found that shortfalls in water supply will likely occur as warmer temperatures cause significant declines in Colorado River flow and Sierra Nevada snowpack, the region's two main sources of imported water. Additionally, sea level rise along with an increased incidence of extreme high sea level events will lead to coastal erosion and will damage critical habitat, real estate, and infrastructure. These projected impacts will also put additional stress on the region's threatened and vulnerable ecosystems.

In response to the climate change threat, many communities in the United States are taking responsibility for addressing climate change at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing greenhouse gas emissions within their boundaries. Through proactive measures around sustainable land use patterns, transportation demand management, energy efficiency, green building, and waste diversion, local governments can dramatically reduce emissions in their communities. In addition, local governments are primarily responsible for the provision of emergency services and the mitigation of natural disaster impacts. As the effects of climate change become more common and severe, local government adaptation policies will be fundamental in preserving the welfare of residents and businesses.

1.2 Purpose of Inventory

The objective of this greenhouse gas emissions inventory is to identify the sources and quantities of greenhouse gas emissions resulting in Encinitas in 2005. This inventory is a necessary first step in addressing greenhouse gas emissions, serving two purposes:

- It creates an emissions baseline against which the City can set emissions reductions targets and measure future progress.
- It allows local governments to understand the scale of emissions from various sources.

While Encinitas has already begun to reduce greenhouse gas emissions through its actions (See Section 1.4 for more detail), this inventory represents the first step in a systems approach to reducing the City's emissions. This system, developed by ICLEI is called the Five Milestones for Climate Mitigation. This Five-Milestone process involves the following steps:

Milestone One: Conduct a baseline emissions inventory and forecast

Milestone Two: Adopt an emissions reduction target for the forecast year

Milestone Three: Develop a local climate action plan

Milestone Four: Implement the climate action plan

Milestone Five: Monitor progress and report results

Figure 1.1 The Five-Milestone Process

1.3 Climate Change Mitigation Activities in California

Since 2005, the State of California has responded to growing concerns over the effects of climate change by adopting a comprehensive approach to addressing emissions in the public and private sectors. This approach was officially initiated with the passage of the Global Warming Solutions Act of 2006 (AB 32), which requires the state to reduce its greenhouse gas emissions to 1990 levels by 2020. It also requires the California Air Resources Board (CARB) to develop a policy plan for reaching AB32 emissions reduction goals and to adopt and enforce regulations to implement the plan.

The resulting AB 32 Scoping Plan was adopted by CARB in December 2008. Among many other strategies, it encourages local governments to reduce emissions in their jurisdictions by a degree commensurate with state goals, approximately 15 percent below current levels. In addition, it identifies the following strategies that will impact local governance:

- Develop a California cap-and-trade program
- Expand energy efficiency programs
- Establish and seek to achieve reduction targets for transportation-related GHG emissions
- Expand the use of green building practices
- Increase waste diversion, composting, and commercial recycling toward zero-waste
- Continue water efficiency programs and use cleaner energy sources to move and treat water
- Reduce methane emissions at landfills
- Preserve forests that sequester carbon dioxide

Other measures taken by the state include mandating stronger vehicle emissions standards (AB 1493, 2002), establishing a low-carbon fuel standard (EO # S-01-07, 2007), mandating a climate adaptation plan for the state (S-EO # 13-08, 2008), establishing a Green Collar Job Council, and establishing a renewable energy portfolio standard for power generation or purchase in the state. The state also has made a number of legislative and regulatory changes that have significant implications for local governments:

- SB 97 (2007) requires the Office of Planning and Research to create greenhouse gas planning guidelines for the California Environmental Quality Act (CEQA). In addition, CARB is tasked with creating energy-use and transportation thresholds in CEQA reviews, which may require local governments to account for greenhouse gas emissions when reviewing project applications.
- AB 811 (2007) authorizes all local governments in California to establish special districts that can be used to finance solar or other renewable energy improvements to homes and businesses in their jurisdiction.

- SB 375 (2008) revises the process of regional transportation planning by metropolitan planning organizations (MPOs), which are governed by elected officials from local jurisdictions. The statute calls on CARB to establish regional transportation-related greenhouse gas targets and requires the MPO to develop a regional "Sustainable Communities Strategy" of land use, housing and transportation policies that will move the region towards its GHG target. The statute stipulates that transportation investments must be consistent with the Sustainable Communities Strategy and provides CEQA streamlining for local development projects that are consistent with the Strategy.

1.4 The City of Encinitas and Climate Change Mitigation

Size	2005 Population	20005 Annual Budget	Employees	Climate Zone	Heating and Cooling Degree Days
19.1 sq. miles	62,500	$48,000,000	238	3B	1063/866

The City of Encinitas is highly invested in activities to reduce its carbon footprint, raise awareness of climate change, and create a community dedicated to sustainability. Various departments within City operations participate in the creation and implementation of environmental programs, policies and technologies, including the Planning & Building Department, the City Manager's Office, the Parks and Recreation Department, and Public Works Department. In addition to the efforts by various departments, the City's Environmental Advisory is developing strategies to equip Encinitas for climate change mitigation.

Currently, the Planning & Building Department is working on the Comprehensive General Plan Update. This will be heavily influenced by the greenhouse gas inventory, and will address energy efficiency goals and policies. Additionally, the Planning & Building Department is in the beginning stages of a Climate Action Plan (CAP), and Energy Efficiency and Conservation Strategy.

The City Manager's Office, in June of 2009, applied for federal government funding for energy efficiency under the Energy Efficiency and Conservation Block Grant program (EECBG). Some of the improvements the City hopes to implement include: the development of a CAP and Energy Efficiency and Conservation Strategy, conversion of yellow traffic signal lights to LED technology, and augmentation to the City's Green Building Incentive Program.

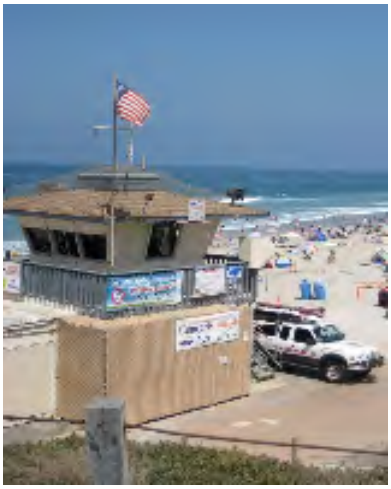
The Environmental Advisory Commission recently developed the City's first Environmental Policy, gearing the city towards alternative energy, and smart water and resource use. Efforts have been made to educate the community through presentations to the public, including single-use bag reduction. As of this writing, over 7,000 reusable bags have been given away to residents.

1.5 The San Diego Regional Climate Protection Initiative

The San Diego Regional Climate Protection Initiative is a joint effort between The San Diego Foundation, ICLEI, and 10 local governments in San Diego County. The Initiative was established in 2009 to provide a regional platform for local governments to follow ICLEI's Five-Milestone process (described in Section 1.2).

Through generous support from the San Diego Foundation, ICLEI is working directly with local governments in the San Diego region to quantify greenhouse gas emissions and drive regional activity to reduce emissions and enhance resiliency to a changing climate. In addition to performing greenhouse gas inventories for each local jurisdiction, ICLEI is providing ongoing training and technical assistance to participating agencies. The Initiative also includes the initiation and facilitation of a formal regional network of local governments and key stakeholders focused on climate protection initiatives, including both mitigation and adaptation activities. The Network mirrors similar networks across the country that ICLEI supports to engage local governments in information and resource exchange, best practices and lessons learned, as well as collaboration opportunities.

Section Two: Methodology



Methodology

The inventories in this report follow two standards, one for government operations emissions and one for community emissions. As local governments all over the world continue to join the climate protection movement, the need for common conventions and a standardized approach to quantifying greenhouse gas (GHG) emissions is more pressing than ever.

The government operations component of the greenhouse gas emissions inventory follows the standard methodology outlined in the Local Government Operations Protocol (LGOP), which was adopted in 2008 by CARB and serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. By participating in the San Diego Regional Climate Protection Initiative, the City of Encinitas has the opportunity to be one of the first in the nation to follow LGOP when inventorying emissions from government operations.

The community emissions inventory follows the standard outlined in the draft International Local Government GHG Emissions Analysis Protocol (IEAP). ICLEI has been developing this guidance since the inception of its Cities for Climate Protection Campaign in 1993, and has recently formalized version 1 of the IEAP as a means to set a common framework for all local government worldwide. The community inventory also draws on the methodology developed in the *San Diego County Greenhouse Gas Inventory* developed by the Energy Policy Initiatives Center (EPIC) at the University of San Diego in September 2008.

This chapter outlines the basic methodology utilized in the development of this inventory to provide clarity on how the inventory results were reported. Specifically, this section reviews:

- What greenhouse gases were measured in this inventory.
- What general methods were used to estimate emissions.
- How emissions estimates can be reported (the scopes framework, roll-up numbers).
- How emissions estimates were reported in this inventory.

A more detailed account of the methodology used in this inventory can be found in Appendices A and B.

2.1 Greenhouse Gases

According to both the LGOP and the IEAP, local governments should assess emissions of all six internationally recognized greenhouse gases regulated under the Kyoto Protocol. These gases are outlined in Table 2.1, which includes the sources of these gases and their global warming potential (GWP).[5] This report focuses on the four GHGs most relevant to local government policymaking: CO_2, CH_4, N_2O, and hydrofluorocarbons. These gases comprise a large majority of greenhouse gas emissions at the community level, and are the only gases emitted in Encinitas' government operations. The omitted gases, SF_6 and perfluorocarbons, are emitted primarily in private sector manufacturing and electricity transmission, and are the subject of regulation at the state level.

Table 2.1 Greenhouse Gases

Gas	Chemical Formula	Activity	Global Warming Potential (CO_2e)
Carbon Dioxide	CO_2	Combustion	1
Methane	CH_4	Combustion, Anaerobic Decomposition of Organic Waste (Landfills, Wastewater), Fuel Handling	21
Nitrous Oxide	N_2O	Combustion, Wastewater Treatment	310
Hydrofluorocarbons	Various	Leaked Refrigerants, Fire Suppressants	12–11,700
Perfluorocarbons	Various	Aluminum Production, Semiconductor Manufacturing, HVAC Equipment Manufacturing	6,500–9,200
Sulfur Hexafluoride	SF_6	Transmission and Distribution of Power	23,900

2.2 Calculating Emissions

The majority of the emissions recorded in this inventory have been calculated using **calculation-based methodologies** to derive emissions using activity data and emission factors. To estimate emissions accordingly, the basic equation below is used:

Activity Data x Emission Factor = Emissions

5 Global warming potential (GWP) is a measure of the amount of warming a greenhouse gas may cause, measured against the amount of warming caused by carbon dioxide.

Activity Data

Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. Please see the appendices for detailed listing of the activity data used in composing this inventory.

Emission Factors

Emission factors are used to convert energy usage or other activity data into associated emissions quantities. They are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO_2/kWh). Please see Appendix B for a listing of emissions factors used in this report. Table 2.2 demonstrates an example of common emission calculations that use this formula.

Table 2.2 Basic Emissions Calculations

Activity Data	Emissions Factor	Emissions
Electricity Consumption (kilowatt hours)	CO_2 emitted/kWh	CO_2 emitted
Natural Gas Consumption (therms)	CO_2 emitted/therm	CO_2 emitted
Gasoline/Diesel Consumption (gallons)	CO_2 emitted /gallon	CO_2 emitted
Waste Generated by Government Operations (tons)	CH_4 emitted/ton of waste	CH_4 emitted

2.3 Reporting Emissions

This section defines the two reporting frameworks—scopes and sectors—and discusses how they are used in this inventory. It also discusses the concept of "rolling up" emissions into a single number. The section provides guidance on communicating the results of the inventory and using the inventory to formulate emissions reductions policies.

2.3.1 The Scopes Framework

For government operations and community inventories, emissions sources can be categorized by "scope" according to the entity's degree of control over the emissions source and the location of the source. Emissions sources are categorized as direct (Scope 1) or indirect (Scope 2 or Scope 3), in accordance with the World Resources Institute and the World Business Council for Sustainable Development's *Greenhouse Gas Protocol Corporate Standard.* The standard is to report emissions by scope as a primary reporting framework.[6]

Government Scope Definitions

Similar to the community framework, the government scopes are divided into three main categories:

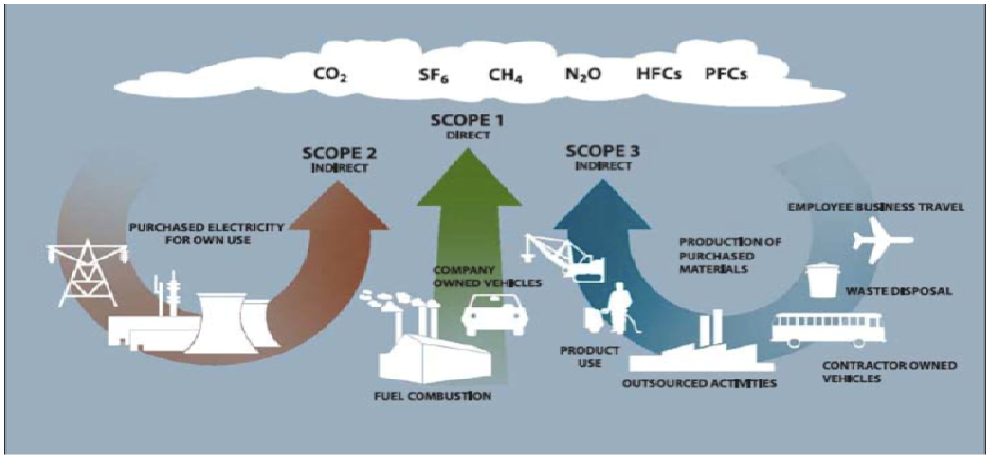
[6] Another common reporting framework is emissions by sector: See Section 2.3.3-Emisisons Sectors for details

Scope 1: Direct emissions from sources within a local government's operations that it owns and/or controls. This includes stationary combustion to produce electricity, steam, heat, and power equipment; mobile combustion of fuels; process emissions from physical or chemical processing; fugitive emissions that result from production, processing, transmission, storage and use of fuels; leaked refrigerants; and other sources.

Scope 2: Indirect emissions associated with the consumption of electricity, steam, heating, or cooling that are purchased from an outside utility.

Scope 3: All other emissions sources that hold policy relevance to the local government that can be measured and reported. This includes all indirect emissions not covered in Scope 2 that occur as a result of activities within the operations of the local government. Scope 3 emission sources include (but are not limited to) tailpipe emissions from employee commutes, employee business travel, and emissions resulting from the decomposition of government-generated solid waste.

Figure 2.1 Emissions Scopes



Source: WRI/WBCSD GHG Protocol Corporate Accounting and Reporting Standard (Revised Edition), Chapter 4.

Community Scope Definitions

The scopes framework includes three emissions scopes for community emissions:

Scope 1: All direct emissions from sources located within the jurisdictional boundaries of the local government, including fuel combusted in the community and direct emissions from landfills in the community.

Scope 2: Indirect emissions associated with the consumption of energy that is generated outside the jurisdictional boundaries of the local government.

Scope 3: All other indirect or embodied emissions not covered in Scope 2, that occur as a result of activity within the jurisdictional boundaries.

Scope 1 and Scope 2 sources are the most essential components of a community greenhouse gas analysis. This is because these sources are typically the most significant in scale, and are most easily impacted by local policy making. The IEAP also includes, in its *Global Reporting Standard,* the reporting of Scope 3 emissions associated with the future decomposition of solid waste generated in the community in the base year.

2.3.2 Double Counting and Rolling Up Scopes

Many local governments find it useful for public awareness and policymaking to use a single number (a "roll-up" number) to represent emissions in its reports, target setting, and action plan. A roll-up number allows local governments to determine the relative proportions of emissions from various sectors (e.g., 30 percent of rolled up emissions came from the vehicle fleet), which can help policymakers and staff identify priority actions for reducing emissions from their operations.

For these reasons, this report includes roll-up numbers as the basis of the both the government operations and community emissions analyses in this inventory. This roll-up number is composed of direct emissions (Scope 1), all emissions from purchased electricity (Scope 2), and other indirect emissions (Scope 3).

While this report uses a standard roll-up number, these numbers should be used with caution, as they can be problematic for three reasons:

First, a roll-up number does not represent all emissions from the City's operations, only a summation of inventoried emissions using available estimation methods. Reporting a roll-up number can be misleading and encourage citizens, staff, and policymakers to think of this number as the local government's "total" emissions. Therefore, when communicating a roll-up number it is important to represent it only as a sum of inventoried emissions, not as a comprehensive total.

Second, rolling up emissions may not simply involve adding emissions from all sectors, as emissions from different scopes can be double-counted when they are reported as one number. For example, if a local government operates a municipal utility that provides electricity to government facilities, these are emissions from both the power generation and facilities sectors. If these sectors are rolled up into a single number, these emissions are double counted, or reported twice. For these reasons, it is important to be cautious when creating a roll-up number to avoid double counting; the roll-up number used in this report was created specifically to avoid any possible double counting.

Third, it is very difficult to use a roll-up number as a common measure between local governments, which is how the results are sometimes applied. Currently, there is no national or international standard for reporting emissions as a single roll-up number. In addition, local governments provide different services to their citizens, and the scale of the services (and thus the emissions) is highly dependent upon the size of the jurisdiction. For these reasons,

comparisons between local government roll-up numbers should not be made without significant analysis of the basis of the roll-up number and the services provided by the local governments being compared.

Furthermore, the results from the government operations component and community component of the inventory should not be rolled-up into one number, as government operations emissions are already accounted for as one source among many in the community inventory.

2.3.3 Emissions Sectors

In addition to categorizing emissions by scope, ICLEI recommends that local governments examine their emissions in the context of the sector that is responsible for those emissions. Many local governments will find a sector-based analysis more directly relevant to policy making and project management, as it assists in formulating sector-specific reduction measures and climate action plan components. The government operations inventory uses LGOP sectors as a primary reporting framework, including the following sectors:

- Buildings and other facilities
- Streetlights, traffic signals, and other public lighting
- Water delivery facilities
- Vehicle fleet and mobile equipment
- Government-generated solid waste
- Emissions from employee commutes

The community inventory reports emissions by the following sectors:

- Residential. This sector includes Scope 1 natural gas combustion and Scope 2 electricity consumption.
- Commercial/Industrial. This sector includes Scope 1 fuel combustion and Scope 2 electricity consumption.
- Transportation. The transportation sector includes exclusively Scope 1 transportation fuel combustion.
- Solid Waste. The sector includes Scope 1 emissions from landfills located in the jurisdiction and Scope 3 emissions from future decomposition of solid waste generated in the community in the base year.
- Wastewater. This sector includes Scope 3 emissions from wastewater generated within the community in the base year.

Section Three: Government Operations Inventory Results

Government Operations Inventory Results

This chapter provides a detailed description of the City of Encinitas' greenhouse gas emissions from government operations in 2005, rolling up and comparing emissions across sectors and sources as appropriate. This chapter also provides details on emissions from each sector, including a breakdown of emissions types and, where possible, an analysis of emissions by department. This information identifies more specific sources of emissions (such as a particular building) that can help staff and policymakers in Encinitas to best target emissions reduction activities in the future.

For a report of emissions by scope, and a detailed description of the methodology and emission factors used in calculating the emissions from the City's operations, please see Appendix B: LGOP Standard Report.

In 2005, Encinitas' government operations greenhouse gas emissions totaled 2,480 metric tons of CO_2e.[7] In this report, this number is the basis for comparing emissions across sectors and sources (fuel types), and is the aggregate of all emissions estimates used in this inventory.

3.1 Summary by Sector

Reporting emissions by sector provides a useful way to understand the sources of jurisdiction's emissions. By better understanding the relative scale of emissions from each of the sectors, Encinitas can more effectively focus emissions reduction strategies to achieve the greatest emissions reductions.[8]

7 This number represents a roll-up of emissions, and is not intended to represent a complete picture of emissions from the City of Encinitas' operations. This roll-up number should not be used for comparison with other local government roll-up numbers without a detailed analysis of the basis for this total. See section 2.3.2 for more detail.

8 The sectors with the largest scale of emissions do not necessarily represent the best opportunity for emissions reductions. Cost, administration, and other concerns may affect the City of Encinitas' ability to reduce emissions from any one sector.

Figure 3.1 2005 Encinitas Government Operations Emissions by Sector

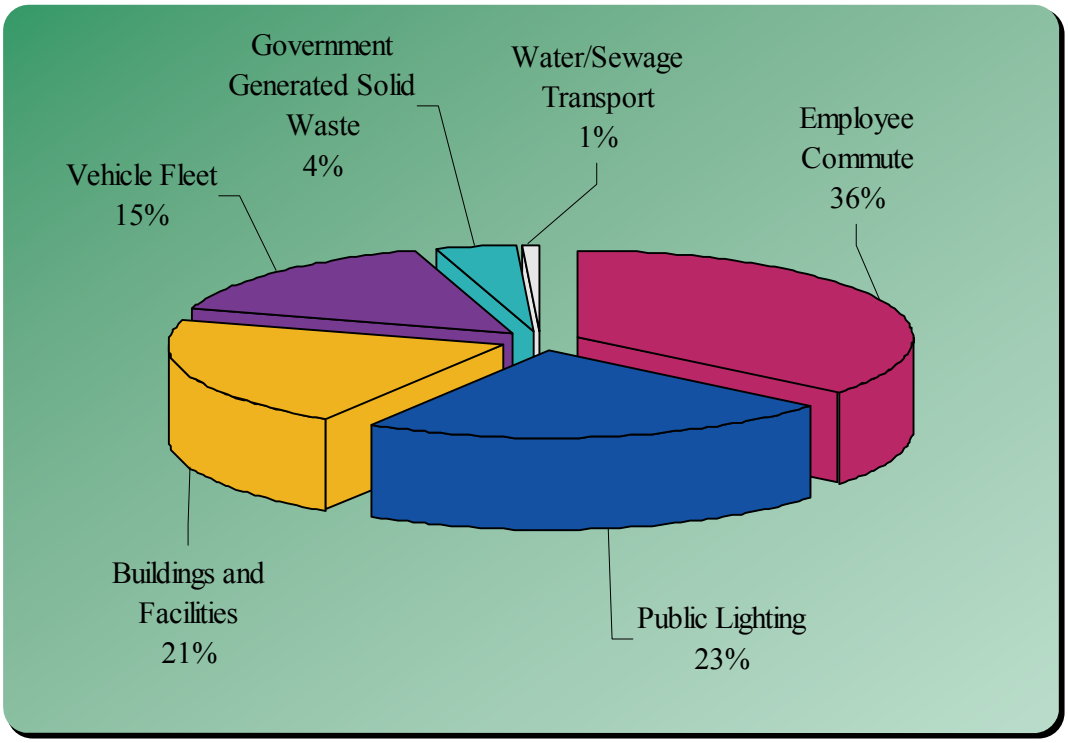


Table 3.1 2005 Encinitas Government Operations Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Employee Commute	887
Public Lighting	576
Buildings and Facilities	515
Vehicle Fleet	384
Government Generated Solid Waste	99
Water/Sewage Transport	18

As visible in Figure 3.1, employee commute was the largest emitter (887 metric tons CO_2e) in 2005. Emissions from public lighting produced the second highest quantity of emissions, resulting in 576 metric tons of CO_2e. The City's buildings and facilities produced 515 metric tons of CO_2e of total emissions with the remainder coming from vehicle fleet, government-generated solid waste, and water delivery.

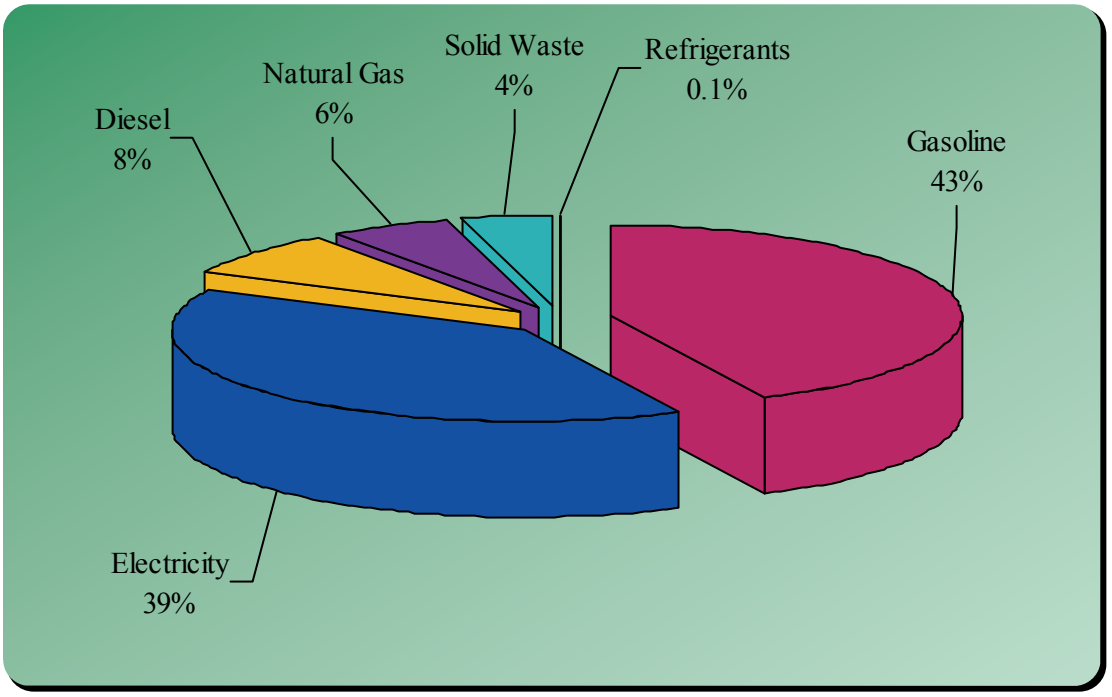
3.2 Summary by Source

When considering how to reduce emissions, it is helpful to look not only at which sectors are generating emissions, but also at the specific raw resources and materials (gasoline, diesel, electricity, natural gas, solid waste, etc.) whose use and generation directly result in the release of greenhouse gases. This analysis can help target resource management in a way that will successfully reduce greenhouse gas emissions. Table 3.2 and Figure 3.2 provide a summary of the City's government operations 2005 greenhouse gas emissions by fuel type or material.

Table 3.2 2005 Encinitas Government Operations Emissions by Source

Fuel/Source	Greenhouse Gas Emissions (metric tons CO_2e)
Gasoline	1,064
Electricity	972
Diesel	204
Natural Gas	137
Solid Waste	99
Refrigerants	3

Figure 3.2 2005 Encinitas Government Operations Emissions by Source



3.3 Summary of Energy-Related Costs

In addition to tracking energy consumption and generating estimates on emissions per sector, ICLEI has calculated the basic energy costs of various government operations. Encinitas spent approximately $696,163 on energy (e.g., electricity, natural gas, gasoline, and diesel) for its operations[9]. Eighty-seven percent of these energy expenses ($607,000) are the result of electricity and natural gas purchases from SDG&E. Encinitas spent approximately $89,000 on gasoline and diesel for the municipal fleet (13 percent of total costs). Beyond reducing harmful greenhouse gases, any future reductions in energy use will have the potential to reduce these costs, enabling Encinitas to reallocate limited funds toward other municipal services or create a revolving energy loan fund to support future climate protection activities.

Table 3.3 2005 Encinitas Energy Costs by Sector

Activity	Costs ($)
Public Lighting	$310,076
Buildings and Facilities	$282,598
Vehicle Fleet	$88,895
Water / Sewage Transport	$14,594
Total Assessed Costs	**$696,163**

3.4 Detailed Sector Analyses

3.4.1 Buildings and Other Facilities

Through their use of energy for heating, cooling, lighting, and other purposes, buildings and other facilities operated by local governments constitute a significant amount of their greenhouse gas emissions. Encinitas operates nine major facilities, including City Hall, five fire stations, a Community/Senior Center, and marine safety facilities, in addition to numerous parks and smaller facilities. Facility operations contribute to greenhouse gas emissions in two major ways. First, facilities consume electricity and fuels such as natural gas and diesel (for generators), and this consumption contributes the majority of greenhouse gas emissions from facilities. In addition, fire suppression, air conditioning, and refrigeration equipment in buildings can emit hydrofluorocarbons (HFCs) and other greenhouse gases when these systems leak refrigerants or fire suppressants.

In 2005, the operation of the City's facilities produced approximately 515 metric tons of CO_2e from the above sources. Table 3.4 shows estimated costs associated with the activities that generated these emissions, and Figure 3.3 depicts 2005 emissions per facility. Of total facility emissions, 73 percent came from the consumption of electricity, 27 percent came from the combustion of natural gas, and much of the remaining percent (one percent)

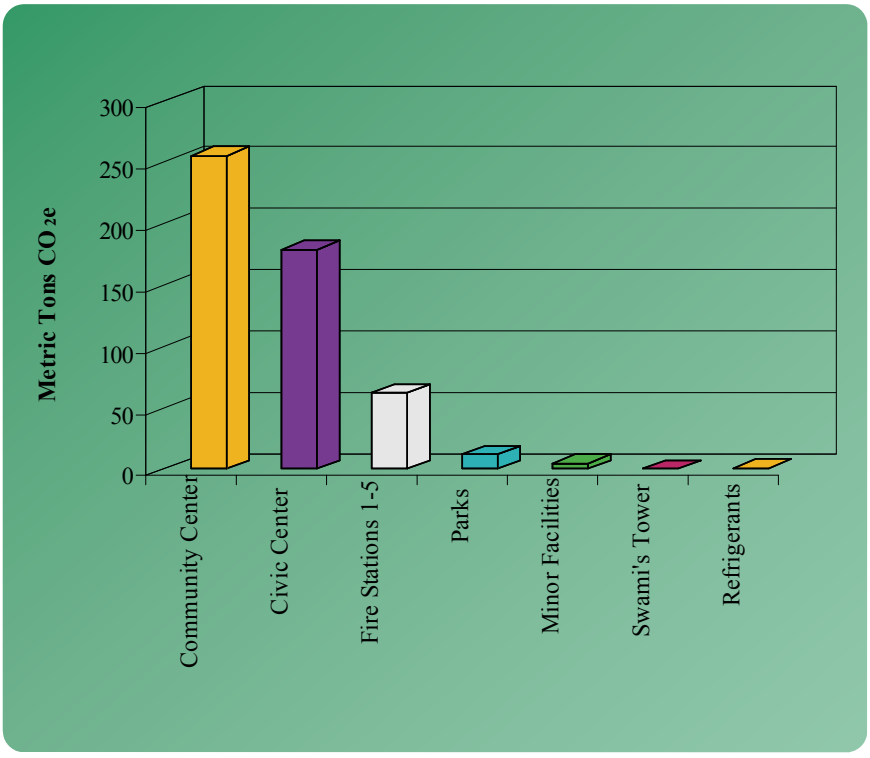
[9] Cost data was estimated using more-recent 2007 SDG&E data as a proxy for 2005.

came from the combustion of diesel (see Figure 3.4). The City spent approximately $282,598[10] in on the fuels and electricity that were the cause of these emissions. In addition to fuels consumed, estimated emissions from refrigerants leaked from HVAC, or refrigeration, totaled 1 metric ton of CO_2e.[11]

Table 3.4: Energy Use and Emissions from Major Facilities

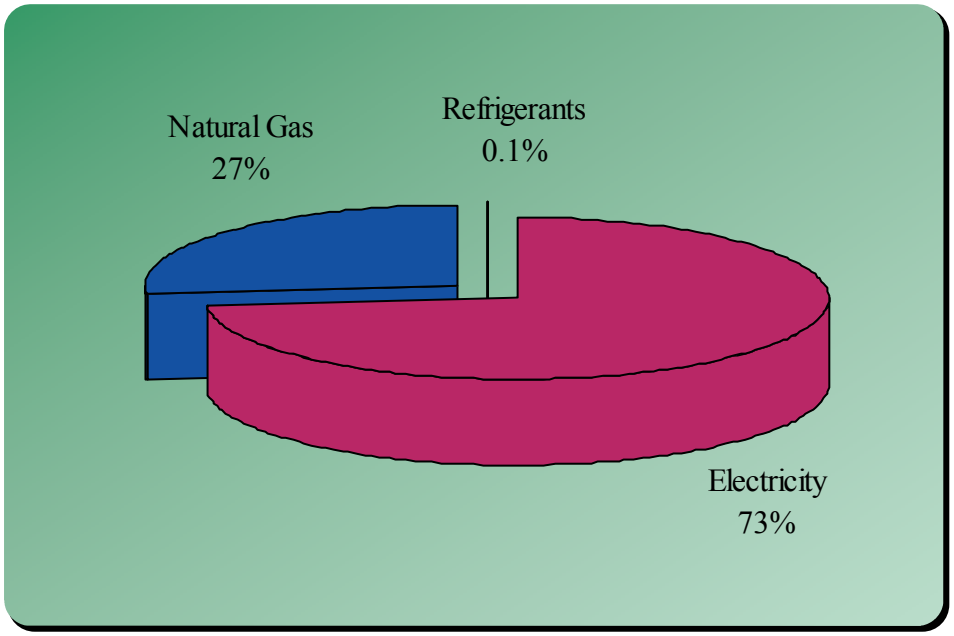
Facility	Greenhouse Gas Emissions (metric tons CO_2e)	Percent Emissions of All Facilities[12]	Electricity Use (kWh)	Natural Gas Use (therms)
Community Center	256	49.7%	656,320	17,227
Civic Center (City Hall)	179	34.8%	616,960	4,651
Fire Stations 1-5	62	12.1%	168,266	3,830
Parks	12	2.4%	49,456	0
Swami's Tower	1	0.1%	2,173	0
Minor Facilities	5	0.9%	19,340	0
TOTAL	**514**	**100%**	**1,512,515**	**25,708**

Figure 3.3: Emissions from Major Facilities



[10] Total costs from 2007 provided by SDG&E as a proxy year for 2005.
[11] A default method was used to estimate emissions from leaked refrigerants, this amount is a significant overestimate but is in line with LGOP methods.
12 Estimated emissions from leaked refrigerants and fire suppressants were not reported by facility and therefore are not included in the total emissions used to calculate these percentages.

Figure 3.4: Emissions from Major Facilities by Source



3.4.2 Streetlights, Traffic Signals, and Other Public Lighting

Like most local governments, Encinitas operates a range of public lighting, from traffic signals and sidewalk lighting to park lights. Electricity consumed in the operation of this infrastructure is a significant source of greenhouse gas emissions.

In 2005, public lighting in Encinitas consumed a total of 2,308,000 kilowatt hours of electricity, producing approximately 576 metric tons CO_2e. Table 3.5 depicts 2005 emissions per lighting type and estimated electricity consumption and costs associated with the activities that generated these emissions. The City spent approximately $310,000 on the fuels and electricity that were the cause of these emissions[13].

Table 3.5: Energy Use and Emissions from Public Lighting

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Percent Emissions of All Lighting	Electricity Use (kWh)
Traffic Signals/Controllers	70	12.1%	278,962
Streetlights	452	78.5%	1,811,180
Outdoor Lighting	54	9.4%	218,128
TOTAL	**576**	**100.0%**	**2,308,270**

[13] Cost data were estimated using 2007 SDG&E data as a proxy for 2005.

3.4.3 Water Transport

This section addresses any equipment used for the distribution of water.[14] Typical systems included in this section are water pumps and lifts; however, the San Dieguito Water District and the Olivenhain Municipal Water District operate water distribution for the City, so these sources are not included. Irrigation systems are the only source included in this section. Electricity consumption is the most significant source of greenhouse gas emissions from the operation of the City's water transport equipment.

In 2005, the operation of Encinitas irrigation and sprinkler systems produced approximately 18 metric tons of CO_2e from the above sources. Table 3.6 depicts 2005 emissions per equipment type and shows estimated activities and costs associated with the operation of this equipment. Encinitas spent approximately $14,595 on the fuels and electricity that were the cause of these emissions[15].

Table 3.6: Energy Use and Emissions from Water Transport Equipment

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Percent Emissions of Water Transport Equipment	Electricity Use (kWh)
Irrigation / Sprinkler Systems	18	100.0%	73,818
TOTAL	**18**	**100.0%**	**73,818**

3.4.4 Vehicle Fleet and Mobile Equipment

The majority of local governments use vehicles and other mobile equipment as an integral part of their daily operations—from maintenance trucks used for parks and recreation to police cruisers and fire trucks. These vehicles and equipment burn gasoline, diesel, and other fuels, which results in greenhouse gas emissions. In addition, vehicles with air conditioning or refrigeration equipment use refrigerants that can leak from the vehicle. Emissions from vehicles and mobile equipment compose a significant portion of emissions within most local governments.

14 While equipment that transports water and stormwater may be managed separately in jurisdiction's operations, the types of equipment are similar, and therefore the ways to reduce emissions from this equipment, are similar. For this reason, this section groups equipment used for transporting water and wastewater.
15 Cost data was estimated using more-recent 2007 SDG&E data as a proxy for 2005.

Table 3.7: Vehicle Fleet and Mobile Equipment Emissions[16]

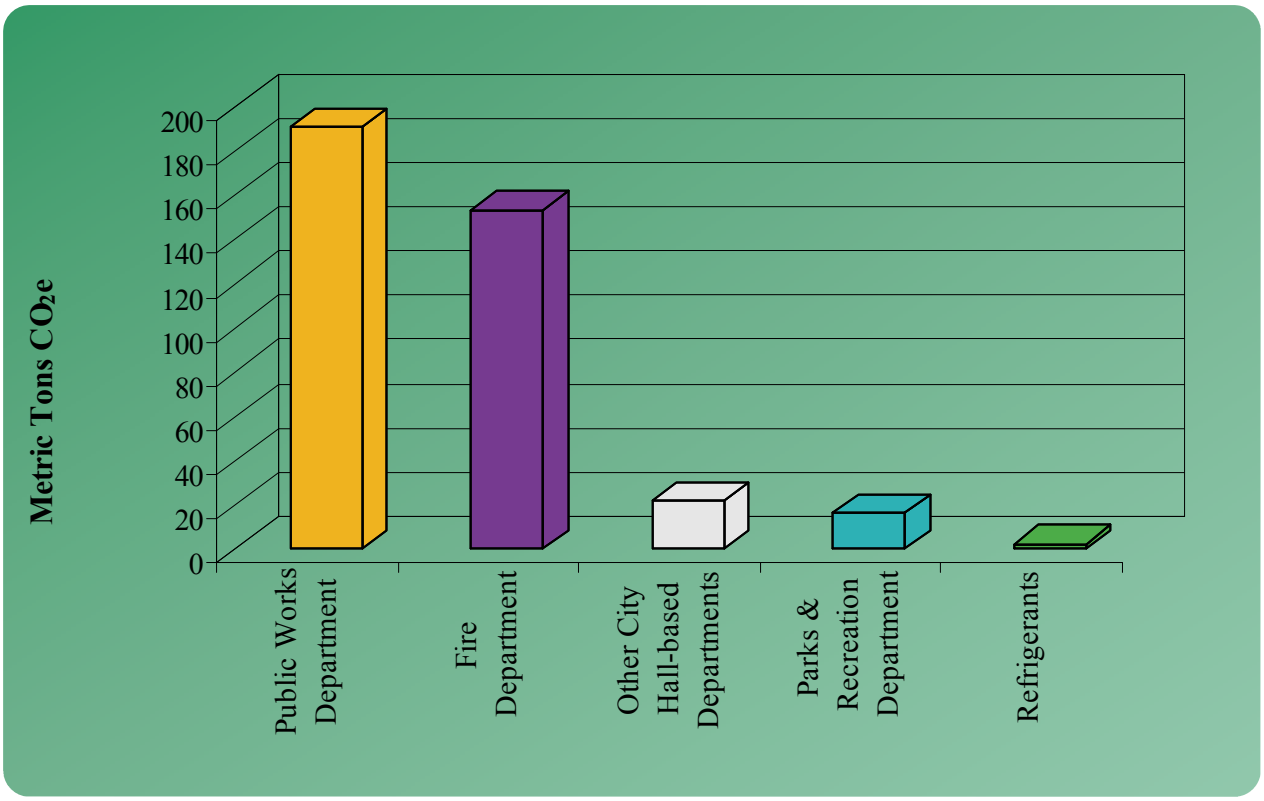
Function	GHG Emissions (metric tons CO_2e)	Percent of All Mobile Emissions	Gasoline Consumption (gal)	Diesel Consumption (gal)	Cost
Public Works Department	190	49.6%	10,245	4,637	$37,845
Fire Department	153	39.9%	4,209	11,387	$40,289
Other City Hall-based Departments	22	5.7%	2,435	0	$6,129
Parks & Recreation Department	16	4.3%	1,840	0	$4,632
Refrigerants	2	0.6%			
TOTAL	**384**	**100.0%**	**18,729**	**16,024**	**$88,895**

In 2005, Encinitas operated a vehicle fleet with 62 trucks, vans, sports utility vehicles, and fire trucks. Encinitas' vehicle fleet performed a number of essential services, from public safety to park maintenance. In 2005, the majority of vehicles in the fleet (45 percent) were used in the Public Works Department for operation and maintenance of City facilities and infrastructure. The Fire Department vehicles comprised 27 percent of the fleet, providing essential fire protection and emergency services.

In 2005, Encinitas emitted approximately a total of 382 metric tons of CO_2e as a result of the combustion of fuels to power the City's vehicle fleet.[17] Table 3.7 shows estimated costs associated with the activities that generated these emissions, and Figure 3.5 depicts 2005 emissions per department. Across departments, the vehicles used by Public Works Department were the largest emitters of greenhouse gases, representing 50 percent of total vehicle fleet emissions. The Fire Department was responsible for 40 percent of total vehicle fleet emissions, followed by the other City Hall-based departments and the Parks and Recreation Department. Across all government operations, emissions from mobile sources represented 15 percent of rolled-up emissions from City operations in 2005. Of total mobile emissions, 57 percent came from the consumption of gasoline, and 43 percent came from the combustion of diesel. Encinitas spent approximately $89,000 in 2005 on the fuels that were the cause of these emissions.

16 The numbers reported here include emissions from fuel consumption only-emissions from leaked refrigerants are reported separately.
17 Since electric vehicles are charged through facilities using energy provided by SDG&E, it is impossible to distinguish the electricity used for electric vehicles from that of the facilities where they are charged. For this reason, all Scope 2 purchased electricity used to charge electric vehicles operated by the City of Encinitas is included in the discussion of Scope 2 purchased electricity in the facility where the vehicles are charged.

Figure 3.5: Emissions from Mobile Sources



3.4.5 Government-Generated Solid Waste

Many local government operations generate solid waste, much of which is eventually sent to a landfill. Typical sources of waste in local government operations include paper and food waste from offices and facilities, construction waste from public works, and plant debris from parks departments. Organic materials in government-generated solid waste (including paper, food scraps, plant debris, textiles, wood waste, etc.) generate methane as they decay in the anaerobic environment of a landfill. An estimated 75 percent of this methane is routinely captured via landfill gas collection systems;[18] however, a portion escapes into the atmosphere, contributing to the greenhouse effect. As such, estimating emissions from waste generated by government operations is an important component of a comprehensive emissions inventory.

Inventorying emissions from government-generated solid waste is considered optional by LGOP for two reasons. First, the emissions do not result at the point of waste generation (as with fuel combustion), but often in a landfill

18 This is a default methane collection rate per LGOP. This rate can vary from 0 to 99 percent based upon the presence and extent of a landfill gas collection system at the landfill/s where the waste is disposed. Most commonly, captured methane gas is flared into the atmosphere, which converts the methane gas to CO_2 and effectively negates the human-caused global warming impact of the methane. Increasingly, landfill methane is being used to power gas-fired turbines as a carbon-neutral means of generating electricity.

located outside of the City's jurisdictional boundaries. In addition, the emissions are not generated in the same year that the waste is disposed, but over a lengthy decomposition period. Since inventorying these emissions is considered optional, LGOP does not provide guidance on recommended methods for quantifying these types of emissions. ICLEI therefore devised data collection and calculation methods based upon previous experience and national standards. See Appendix D for more information for more detail on quantifying emissions from government-generated solid waste.

It is estimated that the waste disposed by government facilities in 2005[19] will cumulatively produce 4.7 metric tons of methane gas, or 99 metric tons CO_2e. Please see Table 3.8 for a breakdown of emissions per facility.

Table 3.8: Emissions from Government-Generated Solid Waste

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Estimated Landfilled Waste (Tons)
Parks & Recreation Department	48	187
Fire Department	22	89
Other City Hall-based departments	16	62
Public Works Department	11	42
Minor Facilities	3	12
TOTAL	**99**	**392**

3.4.6 Employee Commute

Fuel combustion from employees commuting to work is another important emissions source from Encinitas' operations. Similar to the City's vehicle fleet, personal employee vehicles use gasoline and other fuels which, when burned, generate greenhouse gas emissions. Emissions from employee commutes are considered optional to inventory by LGOP because the vehicles are owned and operated privately by the employees. However, LGOP encourages reporting these emissions because local governments can influence how their employees commute to work through incentives and commuting programs. For this reason, employee commute emissions were included in this report as an area where Encinitas could achieve significant reductions in greenhouse gases.

To calculate emissions, the City administered a survey to all of its employees regarding their commute patterns and preferences. ICLEI then extrapolated the results of the survey to represent emissions from all employees. See Appendix C for a detailed description of the survey and methods used to calculate emissions.

In 2005[20], employees commuting in vehicles to and from their jobs at Encinitas emitted an estimated 887 metric tons of CO_2e. Table 3.9 shows estimated emissions and vehicle miles traveled for all City of Encinitas employees.

[19] 2009 EDCO data used as a proxy year for 2005.
[20] Commuter Survey administered July 2009 as a proxy year for 2005.

Table 3.9: Emissions from Employee Commutes

	Greenhouse Gas Emissions (metric tons CO_2e)	Estimated Vehicle Miles Traveled to Work	Average Estimated Vehicle Miles Traveled to Work
All Employees (Estimated)	887	1,629,220	6760.25

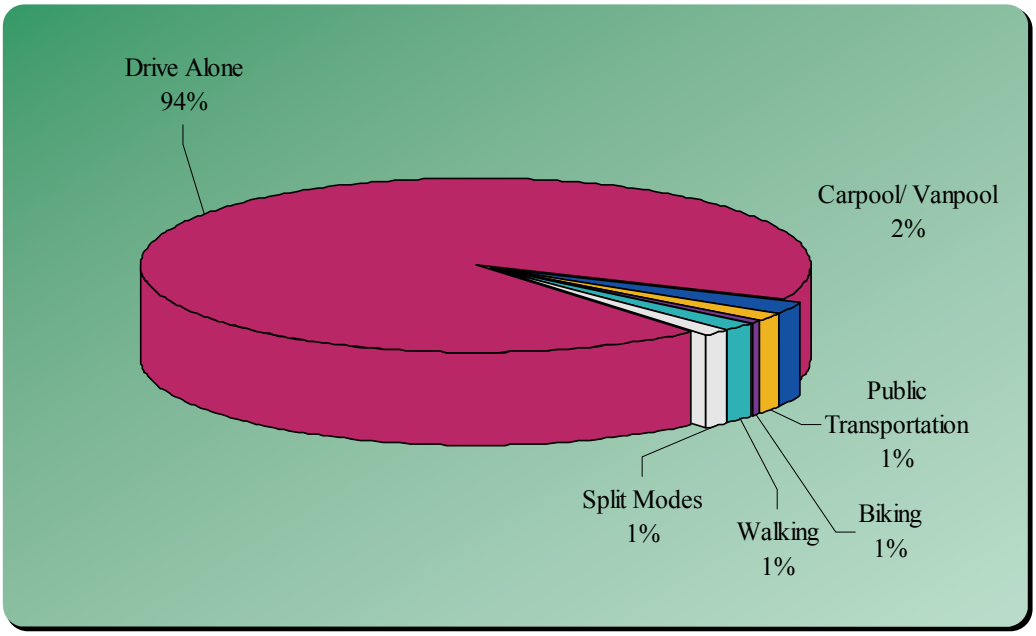
3.4.6.1 Employee Commute Indicators

In addition to estimating greenhouse gas emissions from employee commutes, ICLEI examined other policy-relevant information that was extracted from the employee commute survey—in this way Encinitas staff can develop the most effective policies to reduce emissions from employee commutes. These measures often have co-benefits including increased productivity, reduced commute times and costs, and improvement in the quality of life for employees. No extrapolation was done with the following data; analyses were done using data from survey respondents only.

Commute Modes

In 2005, the majority (93 percent) of respondents commuted to work driving alone. Seven percent of all respondents used some form of alternative transportation (bicycle, public transit, carpool, etc) to commute to work with carpool/vanpool being the most used form of alternative transportation (two percent of total respondents), followed by public transportation (two percent of total respondents) and walking (two percent of total respondents). See Figure 3.6 for an analysis of the most common commute mode for employees who responded to the survey.

Figure 3.6: Employee Commute Modes



Commute Time and Costs

Table 3.10 shows the median time, cost, and distance of City employees' commutes. In addition to reducing the jurisdiction's greenhouse gas emissions, commuting alternatives may reduce commuting costs, time spent in traffic, and overall employee satisfaction.

Table 3.10: Distance and Time to Work and Cost of Employee Commutes (Responding Employees)

	Median Time to Work (daily minutes)	Median Cost of Commute (weekly)	Median Distance To Work (daily miles)
Responding Employees	20	$20	11

Section Four: Community Inventory Results

Community Inventory Results

In 2005, activities and operations taking place within Encinitas' geopolitical boundary resulted in approximately 546,569 metric tons of CO_2e emissions. This number includes all Scope 1 emissions from the on-site combustion of fuels in the residential and commercial / industrial sectors, and from the combustion of gasoline and diesel in vehicles traveling on local roads and state highways within Encinitas. This number also includes all Scope 2 emissions associated with community electricity consumption, and Scope 3 emissions from waste and wastewater generated by the Encinitas community.[21]

4.1.1 Summary by Scope

As shown in Table 4.1, Scope 1 sources produced the largest amount of community greenhouse gas emissions in 2005, totaling 449,962 metric tons of CO_2e. Scope 2 emissions constituted the second largest amount (78,020 metric tons of CO_2e), and Scope 3 emissions totaled 18,586 metric tons of CO_2e.[22]

Table 4.1: Community Emissions Summary by Scope

Activity	CO_2e emitted (metric tons)	Scope Total (metric tons)
Scope 1		**449,962**
Natural Gas	64,748	
Landfill Waste-in-Place	1,648	
Transportation Fuels	383,566	
Scope 2		**78,020**
Purchased Electricity	78,020	
Scope 3		**18,586**
Community-Generated Solid Waste	15,685	
Wastewater	2,901	

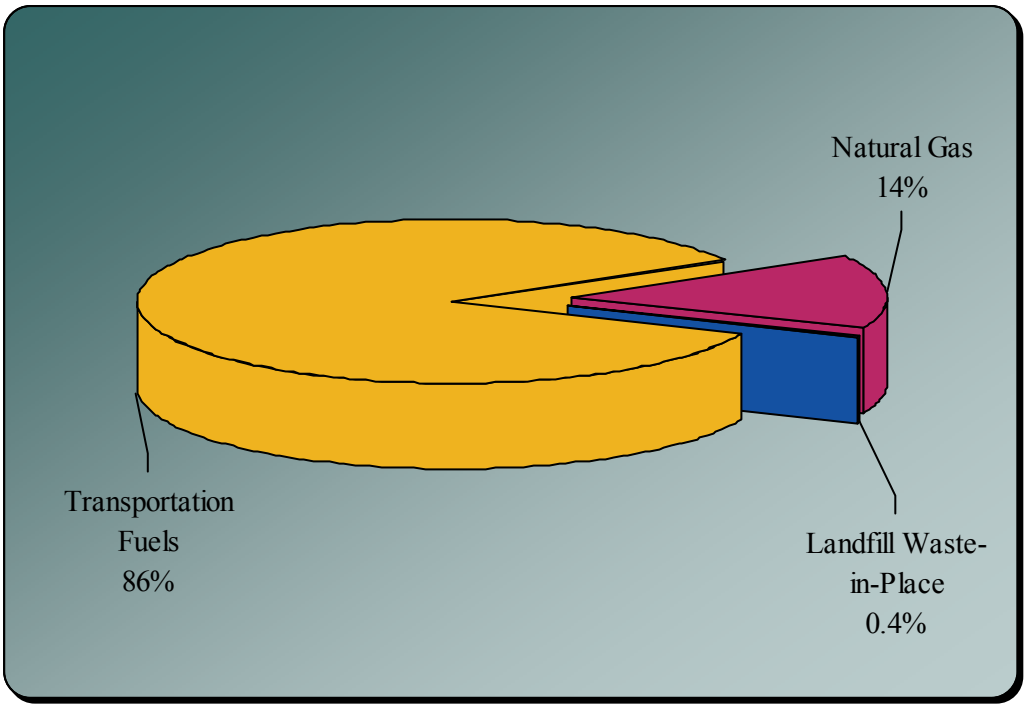
[21] For a detailed description of scopes, please see Section 2: Methodology

[22] These emissions have not been totaled as this may result in double counting and a percentage is not significantly relevant to forming emissions reduction policy. The summaries by sector and source have percentage breakdowns, as do individual sources of emissions.

Scope 1 Emissions

In 2005, Encinitas produced 449,962 metric tons CO_2e of Scope 1 greenhouse gas emissions. As seen in Figure 4.1, the largest percent (86 percent) of Scope 1 emissions resulted from mobile combustion of fuels. The second largest source of Scope 1 emissions was stationary combustion, constituting 14 percent of Scope 1 emissions.

Figure 4.1 Community Scope 1 Emissions



Scope 2 Emissions

In 2005, Encinitas' community generated 78,020 metric tons of CO_2e in the form of Scope 2 emissions from purchased electricity. All Scope 2 emissions in this inventory result from electricity consumed within Encinitas but produced outside of Encinitas.

Scope 3 Emissions

In 2005, Encinitas' community generated 18,586 metric tons of CO_2e in the form of Scope 3 emissions. All Scope 3 sources included in this report are an estimate of methane and nitrous oxide emissions that will result from the anaerobic decomposition of solid waste as well as wastewater, generated by the Encinitas community during 2005.

4.1.2 Summary by Sector

By better understanding the relative scale of emissions from each primary sector, Encinitas can more effectively focus emissions reductions strategies to achieve the greatest emission reductions. For this reason, an analysis of

emissions by sector is included in this report, based on the total of 546,569 metric tons of CO_2e. The five sectors included in this inventory are the following:

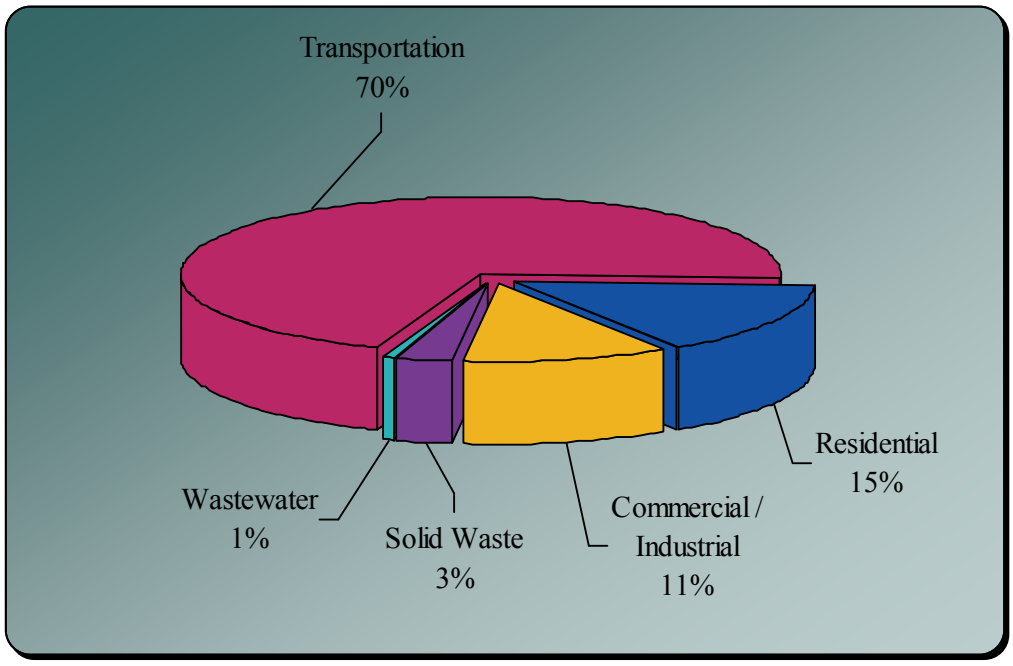
1. Residential
2. Commercial / Industrial
3. Transportation
4. Solid Waste
5. Wastewater

As visible in Figure 4.2, the transportation sector was the largest emitter (70 percent) in 2005 (383,566 metric tons CO_2e). Emissions from the residential sector produced the second highest quantity, resulting in 15 percent of total emissions, or 82,975 metric tons of CO_2e. The remainder of emissions came from the commercial/industrial sector (11percent), solid waste (3 percent), and wastewater (1 percent). Please see detailed sector emissions analyses below for more detail.

Table 4.2: Community Emissions Summary by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Transportation	383,566
Residential	82,975
Commercial / Industrial	59,793
Solid Waste	17,333
Wastewater	2,901

Figure 4.2 Community Emissions Summary by Sector



4.1.3 Summary by Source

When considering how to reduce emissions, it is also helpful to look not only at which sectors are generating emissions, but also at the specific raw resources and materials (gasoline, diesel, electricity, natural gas, solid waste, etc.) whose use and generation directly result in the release of greenhouse gases. Such analysis can help target resource management in a way that will successfully reduce greenhouse gas emissions. Below (Figure 4.3 and Table 4.3) is a summary of Encinitas' 2005 greenhouse gas emissions by fuel type or material, based upon the total community emissions of 546,569 metric tons.

Figure 4.3 Community Emissions Summary by Source

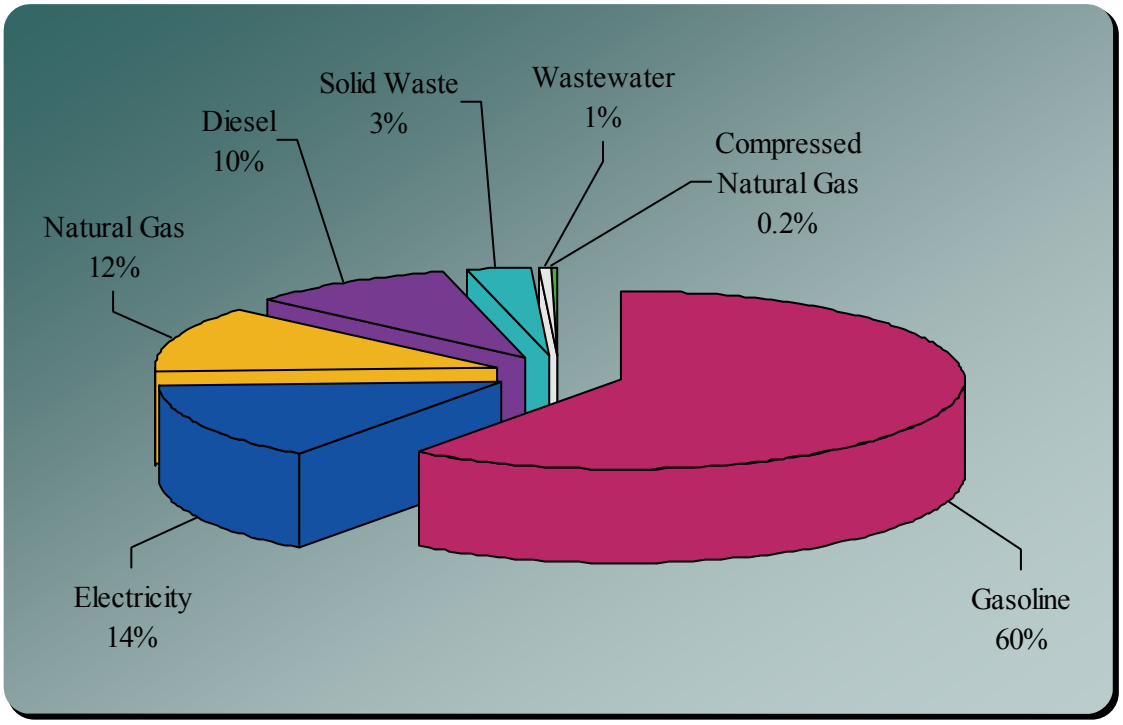


Table 4.3: Community Emissions Summary by Source

Source	Greenhouse Gas Emissions (metric tons CO_2e)
Gasoline	328,681
Electricity	78,020
Natural Gas	64,748
Diesel	53,869
Solid Waste	17,333
Wastewater	2,901
Compressed Natural Gas	1,017
TOTAL	**546,569**

4.1.4 Per Capita Emissions

Per capita emissions can be a useful metric for measuring progress in reducing greenhouse gases and for comparing one community's emissions with neighboring cities and against regional and national averages. That said, due to differences in emission inventory methods, it can be problematic to produce directly comparable per capita emissions numbers, and one must be cognizant of a margin of error when comparing figures between jurisdictions.

As detailed in Table 4.4, dividing the total community-wide GHG emissions by population yields a result of 9 metric tons of CO_2e *per capita*. It is important to note that this number is not the same as the carbon footprint of the average individual living in Encinitas (which would include lifecycle emissions, emissions resulting from air travel, etc.).

Table 4.4: Per Capita Emissions

Estimated 2005 Population*	62,650
Community GHG Emissions (metric tons CO_2e)	546,569
Per Capita GHG Emissions (metric tons (CO_2e)	8.7

4.2 Community Inventory Detail by Sector

This section explores community activities and emissions by taking a detailed look at each primary sector. As listed above, the sectors included in the community emissions analysis are:

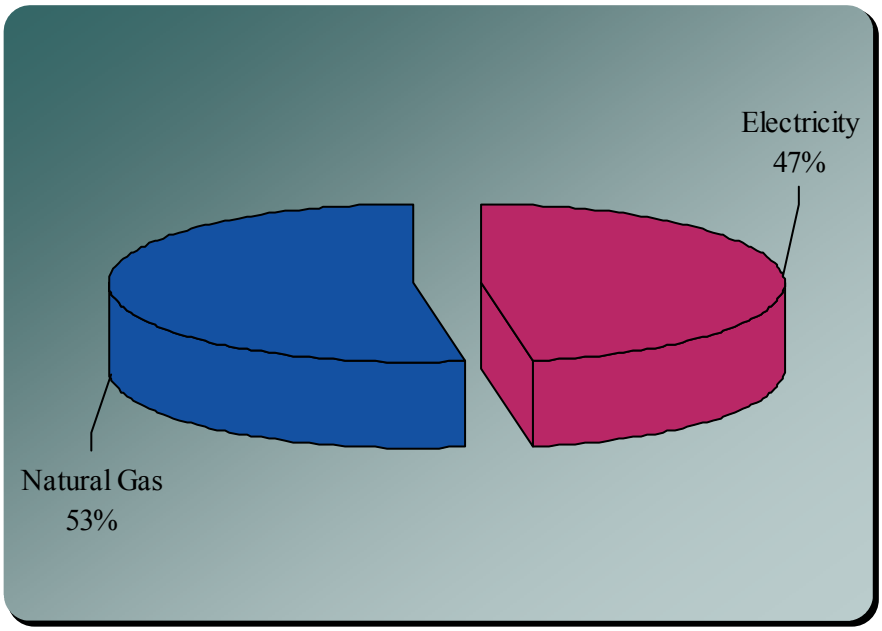
- Residential
- Commercial / Industrial
- Transportation
- Waste Generation
- Wastewater

4.2.1 Residential Sector

Energy consumption associated with Encinitas' homes produced 82,975 metric tons of metric tons of CO_2e in 2005 (15 percent of total community emissions). All residential sector emissions are the result of electricity consumption and the on-site combustion of natural gas. Emissions from lawn equipment, wood-fired stoves, transportation and waste generation are **not** included in these totals.

In 2005, Encinitas' entire residential sector consumed 156,809,813 kWh of electricity and 8,184,561 therms of natural gas. As shown in Figure 4.4, 53 percent of total residential emissions were the result of natural gas use, and 47 percent were the result of electricity consumption. Natural gas is typically used in residences as a fuel for home heating, water heating and cooking, and electricity is generally used for lighting, heating, and to power appliances.

Figure 4.4 Residential Emissions by Source



4.2.2 Commercial / Industrial Sector

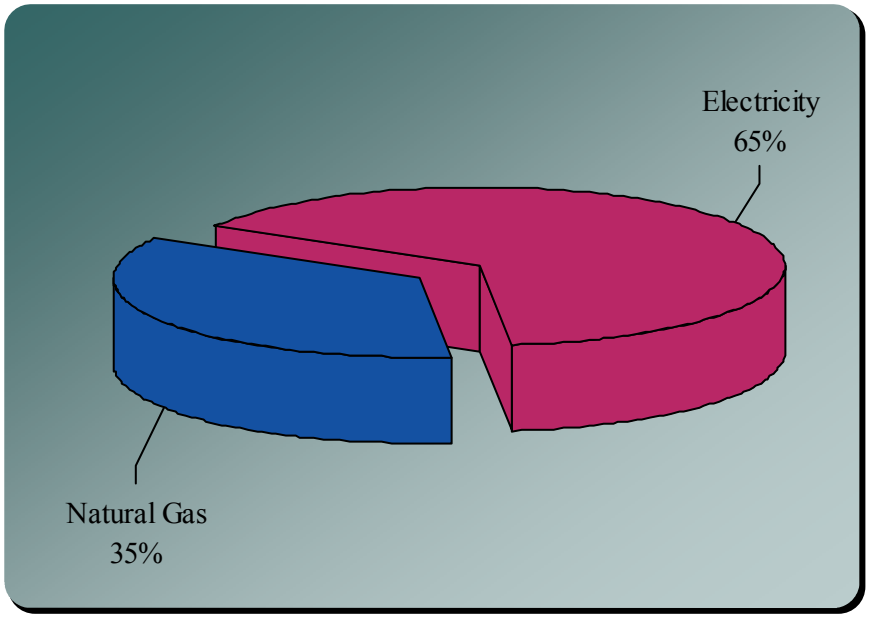
The commercial / industrial sector includes emissions from the operations of businesses as well as public agencies. For example, the majority of buildings and facilities included in the government operations inventory are also included as a subset of the commercial / industrial sector. In 2005, buildings and facilities within the commercial / industrial sector produced 59,793 metric tons of greenhouse gas emissions (11 percent of total community emissions). All commercial / industrial sector emissions included in this inventory are the result of electricity consumption and the on-site combustion of natural gas. It is important to note that emissions from off-road equipment, transportation, waste generation, stationary combustion other than natural gas, and other industrial processes are **not** included in these totals.

Encinitas' businesses generated 2.2 metric tons of GHG emissions per job in 2005.[23] This metric provides an indication of the carbon intensity of economic activity in Encinitas.

[23] 2005 jobs data was provided by SANDAG Technical Services Department, *Current Estimates,* August 2009.

As shown in Figure 4.5, 35 percent of total commercial / industrial emissions were the result of natural gas use, and 65 percent were the result of electricity consumption. Natural gas is typically used in the commercial / industrial sector to heat buildings, fire boilers, and generate electricity; and electricity is generally used for lighting, heating, and to power appliances and equipment.

Figure 4.5 Commercial / Industrial Emissions by Source



4.2.3 Transportation Sector

As with many other local governments, transportation within Encinitas' geographical boundary constitutes the greatest percentage (70 percent) of community wide greenhouse gas emissions – 383,566 metric tons CO_2e.

As shown in Table 4.5, 95 percent of transportation sector emissions came from on-road travel, with the remaining 5 percent originating from off-road vehicle use. Of on-road transportation activity, travel on local city roads constituted 36 percent of emissions, and 59 percent came from travel on Interstate 5 within Encinitas' jurisdictional boundary. An estimated 90 percent of on-road transportation emissions were due to gasoline consumption with the remaining 10 percent coming from diesel use.

Please see Appendix E for more detail on methods and emissions factors used in calculating emissions from the transportation sector.

Table 4.5: Transportation Emissions by Type

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Share of On-Road Emissions
On-Road Transportation		
Local Roads	136,388	36%
State Highways (Interstate 5)	228,070	59%
On-Road Subtotal	***364,458***	***95%***
Off-Road Transportation	19,108	5%
TOTAL	**383,566**	**100%**

4.2.4 Solid Waste Sector

As noted above in Figure 4.2, the solid waste sector constituted 3 percent of total emissions for the Encinitas community in 2005. Emissions from the solid waste sector are an estimate of methane generation from the decomposition of municipal solid waste (MSW) and alternative daily cover (ADC) sent to landfill in the base year (2005). These emissions are considered Scope 3 because they are not generated in the base year, but will result from the decomposition of 2005 waste over the full 100+ year cycle of its decomposition. As stated in the Government Inventory section, about 75 percent[24] of landfill methane emissions are captured through landfill gas collection systems, but the remaining 25 percent escape into the atmosphere as a significant contributor to global warming. The sector also includes base year emissions from the decomposition of waste-in-place at the inactive Encinitas landfill. Please see Table 4.10 below for a summary of emissions per waste type.[25]

Table 4.6: Waste Emissions Sources

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Share of Total Waste Emissions
Paper Products	8,339	53%
Food Waste	3,282	21%
Wood / Textiles	2,450	16%
Plant Debris	1,614	10%
TOTAL	**15,685**	**100%**

4.2.5 Wastewater Sector

The wastewater sector contributed 2,901 metric tons of greenhouse gas emissions, constituting 1 percent of total emissions for the jurisdiction community in 2005. Emissions from the wastewater sector are an estimate of methane and nitrous oxide generated in the process of wastewater treatment. These emissions are considered Scope 3 because they occur at treatment facilities outside the jurisdictional boundaries and "downstream" from the

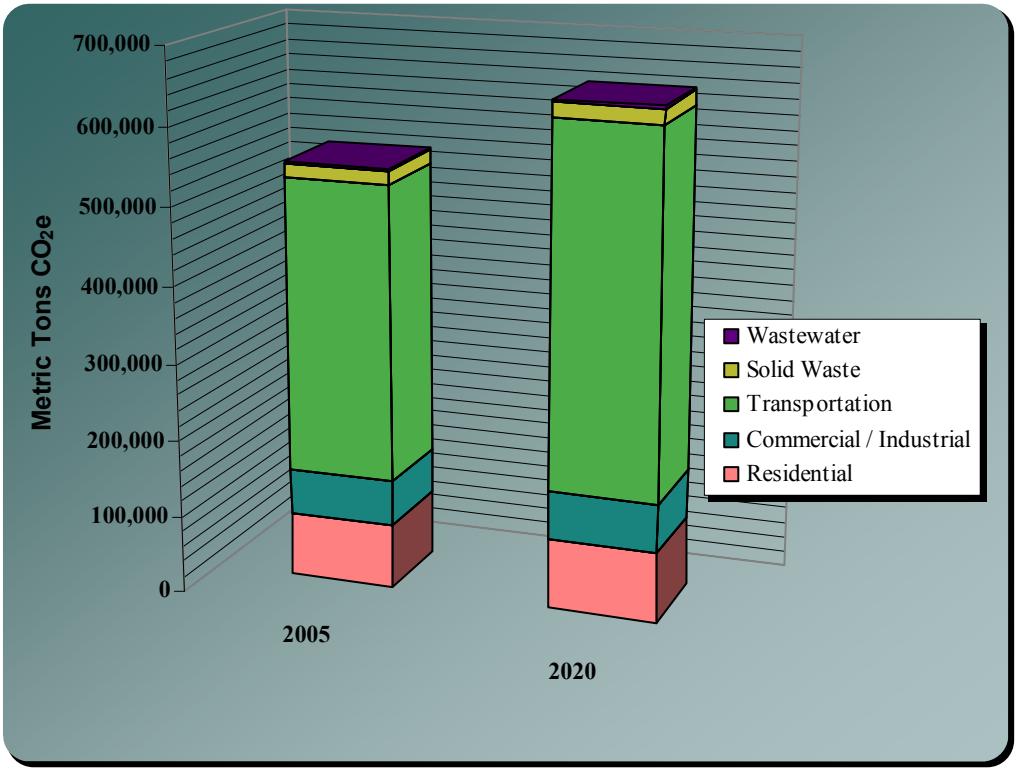
[24] US EPA AP 42.
[25] Waste characterization figures were provided by the 2004 *California Waste Characterization Study*, http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097

jurisdiction community where the wastewater in generated. In the San Diego region, about 71 percent[26] of wastewater treatment methane emissions are captured through biogas collection systems, but the remainder escape into the atmosphere and contribute the jurisdiction's impact on climate change.

4.3 Community Emissions Forecast

To illustrate the potential emissions growth based on projected trends in energy use, driving habits, job growth, and population growth from the baseline year going forward, this report includes an emissions forecast for the year 2020. Under a business-as-usual scenario, Encinitas' emissions will grow by approximately 18 percent by the year 2020, from 546,569 to 644,522 metric tons CO_2e. Figure 4.6 and Table 4.7 show the results of the forecast. A variety of different reports and projections were used to create the emissions forecast, as profiled below.

Figure 4.6 Community Emissions Forecast for 2020



[26] *San Diego County Greenhouse Gas Inventory*, USD Energy Policy Initiatives Center.

4.3.1 Residential Forecast

For the residential sector, a households projection for Encinitas conducted by the San Diego Association of Government (SANDAG) was used to estimate average annual compound growth in residential energy demand (0.35 percent). SANDAG estimates that the number of households in Encinitas was 23,530 in 2005, and will be 24,797 in 2020.[27]

4.3.2 Commercial / Industrial Forecast

The California Energy Commission's *California Energy Demand 2008-2018* shows that commercial floor space and the number of jobs have closely tracked the growth in energy use in the Commercial Sector. Using job growth projections for Encinitas also provided by SANDAG, it was calculated that the average annual growth in energy use in the commercial / industrial sector between 2005 and 2020 will be 0.45 percent.[28]

4.3.3 Transportation Forecast

Growth in transportation emissions over the forecast period is closely related to planned transportation infrastructure investments and the associated vehicle activity, as measured in vehicle miles traveled (VMT). Long-term transportation infrastructure is planned through the 2030 San Diego Regional Transportation Plan, published by SANDAG in 2007, and travel activity projections performed by SANDAG are based on this plan. These projections forecast a 22 percent increase in regional VMT between 2005 and 2020; this trend was applied to Encinitas' 2005 VMT to estimate 2020 travel activity. While this increase is attributed to regional travel as a whole and not specifically local travel in Encinitas, local VMT is likely to follow a similar trend, and this forecasting approach is more reliable than applying state-wide travel forecasts to the local level.[29]

4.3.4 Solid Waste and Wastewater Forecast

Population is the primary determinate for growth in emission pertaining to solid waste and wastewater generation. Therefore, the average annual population growth rate from 2005 to 2020 (0.55 percent, as calculated from above-referenced SANDAG population projections) was used to estimate future emissions from waste disposal and wastewater treatment.

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[27] SANDAG 2030 Regional Growth Forecast Update (2006).
[28] Ibid.
[29] New fuel efficiency standards under the federal Corporate Average Fuel Economy (CAFE) program and State of California "Clean Car" standards under AB 1493 (Pavley) could significantly reduce the demand for transportation fuel in Encinitas. An analysis of potential fuel savings from these measures at a scale that would be useful for the purpose of this report has not been conducted, nor would such an analysis produce a true business-as-usual estimation.

Table 4.7: Community Emissions Growth Forecast by Sector

Sector	2005 (metric tons $CO_{2e)}$	2020 (metric tons CO_2e)	Annual Growth Rate	Percent Change from 2005 to 2020
Residential	82,975	90,101	0.55%	9%
Commercial / Industrial	59,793	63,942	0.45%	7%
Transportation	383,566	468,508	1.34%	22%
Solid Waste	17,333	18,821	0.55%	9%
Wastewater	2,901	3,150	0.55%	9%
TOTAL	**546,569**	**644,522**	--	**18%**

Section Five: Conclusion

Conclusion

By participating in the San Diego Regional Climate Protection Initiative and other sustainability initiatives, the City of Encinitas has taken bold steps toward reducing its impacts on the environment. Policymakers and staff have chosen to take a leadership role in addressing climate change, and this leadership will allow the City to make tough decisions to create and implement innovative approaches to reduce its emissions. With increasing guidance and support from the state and the federal governments, Encinitas should be increasingly empowered to make the necessary changes to promote its vision for a more sustainable future.

This conclusion discusses the inventory as a baseline for emissions targets and suggests steps for the City of Encinitas to move forward to reduce emissions both from its internal operations and from the Encinitas community.

5.1 Toward Setting Emissions Reduction Targets

This inventory provides an emissions baseline that the City can use to inform Milestone Two of ICLEI's Five-Milestone process—setting emissions reduction targets. The greenhouse gas emissions reduction target is a goal to reduce emissions to a certain percentage below base year levels by a chosen planning horizon year. An example target might be a 20 percent reduction in emissions below 2005 levels by 2020. A target provides an objective toward which to strive and against which to measure progress. It allows a local government to quantify its commitment to fighting climate change—demonstrating that the jurisdiction is serious about its commitment and systematic in its approach.

In selecting a target, it is important to strike a balance between scientific necessity, ambition, and what is realistically achievable. Encinitas will want to give itself enough time to implement chosen emissions reduction measures—but note that the farther out the target year is, the more that the City should pledge to reduce. ICLEI recommends that regardless of the City's chosen long-term emissions reduction target (e.g., 15-year, 40-year), it should establish interim targets for every two- to three-year period. Near-term targets facilitate additional support and accountability, and help to ensure continued momentum around Encinitas's local climate protection efforts. To monitor the effectiveness of its programs, Encinitas should plan to re-inventory its emissions on a regular basis;

many jurisdictions are electing to perform annual inventories. See Appendix F for more information on how to re-inventory the City's emissions.

5.1.1 The Long-Term Goal

ICLEI recommends that the City of Encinitas' near-term climate work should be guided by the long-term goal of reducing its emissions by 80 percent to 95 percent from the 2005 baseline level by the year 2050. By referencing a long-term goal that is in accordance with current scientific understanding, Encinitas can demonstrate that it intends to do its part to reduce emissions over the long haul.

It is important to keep in mind that it will be next to impossible for local governments to reduce emissions by 80 to 95 percent without the assistance of state and federal policy changes that create new incentives and new sources of funding for emissions reduction projects and programs. However, in the next 15 years, there is much that local governments can do to reduce emissions independently. It is also important that Encinitas works to reduce its emissions sooner, rather than later: the sooner a stable level of greenhouse gases in the atmosphere is achieved, the less likely it is that some of the most dire climate change scenarios will be realized.

5.1.2 State of California Targets and Guidance

An integral component of the State of California's climate approach has been establishing three core emissions reduction targets at the community level. While these targets are specific to the community-scale, they can be used to inform emissions targets for government operations as well. Figure 4.1 highlights adopted emissions targets for the State. The AB 32 Scoping Plan also provides further guidance on establishing targets for local governments; specifically the Plan suggests creating an emissions reduction goal of 15 percent below "current" levels by 2020. This target has informed many local government's emission reduction targets for municipal operations—most local governments in California with adopted targets have targets of 15 to 25 percent reductions under 2005 levels by 2020.

Figure 4.1: California Greenhouse Gas Reduction Targets

On June 1, 2005, California Governor Schwarzenegger signed Executive Order S-3-05 establishing climate change emission reductions targets for the State of California. The California targets are an example of near-, mid- and long-term targets:

Reduce emissions to 2000 levels by 2010
Reduce emissions to 1990 levels by 2020
Reduce emissions to 80 percent below 1990 levels by 2050

5.1.3 Department Targets

If possible, ICLEI recommends that Encinitas consider department-specific targets for each of the departments that generate emissions within its operations. This allows City staff to do a more in-depth analysis of what is achievable

in each sector in the near, mid and long-term, and also encourages each department head to consider their department's impact on the climate and institute a climate-conscious culture in its operations.

5.2 Creating an Emissions Reduction Strategy

This inventory identifies the major sources of emissions from Encinitas's operations and, therefore, where policymakers will need to target emissions reductions activities if they are to make significant progress toward adopted targets. For example, since Employee Commute was a major source of emissions from City operations, it is possible that Encinitas could meet near-term targets simply by implementing a few major actions within employee commute modes. In addition, medium-term targets could be met by focusing emissions reduction actions on the public lighting and building and facilities, and the long term (2050) target will not be achievable without major reductions in all of those sectors.

Given the results of the inventory, ICLEI recommends that Encinitas focus on the following tasks in order to significantly reduce emissions from its government operations:

- Explore alternative commute modes for employees, including subsidized public transportation passes or carpool incentives such as preferred parking spaces, and options for telecommuting.
- Replace existing traffic signals, streetlights, and outdoor lighting with more efficient LED technologies.
- Replace vehicles with more-efficient technologies, including hybrid, biodiesel, or electric vehicles. Explore infrastructure needed for such vehicles and designate alternative-fuel vehicle preferred parking spaces.
- Educate employees about fuel-efficient driving practices and implement anti-idling regulations for City fleet.
- Complete weatherization, energy audits, and identify retrofits for facilities. Examples of these include lighting controls and occupancy-sensing vending machines and the installation of Energy-Star appliances.

In addition to the types of actions described above, which reduce emissions from government operations, ICLEI recommends developing policies and actions that will help to reduce emissions throughout the community. Examples include:

- Promoting growth through redevelopment and infill that maintains or improves the quality of life for existing neighborhoods.
- Adopting local parking standards that encourage reduced single-occupancy vehicle travel.
- Adopting building codes that exceed Title 24 energy requirements, on either a mandatory or voluntary basis.

- Establish water conservation guidelines and standards for existing development, new development and City facilities
- Provide public education programs on waste prevention, source reduction, recycling, yard waste, wood waste, and hazardous waste

By identifying and implementing a set of these types of strategies, Encinitas should be able to reduce and reverse its impact upon global warming. In the process, it may also be able to improve the quality of its services, reduce costs, stimulate local economic development, and inspire local residents and businesses to redouble their own efforts to combat climate change.

Appendices

Appendix A:
The Local Government Operations Protocol

This inventory follows the standard outlined in the Local Government Operations Protocol, which was adopted in 2008 by the California Air Resources Board (CARB) and serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. This and the other inventories conducted for the San Diego Regional Climate Protection Initiative are among the first to follow LGOP, representing a strong step toward standardizing how inventories are conducted and reported.

A.1 Local Government Operations Protocol

A.1.1 Background

In 2008, ICLEI, CARB, and the California Climate Action Registry (CCAR) released LGOP to serve as a U.S. supplement to the International Emissions Analysis Protocol. The purpose of LGOP is to provide the principles, approach, methodology, and procedures needed to develop a local government operations greenhouse gas emissions inventory. It leads participants through the process of accurately quantifying and reporting emissions, including providing calculation methodologies and reporting guidance. LGOP guidance is divided into three main parts: identifying emissions to be included in the inventory, quantifying emissions using best available estimation methods, and reporting emissions.

The overarching goal of LGOP is to allow local governments to develop emissions inventories using standards that are consistent, comparable, transparent, and recognized nationally, ultimately enabling the measurement of emissions over time. LGOP adopted five overarching accounting and reporting principles toward this end: relevance, completeness, consistency, transparency and accuracy. Methodologies that did not adhere to these principles were either left out of LGOP or included as Scope 3 emissions. LGOP was created solely to standardize how emissions inventories are conducted and reported; as such it represents a currently accepted standard for inventorying emissions but does not contain any legislative or program-specific requirements. Mandates by the State of California or any other legislative body, while possibly using LGOP as a standard, do not currently exist, and California local governments are not currently required to inventory their emissions. Program-specific

requirements, such as ICLEI's Milestones or CCAR's reporting protocol, are addressed in LGOP but should not be confused with LGOP itself.

Also, while LGOP standardizes inventories from government operations, it does not seek to be a wholly accurate inventory of all emissions sources, as certain sources are currently excluded or otherwise impossible to accurately estimate. This and all emissions inventories therefore represent a best estimate of emissions using best available data and calculation methodologies; it does not provide a complete picture of all emissions resulting from Encinitas's operations, and emissions estimates are subject to change as better data and calculation methodologies become available in the future.

A.1.2 Organizational Boundaries

Setting an organizational boundary for greenhouse gas emissions accounting and reporting is an important first step in the inventory process. The organizational boundary for the inventory determines which aspects of operations are included in the emissions inventory, and which are not. Under LGOP, two control approaches are used for reporting emissions: operational control or financial control. A local government has operational control over an operation if it has full authority to introduce and implement its operating policies at the operation. A local government has financial control if the operation is fully consolidated in financial accounts. If a local government has joint control over an operation, the contractual agreement will have to be examined to see who has authority over operating policies and implementation, and thus the responsibility to report emissions under operational control.[30] Local governments must choose which approach is the most applicable and apply this approach consistently throughout the inventory.

While both control approaches are acceptable, there may be some instances in which the choice may determine whether a source falls inside or outside of a local government's boundary. LGOP strongly encourages local governments to utilize operational control as the organization boundary for a government operations emissions inventory. Operational control is believed to most accurately represent the emissions sources that local governments can most directly influence, and this boundary is consistent with other environmental and air quality reporting program requirements. For this reason, all inventories in the San Diego Regional Climate Protection Initiative are being conducted according to the operational control framework.

30 Please see Local Government Operations Protocol for more detail on defining your organizational boundary: http://www.icleiusa.org/programs/climate/ghg-protocol

A.1.3 Types of Emissions

The greenhouse gases inventoried in this report are described in Section 2.1 As described in LGOP, emissions from each of the greenhouse gases can come in a number of forms:

Stationary or mobile combustion: These are emissions resulting from on-site combustion of fuels (natural gas, diesel, gasoline, etc.) to generate heat, electricity, or to power vehicles and mobile equipment.

Purchased electricity: These are emissions produced by the generation of power from utilities outside of the jurisdiction.

Fugitive emissions: Emissions that result from the unintentional release of greenhouse gases into the atmosphere (e.g., leaked refrigerants, methane from waste decomposition, etc.).

Process emissions: Emissions from physical or chemical processing of a material (e.g., wastewater treatment).

A1.4 Quantifying Emissions

Emissions can be quantified two ways:

Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility. This methodology is not generally available for most types of emissions and will only apply to a few local governments that have these monitoring systems.

The majority of the emissions recorded in the inventory can be and will be estimated using **calculation-based methodologies** to calculate their emissions using activity data and emission factors. To calculate emissions, the equation below is used:

Activity Data x Emission Factor = Emissions

Activity data refer to the relevant measurement of energy use or other greenhouse gas–generating processes such as fuel consumption by fuel type, metered annual energy consumption, and annual vehicle mileage by vehicle type. Emissions factors are calculated ratios relating emissions to a proxy measure of activity at an emissions source (e.g., CO_2 generated/kWh consumed). For a list of common emissions calculations see Table 2.2.

The guidelines in LGOP are meant to provide a common method for local governments to quantify and report greenhouse gas emissions by using comparable activity data and emissions factors. However, LGOP recognizes that local governments differ in how they collect data concerning their operations and that many are not able to meet the data needs of a given estimation method. Therefore, LGOP outlines both "recommended" and "alternative" methods

to estimate emissions from a given source. In this system, recommended methods are the preferred method for estimating emissions, as they will result in the most accurate estimate for a given emission source. Alternative methods often require less intensive data collection, but are likely to be less accurate. This approach allows local governments to estimate emissions based on the data currently available to them. It also allows local governments that are unable to meet the recommended methods to begin developing internal systems to collect the data needed to meet these methods.

This inventory has used the recommended activity data and emissions factors wherever possible, using alternative methods where necessary. For details on the methodologies used for each sector, see Appendix B.

A.1.5 Reporting Emissions

A.1.5.1 Significance Thresholds

Within any local government's own operations there will be emission sources that fall within Scope 1 and Scope 2 that are minimal in magnitude and difficult to accurately measure. Within the context of local government operations, emissions from leaked refrigerants and backup generators may be common sources of these types of emissions. For these less significant emissions sources, LGOP specifies that up to 5 percent of total emissions can be reported using estimation methods not outlined in LGOP.[31]

In this report, the following emissions fell under the significance threshold and were reported using best available methods:

- Scope 1 fugitive emissions from leaked refrigerants from HV/AC and refrigeration equipment
- Scope 1 CH_4 and N_2O emissions from vehicle fleet

A.1.5.2 Units Used in Reporting Emissions

LGOP requires reporting of individual gas emissions, and this reporting is included in Appendix B. In this narrative report, emissions from all gases released by an emissions source (e.g., stationary combustion of natural gas in facilities) are combined and reported in metric tons of carbon dioxide equivalent (CO_2e). This standard is based on the global warming potential (GWP) of each gas, which is a measure of the amount of warming a greenhouse gas may cause, measured against the amount of warming caused by carbon dioxide. For the GWPs of reported greenhouse gases, see Table 2.1.

31 In the context of registering emissions with an independent registry (such as the California Climate Action Registry), emissions that fall under the significance threshold are called *de minimis*. This term, however, is not used in LGOP and was not used in this inventory.

A.1.5.3 Information Items

Information items are emissions sources that, for a variety of reasons, are not included as Scope 1, 2, or 3 emissions in the inventory. In order to provide a more complete picture of emissions from the City of Encinitas's operations, however, these emissions should be quantified and reported.

In this report, the following emissions are included as information items (emission quantities are reported in Appendix B):

- Scope 1 CO_2 emissions from biodiesel consumption for employee commute respondents
- Ozone depleting chemical used as refrigerants (most notably R-22)

A common emission that is categorized as an information item is carbon dioxide emitted in the combustion of biogenic fuels. Local governments will often burn fuels that are of biogenic origin (wood, landfill gas, organic solid waste, biofuels, etc.) to generate power. Common sources of biogenic emissions are the combustion of landfill gas from landfills or biogas from wastewater treatment plants, as well as the incineration of organic municipal solid waste at incinerators.

Carbon dioxide emissions from the combustion of biogenic fuels are not included in Scope 1 based on established international principles. [32] These principles indicate that biogenic fuels (e.g., wood, biodiesel), if left to decompose in the natural environment, would release CO_2 into the atmosphere, where it would then enter back into the natural carbon cycle. Therefore, when wood or another biogenic fuel is combusted, the resulting CO_2 emissions are akin to natural emissions and should therefore not be considered as human activity-generated emissions. The CH_4 and N_2O emissions, however, would not have occurred naturally and are therefore included as Scope 1 emissions.

A.2 Baseline Years

Part of the local government operations emissions inventory process requires selecting a "performance datum" with which to compare current emissions, or a base year. Local governments should examine the range of data they have over time and select a year that has the most accurate and complete data for all key emission sources. It is also preferable to establish a base year several years in the past to be able to account for the emissions benefits of recent actions. A local government's emissions inventory should comprise all greenhouse gas emissions occurring during a selected *calendar* year.

32 Methane and nitrous oxide emissions from biogenic fuels are considered Scope 1 stationary combustion emissions and are included in the stationary combustion sections for the appropriate facilities.

For the San Diego Regional Climate Protection Initiative, 2005 was chosen as the baseline year, since this year is increasingly becoming the standard for such inventories; the 1990 baseline year for California is usually difficult for most local governments to meet and would not produce the most accurate inventory.

After setting a base year and conducting an emissions inventory for that year, local governments should make it a practice to complete a comprehensive emissions inventory on a regular basis to compare to the baseline year. ICLEI recommends conducting an emissions inventory at least every five years.

Appendix B:
LGOP Standard Report

1. Local Government Profile

Jurisdiction Name:	Encinitas
Street Address:	505 S. Vulcan Drive
City, State, ZIP, Country:	Encinitas, CA 92024
Website Address:	www.cityofencinitas.org
Size (sq. miles):	19.1
Population:	62,500
Annual Budget:	48,000,000
Employees (Full Time Equivalent):	238
Climate Zone:	3B
Annual Heating Degree Days:	1063
Annual Cooling Degree Days:	866
Lead Inventory Contact Name:	Diane Langager
Title:	Principal Planner
Department:	Planning
Email:	dlangag@cityofencinitas.org
Phone Number:	760-633-2714

2. GHG Inventory Details

Reporting Year:	2005
Protocol Used:	Local Government Operations Protocol, Version 1.0 (September 2008)
Control Approach:	Operational Control

GHG Emissions Summary (All Units in Metric Tons Unless Stated Otherwise)

Note: CO_2e totals listed here are summed totals of the estimated emissions of each inventoried gas based upon their global warming potentials (Appendix E of LGOP)

BUILDINGS & OTHER FACILITIES

SCOPE 1

	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
Stationary Combustion	136.971	136.620	0.013	0.000			
Fugitive Emissions	0.711				0.000		
Total Direct Emissions from Buildings & Facilities	137.681	136.620	0.013	0.000	0.000	0.000	0.000

SCOPE 2

	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity	377.665	374.907	0.020	0.008
Purchased Steam				
District Heating & Cooling				
Total Indirect Emissions from Buildings & Facilities	377.665	374.907	0.020	0.008

STREETLIGHTS AND TRAFFIC SIGNALS

SCOPE 2

	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity	576.359	572.151	0.030	0.012
Total Indirect Emissions from Streetlights and Traffic Signals	576.359	572.151	0.030	0.012

INDICATORS	
	54 Traffic Signals; 2,380 Streetlights

WATER DELIVERY FACILITIES

SCOPE 1

	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
Stationary Combustion							
Total Direct Emissions from Water Delivery Facilities	0.000	0.000	0.000	0.000	0.000	0.000	0.000

SCOPE 2

	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity	18.432	18.297	0.001	0.000
Purchased Steam				
District Heating & Cooling				
Total Indirect Emissions from Water Delivery Facilities	18.432	18.297	0.001	0.000

VEHICLE FLEET

SCOPE 1

	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs
Mobile Combustion	381.947	378.203	0.009	0.011		
Fugitive Emissions	2.366				0.002	
Total Direct Emissions from Vehicle Fleet	384.313	378.203	0.009	0.011	0.002	0.000

SCOPE 2

	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity for Electric Vehicles				
Total Indirect Emissions from Vehicle Fleet	0.000	0.000	0.000	0.000

INDICATORS		
	Number of Vehicles	62.000
	Vehicle Miles Traveled	395,121.000
	Number of Pieces of Equipment	14.000
	Equipment Operating Hours	

WASTE GENERATION

SCOPE 3

	CO_2e
Waste All Facilities	99.417

EMPLOYEE COMMUTE

SCOPE 3

	CO_2e
Mobile Combustion	886.549

INDICATORS		
	Vehicle Miles Traveled	1,629,220.000
	Number of Vehicles	

INFORMATION ITEMS

	CO_2e
R-22	119.978
Biodiesel 20	10.397
Total Information Items	130.374

Total Emissions

	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
SCOPE 1	521.995	514.823	0.021	0.011	0.002	0.000	0.000
SCOPE 2	972.455	965.356	0.051	0.019	0.000	0.000	0.000
SCOPE 3	985.966						
INFORMATION ITEMS	130.374						

POSSIBLE SOURCES OF OPTIONAL SCOPE 3 EMISSIONS

- Employee Commute
- Employee Business Travel
- Emissions From Contracted Services
- Upstream Production of Materials and Fuels
- Upstream and Downstream Transportation of Materials and Fuels
- Waste Related Scope 3 Emissions
- Purchase of Electricity Sold to an End User
- Transmission and Distribution Losses from Consumed Electricity
- Other Scope 3

POSSIBLE INFORMATION ITEMS

- Biogenic CO_2 from Combustion
- Carbon Offsets Purchased
- Carbon Offsets Sold
- Renewable Energy Credits (Green Power) Purchased
- Renewable Energy Credits Sold (GreenPower)
- Ozone-depleting Refrigerants/Fire Suppressants not in LGOP
- Other Information Items

Local Government Operations Standard Inventory Report

3. Activity Data Disclosure

Intro Worksheet

Every emission source must be accompanied by a reference for the activity data. This worksheet is meant to assist in recording activity data and the methods used to gather those data for government operations. Activity data represent the magnitude of human activity resulting in emissions; data on energy use, fuel consumtion, vehicle miles traveled, and waste generation are all examples of activity data that are used to compute GHGs. Detailed disclosure should be made of the activity data used and at what quantities. This disclosure should also cite the source(s) of the data and the methodology used, including whether that methodology is a recommended method or an alternate method.

Deviations from the primary methodology should be explained in detail. All assumptions and estimations should be cited as such. Local governments may also use this space in the reporting format to discuss the rationale for the inclusion or exclusion of optional inventory components. It is good practice to include appropriate citations (such as website URL, report title, etc) and all contact information that is necessary to verify the source and accuracy of the activity data.

BUILDINGS & OTHER FACILITIES (Chapter 6)

SCOPE 1

Stationary Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Natural Gas	CO_2e					
	CO_2	Primary	Known fuel use (utility bill)	25,708	therms	SDGE, Steve Campbell
	CH_4	Primary	Known fuel use (utility bill)	25,708	therms	SDGE, Steve Campbell
	N_2O	Primary	Known fuel use (utility bill)	25,708	therms	SDGE, Steve Campbell
	HFCs					
	PFCs					
	SF_6					
Generators	CO_2e					
	CO_2	Alternate	Estimate based on Run Time	115	gallons	Bryce Wilson (Public
	CH_4	Alternate	Estimate based on Run Time	115	gallons	Bryce Wilson (Public
	N_2O	Alternate	Estimate based on Run Time	155	gallons	Bryce Wilson (Public
	HFCs					
	PFCs					
	SF_6					

Fugitive Emissions

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Refrigerants	R-404a	Alternate	Estimate based on inventory and default	0.000035	tonnes	Eric Hilborn (Public
	R-134a	Alternate	Estimate based on inventory and default	0.000204	tonnes	Eric Hilborn (Public

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Electricity	CO_2e					
	CO_2	Primary	Known fuel use (utility bill)	1,512,515	kWh	SDGE, Steve Campbell
	CH_4	Primary	Known fuel use (utility bill)	1,512,515	kWh	SDGE, Steve Campbell
	N_2O	Primary	Known fuel use (utility bill)	1,512,515	kWh	SDGE, Steve Campbell
	HFCs					
	PFCs					
	SF_6					

STREETLIGHTS AND TRAFFIC SIGNALS (Chapter 6.2)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Electricity	CO_2e					
	CO_2	Primary	Known fuel use (utility bill)	2,308,270	kWh	SDGE, Steve Campbell
	CH_4	Primary	Known fuel use (utility bill)	2,308,270	kWh	SDGE, Steve Campbell
	N_2O	Primary	Known fuel use (utility bill)	2,308,270	kWh	SDGE, Steve Campbell
	HFCs					
	PFCs					
	SF_6					

WATER DELIVERY FACILITIES (Chapter 6)

SCOPE 1

Stationary Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Natural Gas	CO_2e					
	CO_2					
	CH_4					
	N_2O					
	HFCs					
	PFCs					
	SF_6					

Diesel	CO_2e					
	CO_2					
	CH_4					
	N_2O					
	HFCs					
	PFCs					
	SF_6					

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Electricity	CO_2e					
	CO_2	Primary	Known fuel use (utility bill)	73,818	kWh	SDGE, Steve Campbell
	CH_4	Primary	Known fuel use (utility bill)	73,818	kWh	SDGE, Steve Campbell
	N_2O	Primary	Known fuel use (utility bill)	73,818	kWh	SDGE, Steve Campbell
	HFCs					
	PFCs					
	SF_6					

VEHICLE FLEET (Chapter 7)

SCOPE 1

Mobile Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Gasoline	CO_2e					
	CO_2	Primary	Known fuel use	18,730	gallons; miles	Bryce Wilson (Public
	CH_4	Primary	Known fuel use	18,730	gallons	Bryce Wilson (Public
	N_2O	Primary	Known fuel use	18,730	gallons	Bryce Wilson (Public
	HFCs					
	PFCs					
	SF_6					

Diesel	CO_2e					
	CO_2	Primary	Known fuel use	16,023	gallons	Bryce Wilson (Public
	CH_4	Primary	Fuel use by vehicle type, model year, and	16,023	gallons	Bryce Wilson (Public
	N_2O	Primary	Fuel use by vehicle type, model year, and	16,023	gallons	Bryce Wilson (Public
	HFCs					
	PFCs					
	SF_6					

Fugitive Emissions

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Refrigerants	R-134a	Primary	Mass Balance Method	0	tonnes	Bryce Wilson (Public

WASTE GENERATION (Scope 3)

SCOPE 3

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Generated Waste	CH_4	Primary	Estimated waste weight based upon volume and number of containers	392	tons	Jeff Ritchie-Vice President; EDCO Waste & Recycling Services;Escondido

EMPLOYEE COMMUTE (Scope 3)

SCOPE 3

Stationary Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Gasoline	CO_2e					
	CO_2	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	93,035	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of Diane
	CH_4	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	93,035	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of Diane
	N_2O	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	93,035	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of Diane
	HFCs					
	PFCs					
	SF_6					

Diesel	CO_2e					
	CO_2	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	4,402	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of Diane
	CH_4	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	4,402	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of Diane
	N_2O	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	4,402	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of Diane
	HFCs					
	PFCs					
	SF_6					

Other fuels	CO_2e					
	CO_2					
	CH_4					
	N_2O					
	HFCs					
	PFCs					
	SF_6					

INFORMATION ITEMS

Stationary Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Ozone Depleting Refrigerants	R-22	Alternate	Estimate based on inventory and default	0	tonnes	Eric Hilborn (Public
Biogenic CO_2 from combustion	CO_2e					
	CO_2	Primary	Proxy Year Estimated Fuel Use-based upon	1	tonnes	Online and paper surveys
	CH_4					
	N_2O					
	HFCs					
	PFCs					
	SF_6					

POSSIBLE SOURCES OF OPTIONAL SCOPE 3 EMISSIONS

Employee Commute
Employee Business Travel
Emissions From Contracted Services
Upstream Production of Materials and Fuels
Upstream and Downstream Transportation of Materials and Fuels
Waste Related Scope 3 Emissions
Purchase of Electricity Sold to an End User
Transmission and Distribution Losses from Consumed Electricity
Other Scope 3

POSSIBLE INFORMATION ITEMS

Biogenic CO_2 from Combustion
Carbon Offsets Purchased
Carbon Offsets Sold
Renewable Energy Credits (Green Power) Purchased
Renewable Energy Credits Sold (GreenPower)
Ozone-depleting Refrigerants/Fire Suppressants not in LGOP
Other Information Items

Local Government Operations Standard Inventory Report

4. Calculation Methodology Disclosure

In addition to activity data, every emission source must be accompanied by the emission factor used, a reference for each emission factor, and the calculation

BUILDINGS & OTHER FACILITIES (Chapter 6)

SCOPE 1

Stationary Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Natural Gas	CO_2e			
	CO_2	Default	53.06 kg/MMBtu	LGOP v1 Table G.1
	CH_4	Default	5 g/MMBtu	LGOP v1 Table G.3
	N_2O	Default	0.1 g/MMBtu	LGOP v1 Table G.3
	HFCs			
	PFCs			
	SF_6			
Generators-Diesel	CO_2e			
	CO_2	Default	73.15 kg/MMBtu ;53.06 kg/MMBtu	LGOP v1 Table G.1
	CH_4	Default	11 g/MMBtu ;5 g/MMBtu	LGOP v1 Table G.3
	N_2O	Default	.6 g/MMBtu ; 0.1 g/MMBtu	LGOP v1 Table G.3
	HFCs			
	PFCs			
	SF_6			

Fugitive Emissions

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Refrigerants	R-404a	none	GWP-2730	LGOP v1 Table E.1&E.2
	R-134a	none	GWP-1300	LGOP v1 Table E.1&E.2

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO_2e			
	CO_2	Default	546.46 lbs/MWh	LGOP v1 Table G.5
	CH_4	Default	.029 lbs/MWh	LGOP v1 Table G.6
	N_2O	Default	0.011 lbs/MWh	LGOP v1 Table G.6
	HFCs			
	PFCs			
	SF_6			

STREETLIGHTS AND TRAFFIC SIGNALS (Chapter 6.2)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO_2e			
	CO_2	Default	546.46 lbs/MWh	LGOP v1 Table G.5
	CH_4	Default	.029 lbs/MWh	LGOP v1 Table G.6
	N_2O	Default	0.011 lbs/MWh	LGOP v1 Table G.6
	HFCs			
	PFCs			
	SF_6			

WATER DELIVERY FACILITIES (Chapter 6)

SCOPE 1

Stationary Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Natural Gas	CO_2e			
	CO_2			
	CH_4			
	N_2O			
	HFCs			
	PFCs			
	SF_6			
	CO_2e			
	CO_2			
	CH_4			
	N_2O			
	HFCs			
	PFCs			
	SF_6			

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO_2e			
	CO_2	Default	546.46 lbs/MWh	LGOP v1 Table G.5
	CH_4	Default	.029 lbs/MWh	LGOP v1 Table G.6
	N_2O	Default	0.011 lbs/MWh	LGOP v1 Table G.6
	HFCs			
	PFCs			
	SF_6			

VEHICLE FLEET (Chapter 7)

SCOPE 1

Mobile Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Gasoline	CO_2e			
	CO_2	Default	8.81 kg/gallon	LGOP v1 Table G.9
	CH_4	Default	Varies by model year	LGOP v1 Table G.10; Table G.12 for other equipment
	N_2O	Default	Varies by model year	LGOP v1 Table G.10; Table G.12 for other equipment
	HFCs			
	PFCs			
	SF_6			
Diesel	CO_2e			
	CO_2	Default	10.15 kg/gallon	LGOP v1 Table G.9
	CH_4	Default	Varies by model year	LGOP v1 Table G.10; Table G.12 for other equipment
	N_2O	Default	Varies by model year	LGOP v1 Table G.10; Table G.12 for other equipment
	HFCs			
	PFCs			
	SF_6			

Fugitive Emissions

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Refrigerants	R-134a	None	GWP-1300	LGOP v1 Table E.1&E.2

WASTE GENERATION (Scope 3)

SCOPE 3

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Generated Waste	CH_4	Alternate	Varies by waste type	EPA Waste Reduction Model http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html; Public Administration waste charaterization provided by CIWMB

EMPLOYEE COMMUTE (Scope 3)

SCOPE 3

Stationary Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Gasoline	CO_2e			
	CO_2	Default	8.81 kg CO2 / gallon	LGOP, Table G.9
	CH_4	Default	0.02990 g/mi (cars)	LGOP, Table G.13
	N_2O	Default	0.03413 g/mi (cars)	LGOP, Table G.13
	HFCs			
	PFCs			
	SF_6			
Diesel	CO_2e			
	CO_2	Default	10.15 kg/gallon	LGOP, Table G.9
	CH_4	Default	0.0005 g/mi (cars)	LGOP, Table G.13
	N_2O	Default	0.001 g/mi (cars)	LGOP, Table G.13
	HFCs			
	PFCs			
	SF_6			
Other fuels	CO_2e			
	CO_2			
	CH_4			
	N_2O			
	HFCs			
	PFCs			
	SF_6			

INFORMATION ITEMS

Stationary Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Ozone Depleting Refrigerants	R-22	None	GWP-1700	http://www.epa.gov/ozone/science/ods/classone.html
Biogenic CO2 from combustion	CO_2e			
	CO_2	Default	.0262 kg/scf	LGOP v.1 Table G.2
	CH_4			
	N_2O			
	HFCs			
	PFCs			
	SF_6			

POSSIBLE SOURCES OF OPTIONAL SCOPE 3 EMISSIONS	POSSIBLE INFORMATION ITEMS
Employee Commute	Biogenic CO_2 from Combustion
Employee Business Travel	Carbon Offsets Purchased
Emissions From Contracted Services	Carbon Offsets Sold
Upstream Production of Materials and Fuels	Renewable Energy Credits (Green Power) Purchased
Upstream and Downstream Transportation of Materials and Fuels	Renewable Energy Credits Sold (GreenPower)
Waste Related Scope 3 Emissions	Ozone-depleting Refrigerants/Fire Suppressants not in LGOP
Purchase of Electricity Sold to an End User	Other Information Items
Transmission and Distribution Losses from Consumed Electricity	
Other Scope 3	

Appendix C: Employee Commute

Emissions from employee commutes make up an important optional source of emissions from any local government's operations. The scale of emissions from employee commutes is often large in comparison with many other facets of local government operations, and local governments can affect how their employees get to and from work through a variety of incentives. For this reason, ICLEI recommends estimating emissions from employee commutes as part of a complete government operations greenhouse gas emissions inventory.

To assist in the data collection process, ICLEI provided the jurisdictions with both an online and a paper copy of an employee commute survey.[33] The questions in the survey were aimed at finding three categories of information:

- **Activity data** to calculate emissions from employee commute (vehicles miles traveled, vehicle type, vehicle model year) both 2005 and 2009.
- **Indicator data** to help Encinitas understand how much time and money employees spend as they commute, as well as how many employees use alternative modes of transportation to get to work.
- **Policy data** that will serve as guidance for Encinitas as it adopts policies aimed at reducing emissions from employee commutes. These questions asked employees for their interest in alternative modes of transportation as well as what policies would be most effective in allowing them to switch modes of transportation away from driving alone.

This section provides the emissions estimation methodology and both surveys. Individual survey results are in the possession of Diane Langager, Principal Planner, Planning Department.

C.1 Methodology Summary

The methodology for estimating the employee commute emissions portion of the inventory is similar to the mobile emissions methodology outlined in the mobile emissions section of Appendix B. Encinitas administered the employee commute survey to 241 current employees working for the City, and 134 employees responded to the

33 The paper survey was administered only to employees that do not have access to a computer. The survey asked slightly different questions but was aimed at garnering the same emissions and policy-relevant data as the electronic survey.

survey (a response rate of 56 percent). The survey was administered in 2009 and current data was used as a proxy for 2005 data. Both full time and part-time employee data were included.

To calculate emissions, the survey collected the following information:

- The number of days and number of miles employees drive alone to work (one-way) in an average week
- The number of days they carpooled and how often they drove the carpool in an average week
- The vehicle type of their vehicle and the type of fuel consumed

These weekly data were then converted into annual VMT estimates by the following equation:

Number of days driven to work/week x to-work commute distance x 2 x 48 weeks worked/year

Actual CO_2e emissions from respondents' vehicles were calculated by converting vehicle miles traveled per week by responding employees into annual fuel consumption by fuel type (gasoline, diesel). The VMT data collected were converted to fuel consumption estimates using fuel economy of each vehicle type.[34]

ICLEI then extrapolated estimated fuel consumption to represent all 238 of Encinitas's employees in 2005. This was a simple extrapolation, multiplying the estimated fuel consumption number by the appropriate factor to represent all current employees. For example, if 33.3 percent of employees responded, fuel consumption numbers were tripled to estimate fuel consumption for all employees. This is not a statistical analysis and no uncertainty has been calculated as there is uncertainty not only at the extrapolation point but also in the calculation of actual emissions. Therefore, the resulting calculated emissions should be seen as directional and not as statistically valid.

34 Fuel efficiency estimates from www.fueleconomy.gov, EPA *Green Fleets Guide* and other national sources.

C.2 Employee Commute Survey

1. Introduction
The purpose of this survey is to gather information on your commute to work so your employer can offer the best transportation options to you while reducing the jurisdiction's impact on the environment. The survey should take no more than 15 minutes.

Unless otherwise indicated, all questions refer to a ONE-WAY commute TO WORK only. Please do not include any traveling you do during work hours (meetings, site visits, etc). Any question with an asterisk (*) next to it requires an answer in order to proceed.

Please note that this survey is completely anonymous. We will not collect or report data on any individuals who respond to the survey.

Thank you very much.

2. Workplace
Please provide the following information regarding your workplace. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. What local government do you currently work for?
Carlsbad
County of San Diego
Encinitas
Imperial Beach
La Mesa
National City
Poway
Solana Beach
San Marcos
Vista

*2. What department do you work in?

3. Commuter Background Information
Please provide the following information regarding your background. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. What city/town do you live in?

*2. How many miles do you live from your place of work?
(please enter a whole number)

3. How many minutes does your commute to work typically take?
(please enter a whole number)

4. In a typical week, how much money do you spend on your ROUND TRIP commute? (transit fees, gas, tolls, etc-please enter a number)

5. If you drive to work, what type of vehicle do you usually drive?
Full-size auto
Mid-size auto
Compact/hybrid
Light truck/SUV/Pickup
Van

Heavy Truck
Motorcycle/scooter

6. What year is your vehicle?
(please enter a four digit year)

7. What type of fuel does your vehicle use?
Gas
Diesel
Biodiesel (B20)
Biodiesel (B99 or B100)
Electric
Other (please specify-if Ethanol please indicate grade)

4. Employment Information
Please provide the following information regarding your employment. Click "Next" at the bottom when finished or click "Prev" to go back.

1. Do you typically travel to work between 6-9 am Monday-Friday?
Yes
No
If No, please specify what time of day you commute:

2. Does your position allow you to have flexible hours or to telecommute?
Yes
No

*3. Are you a full time employee or part time employee?
Full
Part

5. Part Time Employees
Please provide the following information regarding your part time employment. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. What is the average number of days you work per week?
(please enter a number)

6. Temporary Employees

Are you a temporary employee?
Yes
No

7. Temporary Employees

How many weeks is your temporary assignment? (please enter a number)

8. Current Daily Commute
Please provide the following information regarding your current daily commute. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. In a typical week, do you drive to work alone at least once?
Yes
No

9. Drive Alone

Click "Next" at the bottom when finished or click "Prev" to go back.

*1. How many DAYS a week do you drive alone to work?
(please enter a number)

*2. How many MILES PER DAY do you drive TO WORK ONLY?
(please enter a number)

10. Carpool
Click "Next" at the bottom when finished or click "Prev" to go back.

*1. In a typical week, do you carpool to work at least once?
Yes
No

11. Carpool
*1. How many DAYS a week do you carpool?
(please enter a number)

*2. How many MILES do you drive TO WORK ONLY when you carpool?
(please enter a number)

3. How many PEOPLE are in your carpool?
(please enter a number)

*4. How many DAYS a week are you the driver of the carpool?
(please enter a number)

12. Public Transit
*1. In a typical week, do you take public transit to work at least once?
Yes
No

13. Public Transit
*1. How many DAYS a week do you take public transit TO WORK?
(please enter a number)

2. What type of public transit do you take TO WORK?
Bus
Ferry
Light Rail
Train
Other (please specify)

14. Bike/Walk
*1. In a typical week, do you bike or walk to work at least once?
Yes
No

15. Bike/Walk
1. How many DAYS a week do you bike to work?
(please enter a number)

2. How many DAYS a week do you walk to work?
(please enter a number)

16. Telecommute

1. If you telecommute:
How many DAYS do you telecommute in a typical week?
(please enter a number)
If you do not telecommute, leave this question blank.

17. Commute Preference Information
Please answer the following questions regarding your CURRENT commute.

1. Why have you chosen your current commute mode?

2. Would you consider taking any of the following transportation modes? (check all that apply):
Public Transportation
Carpooling
Vanpooling
Bicycling
Walking
Other (please specify)

*3. Is there a transit route that you would use to commute by public transit?
Yes
No

4. If no to question 3, please explain why not.

5. If you drive alone, which, if any, of the following benefits would encourage you to take alternative forms of transportation? (check all that apply)
Vanpool/carpool incentives
Pre-tax transit checks
Parking cash-out (reimbursement to give up your parking spot)
Improved transit options
Improved walking routes/conditions
Telecommuting option
Free/inexpensive shuttle
Free public transit benefit
Subsidizing bicycle purchase
Improved bike routes/conditions
Better information about my commute options
None of the above
Other (please specify)

28. Comments

1. If you have other concerns or issues related to your commute, or if something we should know about was not captured in any survey questions, please describe below.

29. Thank You
Thank you for responding to this survey!

Appendix D: Government-Generated Solid Waste Methodology

Emissions from the waste sector are an estimate of methane generation that will result from the anaerobic decomposition of all organic waste sent to landfill in the base year. It is important to note that although these emissions are attributed to the inventory year in which the waste is generated, the emissions themselves will occur over the 100+ year timeframe that the waste will decompose. This frontloading of emissions is the approach taken by EPA's Waste Reduction Model (WARM). Attributing all future emissions to the year in which the waste was generated incorporates all emissions from actions taken during the inventory year into that year's greenhouse gas release. This facilitates comparisons of the impacts of actions taken between inventory years and between jurisdictions. It also simplifies the analysis of the impact of actions taken to reduce waste generation or divert it from landfills.

D.1 Estimating Waste Tonnages from the City of Encinitas's Operations

Like most local governments, the City of Encinitas does not directly track the amount of waste generated from its operations. Therefore, to estimate the amount of waste generated, ICLEI worked with EDCO, the waste hauler for Encinitas in 2009. The amount of waste was estimated by compiling pick-up accounts owned by the City. Garbage trucks do not weigh waste at each pick-up, therefore, it is not possible to directly track disposal figures in mass per facility. Mass of waste generation was estimated using volumetric container size (gallons, yards, etc.) data, along with pick-up frequency and average fill of containers. These data produced a comprehensive annual volumetric figure, which was then converted to mass using standard conversion factors supplied by the California Integrated Waste Management Board (CIWMB). Estimated waste *generation* was converted to final *disposal* (quantity sent to landfill) by applying average waste diversion percentages for each account. Where applicable, self-haul waste (waste brought directly from the local government to landfills) was included as part of this total.

D.2 Emissions Calculation Methods

As some types of waste (e.g., paper, plant debris, food scraps, etc.) generate methane within the anaerobic environment of a landfill and others do not (e.g., metal, glass, etc.), it is important to characterize the various

components of the waste stream. Waste characterization for government-generated solid waste was estimated using the CIWMB's 2004 statewide waste characterization study.[35]

Most landfills in the San Diego region capture methane emissions either for energy generation or for flaring. EPA estimates that 60 percent to 80 percent[36] of total methane emissions are recovered at the landfills to which Encinitas sends its waste. Following the recommendation of LGOP, ICLEI adopted a 75 percent methane recovery factor.

Recycling and composting programs are reflected in the emissions calculations as reduced total tonnage of waste going to the landfills. The model, however, does not capture the associated emissions reductions in "upstream" energy use from recycling as part of the inventory.[37] This is in-line with the "end-user" or "tailpipe" approach taken throughout the development of this inventory. It is important to note that, recycling and composting programs can have a significant impact on greenhouse gas emissions when a full lifecycle approach is taken. Manufacturing products with recycled materials avoids emissions from the energy that would have been used during extraction, transporting and processing of virgin material.

D.2.1 Methane Commitment Method

CO_2e emissions from waste disposal were calculated using the methane commitment method outlined in the EPA WARM model. This model has the following general formula:

$CO_2e = W_t * (1-R)A$

Where:

W_t is the quantify of waste type "t"

R is the methane recovery factor,

A is the CO_2e emissions of methane per metric ton of waste at the disposal site (the methane factor)

While the WARM model often calculates upstream emissions, as well as carbon sequestration in the landfill, these dimensions of the model were omitted for this particular study for two reasons:

This inventory functions on an end-use analysis, rather than a life-cycle analysis, which would calculate upstream emissions), and this inventory solely identifies emissions sources, and no potential sequestration "sinks."

35 CIWMB Waste Characterization Study-Public Administration Group available at http://www.ciwmb.ca.gov/WasteChar/BizGrpCp.asps.
36 AP 42, section 2.4 Municipal Solid Waste, 2.4-6, http://www.epa.gov/ttn/chief/ap42/index.html
37 "Upstream" emissions include emissions that may not occur in your jurisdiction resulting from manufacturing or harvesting virgin materials and transportation of them.

Appendix E: Community Inventory Methodology

This appendix expands on the description of methodology provided in Section 2, describing in more detail the data sources and processes used to calculate emissions in the community inventory.

E.1 Overview of Inventory Contents and Approach

The community inventory describes emissions of the major greenhouse gases from the residential, commercial / industrial, transportation, solid waste, and wastewater sectors. As explained in Section 2, emissions are calculated by multiplying activity data—such as kilowatt hours or gallons of gasoline consumed—by emissions factors, which provide the quantity of emissions per unit of activity. Activity data is typically available from electric and gas utilities, planning and transportation agencies and air quality regulatory agencies. Emissions factors are drawn from a variety of sources, including the California Climate Action Registry, the Local Governments Operations Protocol, and air quality models produced by the California Air Resources Board (CARB).

In this inventory, all GHG emissions are converted into carbon dioxide equivalent units, or CO_2e, per guidance in the Local Government Operations Protocol (LGOP). The LGOP provides standard factors to convert various greenhouse gases into carbon dioxide equivalent units; these factors are known as Global Warming Potential factors, representing the ratio of the heat-trapping ability of each greenhouse gas relative to that of carbon dioxide.

The community inventory methodology is based on guidance from ICLEI's draft International Local Government GHG Emissions Analysis Protocol (IEAP), as well as methods utilized in the *San Diego County Greenhouse Gas Inventory* produced by the University of San Diego's Energy Policy Initiatives Center (EPIC), and in ongoing climate change planning work at SANDAG.

E.1.1 Emissions Sources Included and Excluded

In general, local jurisdictions should seek to measure all emissions of the six Kyoto Protocol greenhouse gases[38] occurring within the jurisdictional boundaries. In practice, this level of detail may not be feasible for the local jurisdiction. The table below describes sources included in this community inventory, followed by sources that were excluded:

Sector	Emissions Source	Sector	Emissions Source
Residential	Bundled Electricity	**Transportation**	***On-Road Transportation***
	Direct Access Electricity		Travel on Local/Regional Roads
	Bundled Natural Gas		Travel on State Highways
	Direct Access Natural Gas		
Commercial / Industrial	Bundled Electricity		***Off-Road Sources***
	Direct Access Electricity		Lawn and Garden Equipment
	Bundled Natural Gas		Construction Equipment
	Direct Access Natural Gas		Industrial Equipment
Solid Waste	Community-generated Solid Waste		Light Commercial Equipment
	Landfill Waste-in-Place	**Wastewater**	Community-generated Wastewater

Local governments will often choose to exclude emissions sources that meet the following criteria:

- ***Below the significance threshold***. In the ICLEI reporting standard, emissions sources can be excluded from the analysis (e.g. are "de minimis") if, when combined, the excluded emissions total less than 5% of the total of the emissions from the Community or Government Inventory.[39]

[38] CO_2, CH_4, N_2O, SF_6, perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs)
[39] Note: an inventory should include at least 95% of the emissions released by the government and community as a whole. Therefore, if a large number of small emissions sources occur within the jurisdiction, they cannot all be ignored.

- ***Insufficient data or accepted standard methodology.*** The science is still evolving in many sectors, and accurate records or standards for measuring emissions are not always available. Examples include non-combustion industrial emissions sources or emissions from composting activities.
- ***Emissions largely located outside the jurisdiction's boundaries.*** These types of emissions could include such sources as aviation departing from local airports or regional transit emissions.

In this inventory, the following emissions were below the significance threshold and were not included:

- $SF_{6,}$ perfluorocarbons (PFCs), and hydrofluorocarbon (HFCs) emissions
- N_2O emissions from transportation
- Emissions of minor off-road sources (those not included in the table above)
- Stationary emissions from propane and diesel fuels
- Non-combustion industrial emissions sources

The following sources were excluded because they occurred largely outside the jurisdiction's boundaries:

- Aviation
- Rail
- Regional public transit

E.2 Emissions Forecast

This inventory includes a "business-as-usual" forecast to 2020, estimating emissions that will occur if no new emissions reduction policies are implemented. The forecast is based on household, population, and job projections from SANDAG's *2030 Regional Growth Forecast Update*. As a business-as-usual projection, the forecast does not take into account legislation or regulation currently under development, and relies on demographic data as the basis for estimating growth in each sector. The forecasting approach varies for each sector:

- Residential emissions are based on projected growth in local jurisdiction *households*.
- Commercial / industrial sector emissions are correlated with forecasted *job growth* in the local jurisdiction.
- Transportation emissions are based on projected growth rates in *regional vehicle miles traveled* associated with SANDAG's Regional Transportation Plan 2030.
- Solid waste and wastewater emissions are correlated with forecasted *population* growth in the local jurisdiction.

E.3 The Built Environment: Residential, Commercial, and Industrial Sectors

Electricity and natural gas quantities sold to San Diego Gas & Electric customers as bundled service (both energy generation and transmission/distribution) was provided by Benjamin Lopez at SDG&E. Direct access electricity and natural gas was also provided by SDG&E, which records the direct access resources that are distributed through its grid. Bundled SDG&E electricity emissions were calculated in ICLEI's CACP software using SDG&E-specific emissions factors provided by the California Climate Action Registry. Direct access electricity consumption was calculated in CACP using EPA eGrid emissions factors for the WECC California eGrid subregion. All natural gas emissions were calculated in CACP with default emissions factors from the Local Government Operations Protocol.

E.4 On-road Transportation and Off-road Mobile Sources

E.4.1 On-road Transportation

On-road transportation emissions were derived from local jurisdiction vehicle miles traveled (VMT) data and regional vehicle and travel characteristics. Observed 2005 VMT on non-State facilities (referred to in the inventory as "local roads") was obtained from Caltrans' Highway Performance Monitoring System reports. VMT on state highways (Interstate 5) in the local jurisdiction was derived from a GIS shapefile output from the SANDAG transportation model, which is the basis of air quality reporting associated with the Regional Transportation Plan. For state highway segments that crossed jurisdictional boundaries, the segments were clipped in GIS and only the portion within the boundaries was accounted for.

The EMFAC2007 model developed by CARB was used to calculate emissions from these VMT figures. EMFAC defaults for San Diego County include regionally-specific information on the mix of vehicle classes and model years, as well as ambient conditions and travel speeds, that determine fuel efficiency. The model estimates carbon dioxide and methane emissions from these factors and inputted vehicle activity data.

Because inputting local VMT without changing regional defaults for vehicle population and vehicle trips would result in an over-estimation of emissions, regionally-specific ratios of VMT to vehicle population and trips were held constant.

EMFAC outputs are reported in short tons per day. Results were converted to metric tons per year. Because state highway VMT and associated emissions were based on average *weekday* traffic volumes, a 5-day to 7-day conversion factor was obtained from Caltrans and applied to the output to allow for annualizing.[40] Methane

[40] Provided by Kim Sturmer, Caltrans. The 2008 5-day to 7-day factor (only available) for state highways is 0.94.

emissions were converted to carbon dioxide equivalent units based on the Global Warming Potential factor from LGOP.

E.4.2 Off-road Mobile Sources

Off-road emissions were obtained from the CARB OFFROAD2007 model. The model was run using default equipment population, usage, and efficiency data for San Diego County. Emissions outputs were scaled to the local jurisdiction level by population share. Results were converted from short tons per day to metric tons per year. Methane and nitrous oxide emissions were converted to carbon dioxide equivalent units based on the Global Warming Potential factors from LGOP.

E.5 Solid Waste

Emissions from solid waste were captured in two ways: emissions from landfills located in the jurisdiction in the base year ("landfill waste-in-place"), and future emissions from decomposition of waste generated in the local jurisdiction in the base year ("community-generated solid waste").

E.5.1 Landfill Waste-in-Place

Methane emissions were obtained from CARB, which utilized a First Order Decay Model (FOD) to estimate emissions from County waste disposal facilities.[41] The FOD incorporates data on waste disposal and facility conditions extending back several decades to calculate methane and carbon dioxide equivalent emissions

E.5.2 Community-Generated Solid Waste

Community-generated solid waste emissions were calculated in CACP using waste disposal data obtained from the California Integrated Waste Management Board Disposal Reporting System, which records tonnages of municipal solid waste and alternative daily cover by local jurisdiction. Emissions were calculated using the same methodology as described in Appendix D for government-generated solid waste.

E.6 Wastewater

This inventory utilizes wastewater emissions estimates from the EPIC San Diego County inventory. EPIC obtained a per capita wastewater emissions estimate from CARB for 2005. This figure was reduced to account for biogas capture at regional wastewater facilities using gas capture data provided by the San Diego County Air Pollution

[41] Provided by Larry Hunsaker, CARB, on November 27, 2007. This data is embedded in the community master data file provided to the local jurisdiction with this report.

Control District. For the purposes of this inventory, this per capita County-wide emissions rate was scaled to the local jurisdiction level by population share.

Appendix F: Conducting a Monitoring Inventory

The purpose of this appendix is to assist City staff in conducting a monitoring inventory to measure progress against the baseline established in this inventory report. Conducting such an inventory represents milestone five of the Five-Milestone Process, and allows a local government to assess how well it is progressing toward achieving its emissions reduction targets.

This inventory was conducted by ICLEI in conjunction with Diane Langager, Principal Planner at the City of Encinitas, who served as the lead data gathering coordinator for the inventory and assisted ICLEI Climate Fellow, Shaina Brown. To facilitate a monitoring inventory, ICLEI has documented all of the raw data, data sources, and calculation methods used in this inventory. Future inventories should seek to replicate or improve upon the data and methods used in this inventory. Wherever possible, however, ICLEI strongly recommends institutionalizing internal data collection in order to be able to meet the recommended methods outlined in LGOP.

F.1 ICLEI Tools for Local Governments

ICLEI has created a number of tools for Encinitas to use to assist them in future monitoring inventories. These tools are designed to work in conjunction with LGOP, which is, and will remain, the primary reference document for conducting an emissions inventory. These tools include:

- A "master data sheet" that contains most or all of the raw data (including emails), data sources, emissions calculations, data templates, notes on inclusions and exclusions, and reporting tools (charts and graphs and the excel version of LGOP reporting tool).
- A copy of all electronic raw data, such as finance records or Excel spreadsheets.
- LGOP reporting tool (included in the master data sheet and in Appendix B) that has all activity data, emissions factors, and methods used to calculate emissions for this inventory.
- Sector-specific instructions that discuss the types of emissions, emissions calculations methods, and data required to calculate emissions from each sector, as well as instructions for using the data collection tools and calculators in the master data sheet.

- The appendices in this report include detailed methodologies for calculating emissions from Scope 3 employee commute and government-generated solid waste, as well as two versions of the employee commute survey.

It is also important to note that all ICLEI members receive on-demand technical assistance from their ICLEI liaison, which local staff should feel free to contact at any point during this process.

F.2 Relationship to Other San Diego Regional Climate Protection Initiative Inventories

While the emissions inventories for the 10 participating local governments were conducted simultaneously using the same tools, a local government operations inventory is based on data specific to each local government's operations. For this reason, data must be collected internally within each local government, and the availability of data (and thus emissions estimation methods) will vary between local governments.

That said, local governments in the San Diego Regional Climate Protection Initiative may benefit by cooperating during the re-inventorying process. For example, by coordinating inventories, they may be able to hire a team of interns to collectively perform the inventories – saving money in the process. In addition, local staff may be able to learn from each other during the process or conduct group training sessions if necessary. As a whole, the Climate Protection Initiative provides the basis for a continuing regional platform for climate actions, and ICLEI recommends taking advantage of this opportunity during all climate actions, including conducting future greenhouse gas emissions inventories.

F.3 Improving Emissions Estimates

One of the benefits of a local government operations inventory is that local government staff can identify areas in their current data collection systems where data collection can be improved. For example, a local government may not directly track fuel consumption by each vehicle and instead will rely upon estimates based upon VMT or purchased fuel to calculate emissions. This affects both the accuracy of the emissions estimate and may have other implications for government operations as a whole.

During the inventory process, ICLEI and local government staff identified the following gaps in data that, if resolved, would allow Encinitas to meet the recommended methods outlined in LGOP in future inventories.

- Direct tracking of refrigerants recharged into HVAC and refrigeration equipment
- Fuel consumption by individual vehicles
- Odometer readings of individual vehicles
- Fuel consumption by mobile equipment
- Fuel consumption by diesel and other generators

ICLEI encourages staff to review the areas of missing data and establish data collection systems for this data as part of normal operations. In this way, when staff are ready to re-inventory for a future year, they will have the proper data to make a more accurate emissions estimate.

F.4 Conducting the Inventory

ICLEI recommends the following approach for San Diego Regional Climate Protection Initiative local governments that wish to conduct a monitoring inventory:

Step 1: Identify a Climate Steward

This steward will be responsible for the jurisdiction's climate actions as a whole and could serve as an ICLEI liaison in all future climate work. In the context of a monitoring inventory, the steward will be responsible for initiating discussions on a new inventory.

Step 2: Determine which Sectors to Inventory

There are many ways to determine which sectors apply to a local government's operations, but the easiest to review will be LGOP Standard Report, which is located both in Appendix B and in the master data sheet. This document clearly delineates which sectors will need to be inventoried within a local government's operations and which LGOP sectors do not apply to a jurisdiction.

Step 3: Gather Support: Identify Data Gathering Team and Leads

Coordination and acceptance among all participating departments is an important factor in coordinating a successful inventory. To that end, the inventory coordinator should work with the city/town/county administrator to identify all staff who will need to be part of the inventory. To facilitate this process, ICLEI has documented all people associated with the inventory in the master data sheet—these names are located in the final completed data form for each sector. Once this team has been identified, the inventory coordinator should hold a kickoff meeting with the administrator, all necessary staff, and relevant department heads which clearly communicates the priority of the inventory in relationship to competing demands. At this meeting, the roles of each person, including the inventory coordinator, should be established.

Step 4: Review Types of Emissions and Available Methodologies for Applicable Sectors

Local staff should then review LGOP and the instructions documents provided through this inventory to better understand the types of emissions for each sector (for example, within Mobile Emissions, CO_2 emissions and CH_4/N_2O emissions represent two different data requirements and emissions calculations methodologies). Each emissions type may have more than one possible estimation methodology, and it is important that the inventory

coordinator understands all possible methodologies and be able to communicate this to all parties assisting in the data gathering.

Step 5: Review Methodologies Used for the 2005 Inventory to Determine Data to Collect

In order to duplicate or improve upon the methods used in this inventory, local staff should again review the methods used for this inventory—these methods are again located in Appendix B—and within the master data sheet. These methods reflect the data limitations for each local government (as many local governments could not obtain data necessary to meet the recommended methods in LGOP). Wherever possible, these methods should be duplicated or, if it is possible, replaced with the recommended methods outlined in LGOP. Using these methodologies, staff will determine what data needs to be collected and communicate this effectively to the data gathering team.

Step 6: Begin Data Collection

With the exception of electricity and natural gas for stationary sources, all data collection will be internal. To obtain stationary source energy consumption data, staff will need to contact the ICLEI representative to determine who the contact is for SDG&E data (other utilities will need to be contacted directly).

Step 7: Use the Data Forms as a Resource During Data Gathering

A number of questions will come up during the data gathering process that may be difficult to answer. ICLEI has attempted to capture all of the questions that arose during the 2005 inventory and how they were addressed through the master data sheet. Within the master data sheet, staff should review the raw data, working data, and completed data forms to review how raw data was converted to final data, and also to review any notes taken by ICLEI staff during the 2005 inventory process.

For example, reviewing the stationary sources SDG&E data within the master data sheet will allow local staff to review how individual accounts were separated into each category and which accounts may have been excluded from the inventory.

Step 8: Use Emissions Software to Calculate Emissions

ICLEI has provided the staff lead on the 2005 inventory with a backup of the software used to calculate many of the emissions included in this report. Staff should use this (or more current ICLEI software) to calculate emissions by inputting the activity data into the software. ICLEI staff and ICLEI trainings are available to assist local government staff in calculating emissions.

Step 9: Report Emissions

The master data sheet also contains the LGOP Standard Reporting Template, which is the template adopted by CARB as the official reporting template for government operations emissions inventory. This tool, as well as the charts and graphs tool provided by ICLEI can be used to report emissions from government operations. Also, local government staff should utilize this narrative report as a guide for future narrative reports if they so choose.

Step 10: Standardize and Compare to Base Year

Conducting a monitoring inventory is meant to serve as a measuring point against the baseline year represented in this report. In order to make a more accurate comparison, it is necessary to standardize emissions from stationary sources based upon heating and cooling degree days (staff can use a ratio of heating /cooling degree days to standardize across years).

In addition, it is important, when comparing emissions across years, to clearly understand where emissions levels may have changed due to a change in methodology or due to excluding an emissions source. For example, if the default method was used to estimate refrigerant leakage in 2005 (this method highly overestimates these emissions), and the recommended method was available in a monitoring year, this would appear as a dramatic reduction in these emissions even though actual leaked refrigerants may be similar to the base year. Changes such as these should not be seen as progress toward or away from an emissions reduction target, but emissions estimates should be adjusted to create as much of an apples-to-apples comparison as possible. If such an adjustment is not possible, staff should clearly note the change in methodology between years when comparing emissions.

APPENDIX C: SUMMARY OF STAKEHOLDER INVOLVEMENT

Overview of the process

In order to guide the preparation of the Climate Action Plan, the City invited a group of citizens comprised of business owners, agency representatives, specialists, property owners, and other stakeholders to participate in developing goals and strategies for emissions reductions. Accordingly, two stakeholder meetings were set. The purpose of the first meeting was to identify goals of the Climate Action Plan. The purpose of the second meeting was to review the GHG emissions inventory, review possible emissions reduction strategies, and identify new emissions reduction strategies that should also be considered.

Goal Setting Meeting

September 24, 2009

The first meeting was held September 24, 2009 to present an overview of Climate Action Plans, the regulatory context, the purpose of the Climate Action Plan, and to obtain input on appropriate goals of the Climate Action Plan. Working collaboratively and within small working groups, the stakeholder group developed the following goals for the Climate Action Plan.

GOALS OF ENCINITAS CLIMATE PLANNING

To create simple, clear, and enforceable solutions which:

- ✓ Are sustainable, not just "green"; uphold economic vitality, equal opportunity, and environmental quality.
- ✓ Conserve water, reduce waste, and improve recycling.
- ✓ Are Encinitas focused, while maintaining regional considerations and alliances.
- ✓ Are embraced by the majority of the community.
- ✓ Promote education and awareness.
- ✓ Connect with the City's long range plans.
- ✓ Promote green business and local products.
- ✓ Are realistic and of high quality; solutions produce actual results.
- ✓ Plan for adaptation.
- ✓ Provide a transportation balance.

- ✓ Implement carbon capture.
- ✓ Create a balanced program that exceeds actual reductions.
- ✓ Uphold the "5 C's"; capture, conserve, create, change, and cost efficiency.
- ✓ Provide funding and financial incentives.
- ✓ Are grounded in science.
- ✓ Are balanced and fair.
- ✓ Are backed by political will.

INDIVIDUAL PARTICIPANT PRIORITIES

Focused, useable, and realistic Climate Action Plan

- Provide a local action focus within regional framework.
- Tailor CAP to Encinitas and its specific constituents. Keep other mandates in mind.
- Adapt to change.
- Create a multi-year plan that implements programs over time that build upon each other to achieve final goals.
- Develop achievable, specific goals and actions for this community.
- Keep it simple.
- Implement *Encinitas* environmental action plan.
- Address GHG reduction strategies for the entire community (i.e. residents, businesses, visitors) not just city operations.
- Interface with Encinitas' 20 year comprehensive plan.
- Create a readable document with clear goals.
- Provide clear metrics and methodologies for goal implementation.
- Choose compliance vs. enforcement.
- Keep rhetoric out of it; tie to concrete consequences.

Conserve

- Promote local food production.
- Create a zero waste program; reduce/eliminate organics from waste stream.
- Improve recycling program within Encinitas including education, incentives, and penalties.
- Conduct a baseline waste stream study and link diversion of various wastes to GHG reductions.
- Promote development of grey water and recycled water programs.

Sustainability – Economics, Equity, and Environment

- Consider funding and costs.
- Conduct full-cost accounting.

- Consider social equity; be sensitive to the "costs" incurred by the economically disadvantaged.
- Demonstrate the benefits (spillover and economic) to Encinitas with CAP policies.
- Demonstrate the economic spillover costs to Encinitas.
- Find the biggest GHG reduction for the "buck" strategies.
- Improve economic viability.

Biological Carbon Capture

- Promote tree planting.
- Increase vegetation within Encinitas.

Transportation

- Promote carpool and bicycle.
- Provide more access to public transit.
- Promote less car use with mixed-use development, walkability, easy to access transit, bike routes, etc.
- Expand Coaster service.
- Conduct transit friendly planning.

Education and Awareness

- Provide public education.
- Promote awareness.
- Encourage awareness to live green for the public and our leadership.
- Promote the use of local products, especially food.
- Promote local green businesses and technology, including using low emission vehicles in the city government.
- Promote education and awareness.
- Provide a comprehensive community-wide education program about CAP policies and programs.
- Provide education for better understanding.

APPENDIX C

Emissions Reduction Strategies Meeting

November 11, 2009

The second meeting was held November 11, 2009 to present the City's preliminary greenhouse gas emissions inventory and to obtain input on potential emissions reductions from the stakeholder group. The stakeholder group was broken into several small working groups, each with a responsibility of reviewing potential emissions reduction strategies, and proposing new strategies, for different emissions sectors. The working groups reviewed the strategies for feasibility, ease of implementation, first costs, money savings, whether behavioral or lifestyle changes would be required, and whether they would engage such a strategy.

The following strategies were reviewed by the stakeholder group:

RESIDENTIAL BUILDINGS

- Point-of-sale energy efficiency retrofits
- New residential exceeds Title 24 standards
- Photovoltaic (PV) and solar thermal on new homes
- Incentivized solar PV on existing homes

WATER AND SOLID WASTE

- Incentivize high efficiency appliances in existing buildings
- Encourage and mandate solid waste reductions

NON-RESIDENTIAL BUILDINGS

- New Commercial exceeds Title 24 standards
- Increase energy efficiency in existing commercial

TRANSPORTATION

- Designated/preferred parking for vanpools/carpools
- Parking pricing and parking cashout programs
- Reduce eliminate parking requirements and establish parking maximums for non-residential uses
- Additional parking reductions for new developments close to transit
- City-wide mobility manager
- Circulation phasing analysis
- Require developments to provide bicycle lockers and showers on site
- Car sharing and bicycle sharing
- Guaranteed ride home

The following new strategies were suggested by the stakeholder group:

WATER AND SOLID WASTE

- Revise existing mandatory recycling ordinance
- Adopt a zero waste policy
- Promote existing rate structure for smaller trash carts
- Aggressive promotion of recycle/waste reduction opportunities for businesses
- Water conservation
- Rainwater capture
- Water pricing/usage tiers
- Reclaimed water infrastructure

TRANSPORTATION

- Electric car charging
- Fleet modernization
- Reintroduce school buses
- Ability to cross railroad track
- Increased mini shuttle flexibility
- Increase diversity in housing so employees could afford to live in the City
- Promote live-work lifestyle
- Promote walkability and bikeability
- Fewer stop signs
- Easier to use bikes on buses
- Create transit hubs

Results

CTG compiled the inputs from the focused stakeholder group and qualitatively analyzed the list to test for feasibility and effectiveness. The resulting list was provided to City staff for review. City staff reviewed the list, editing and adding emissions reductions strategies, and, after an iterative process between the City and CTG, a final list was analyzed for emissions reduction effectiveness. This list comprises the emissions reduction strategy of the Climate Action Plan.

APPENDIX C

Special thanks to all of the participants of these meetings:

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