

County of San Diego
**CLIMATE
ACTION
PLAN**

Adopted June 2012



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Ch. 1

Introduction

More than 3 million people call San Diego County home,

where they enjoy access to coastal and terrestrial amenities and a temperate climate year round.

The County of San Diego (County) serves as the local government for more than 500,000 residents.

Growth in population and employment is expected in the unincorporated areas of the County over the next several decades. Because of this, the profile of the County and the services needed by County residents will change.

Since growth will likely occur in areas both near and far from emergency services, local potable water resources, and other infrastructure, the County will continue to focus its planning efforts to ensure responsible, sustainable growth within its borders.

As part of its planning efforts, the County is addressing the impacts of climate change on its residents, businesses, and environment. The County is committed to enhancing the safety and livability of its communities through the efficient application of land use programs that balance growth and conservation.



PURPOSE OF THE CLIMATE ACTION PLAN

The County of San Diego developed this Climate Action Plan (CAP)¹ to address the issues of growth and climate change, and to safeguard the environment for residents and visitors. The CAP will also help to make the County a more attractive place to live through decreased traffic congestion, better air quality, more efficient use of energy and water, less solid waste generation, safer streets for pedestrians and cyclists, more local amenities, and more local jobs. The CAP was designed to support the following primary functions:

- Mitigate the impacts of climate change by achieving meaningful greenhouse gas (GHG) reductions within the County, consistent with Assembly Bill (AB) 32, the governor's Executive Order S-3-05, and California Environmental Quality Act (CEQA) guidelines.
- Allow lead agencies to adopt a plan or program that addresses the cumulative impacts of a project.
- Provide a mechanism that subsequent projects may use as a means to address GHG impacts under CEQA, in accordance with the 2011 statement by the Attorney General.²
- Comply with the 2011 adopted County General Plan Environmental Impact Report (EIR) Mitigation Measure CC-1.2, Preparation of a Climate Action Plan.

Although efforts are underway at the global, national, state, and regional level, local actions are essential to address climate change effects. According to a 2010 survey of San Diego County voters, prepared for the San Diego Foundation, 72% of voters surveyed agreed that the County should take a statewide leadership position in setting goals for reducing GHG emissions.³ This demonstrates that residents of the County would like to see local jurisdictions take actions, like those discussed in this CAP, to reduce GHG emissions. CAPs are the primary tool for jurisdictions across the world, including many California cities and counties, to reduce GHG emissions. More than 50 CAPs have been adopted within California at the city and county level. Locally, all cities within San Diego County have prepared a GHG emissions inventory, and five have created CAPs with emissions-reduction targets that are the same as or more aggressive than the County's emissions-reduction target (see Table 1.1). By creating this CAP, the County is doing its part to mitigate climate change and comply with state and federal mandates.

TABLE 1.1 | 2020 GHG REDUCTION TARGETS OF OTHER CITIES IN SAN DIEGO COUNTY

CITY	GHG EMISSIONS-REDUCTION TARGET
Chula Vista	20% below 1990
Encinitas	12% below 2005
Escondido	15% below 2005
National City	15% below 2005
San Diego	15% below 1990

¹ A list of acronyms is provided in Appendix A.

² http://ag.ca.gov/cms_attachments/press/pdfs/n2056_santa_clarita_letter.pdf

³ www.sandiego.gov/environmental-services/sustainable/pdf/jobsfinal.pdf

CLIMATE CHANGE SCIENCE

The sun provides energy that drives the Earth's climate. Solar radiation enters the Earth's atmosphere and is trapped by certain "greenhouse" gases (GHGs) that increase the temperature, making the planet habitable by humans (see "The Greenhouse Effect" illustrated on the next page). Without GHGs, the average temperature on Earth would be about -2 degrees Fahrenheit (°F).¹

GHGs from human activities, such as burning fossil fuels for use in buildings and transportation and production of methane from agricultural practices, are trapping more of the sun's heat in the Earth's atmosphere and warming the Earth.

GHG, GWP, AND CO₂E

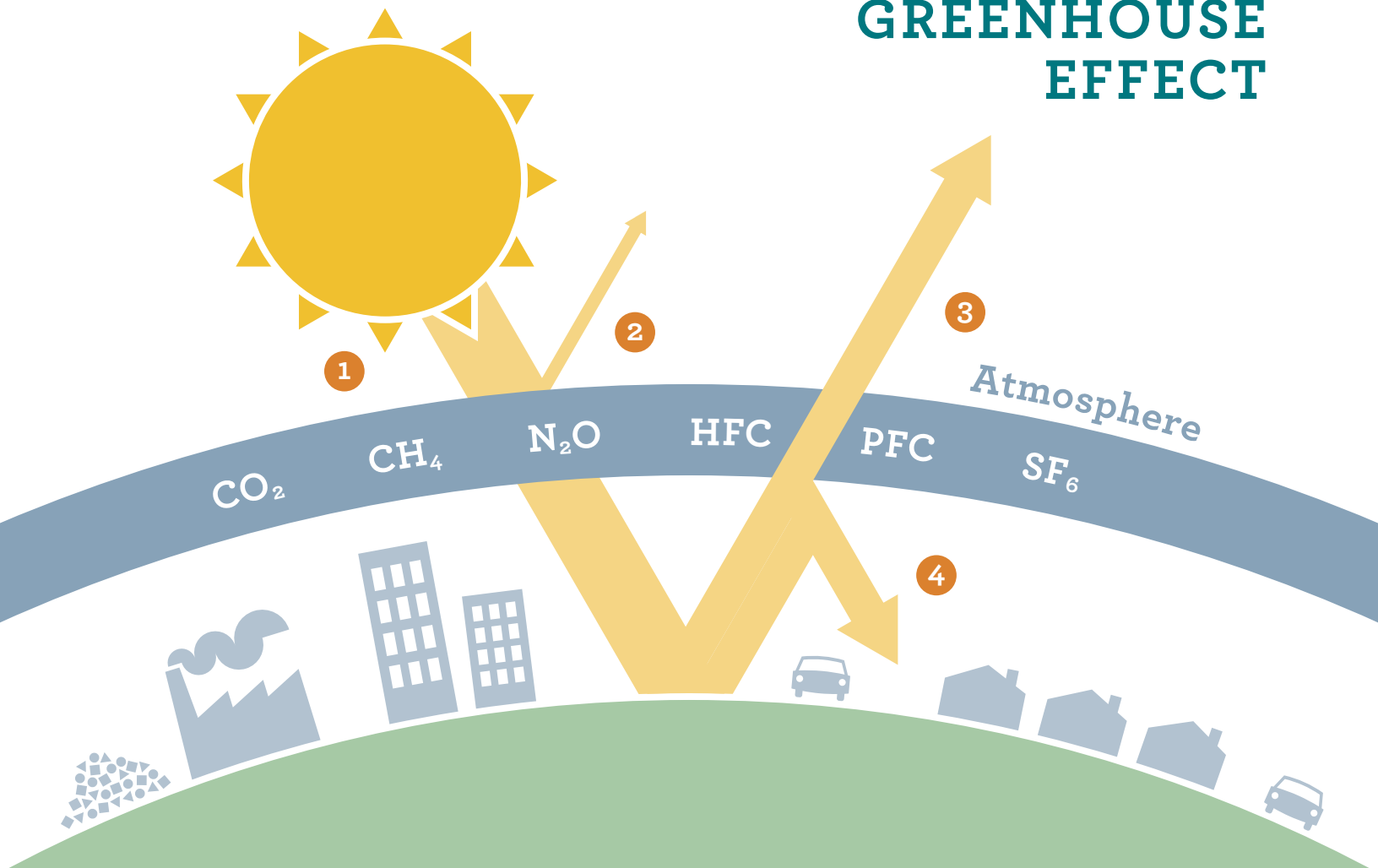
Although there are dozens of GHGs, the International Panel on Climate Change (IPCC) identifies six primary GHG compounds, including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) as the predominant GHGs found in non-industrial processes. Each type of GHG has a different capacity for trapping heat. Therefore, GHG emissions are "equalized" by their global warming potential (GWP) and are

reported in this CAP in "CO₂ equivalents" (CO₂e). For example, 1 ton of CH₄ has the same contribution to the greenhouse effect as approximately 21 tons of CO₂ on a 100-year timescale, and would, therefore, have a CO₂e of 21 tons. Listed below are the primary GHGs, along with their symbols, GWP, and common anthropogenic (human-caused) sources.

SYMBOL	NAME	GWP	ANTHROPOGENIC SOURCES
CO ₂	Carbon Dioxide	1	Fossil fuel combustion, forest clearing, cement production
CH ₄	Methane	21	Fossil fuel combustion, landfills, livestock, rice cultivation
N ₂ O	Nitrous Oxide	310	Fossil fuel combustion, nylon production
HFC	Hydrofluorocarbons	140–14,800	Refrigeration gases, semiconductor manufacturing
PFC	Perfluorocarbons	6,500–12,200	Aluminum production, semiconductor manufacturing
SF ₆	Sulfur Hexafluoride	23,900	Electrical transmissions and distribution system, circuit breakers

¹ http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_appendix.pdf

THE GREENHOUSE EFFECT



- 1 Solar radiation passes through the atmosphere.
- 2 A small amount of solar radiation is reflected before entering the atmosphere.
- 3 After reaching the Earth's surface, some radiation is emitted back through the atmosphere.
- 4 Some infrared radiation is absorbed by greenhouse gases and stays in the atmosphere. The more greenhouse gases there are, the more infrared radiation, or heat, is trapped in the atmosphere.

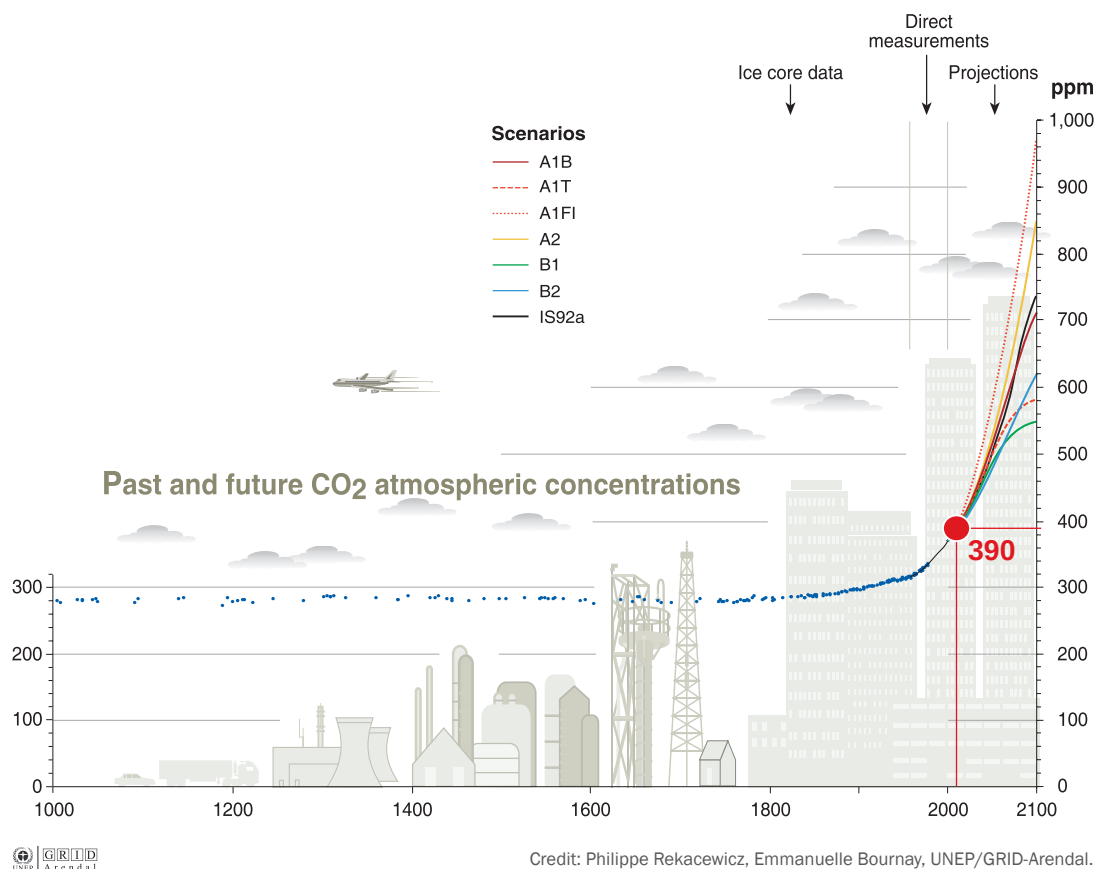
The present level of CO₂ concentration (390 parts per million [ppm]) is the highest in 800,000 years,¹ and likely the highest for the past 15 million years.²

Over the last century, average global temperatures rose by more than 1°F, and some regions warmed by as much as 4°F, with predictions for continued temperature increases in the coming years.

In its fourth assessment of climate change, the United Nations IPCC provided a comprehensive overview of the impacts of climate change and the potential global emissions scenarios for the coming century. The scenarios vary from a best-case scenario characterized by low population growth, clean technologies, and low GHG emissions, to a worst-case scenario where high population and fossil-fuel dependence result in extreme levels of GHG emissions. Future concentration of CO₂ in

the atmosphere could range from 550 to nearly 1,000 ppm by the end of the century (see image below).

In addition to temperature increases, other climate effects are expected as a result of increased GHG concentrations, including increased evaporation; sea-level rise; more severe weather; and a rise in the spread of disease and pests that carry disease, like mosquitoes. These changes are cumulatively referred to as global climate change. If these projections become reality, climate change will threaten our economic well-being, public health, and environment. While some degree of climate change is inevitable, most climate scientists agree that, to avoid serious climate change effects, atmospheric GHG concentrations need to be stabilized as quickly as possible.



Credit: Philippe Rekacewicz, Emmanuelle Bournay, UNEP/GRID-Arendal.

Scenarios refer to IPCC-developed emissions projections based on changes in economic growth, population, and technology, detailed at http://www.ipcc-data.org/ddc_co2.html.

¹ Lüthi, D., et al. 2008. High-Resolution Carbon Dioxide Concentration Record 650,000–800,000 years before present. *Nature* 453, 379–382.

² Tripathi, A.K, C.D. Roberts, and R.A. Eagle. Coupling of CO₂ and Ice Sheet Stability Over Major Climate Transitions of the Last 20 Million Years. *Science* 326 (5958): 1394–1397.

LOCAL EFFECTS OF CLIMATE CHANGE

Climate change is one of the most urgent global issues, and scientists are already seeing the effects of climate change around the world. Regionally, climate change is beginning to affect California residents and businesses through events such as reduced snow pack in the Sierra Nevada Mountains—affecting drinking water supplies in areas that depend on snow pack from this region, including San Diego County—and increased salinity in the Bay Delta. Locally, the County is expected to experience changes such as the following:

- higher temperatures,
- a greater number of extremely hot days,
- changes in the pattern and amount of precipitation,
- decreased water supplies accompanied by increased demand,
- increased wildfire risk,
- changes in ecosystems, and
- decline or loss of plant and animal species.

All of these changes have the capacity to affect the economy, environment, public health, and lifestyle of people throughout the San Diego region. More extreme weather events, including a greater number of extremely hot days, can lead to heat-related health issues, especially for those who cannot access cool areas. Indirectly, climate change affects water, air, and food systems, as well as ecosystems as a whole, since climate change reduces an ecosystem's ability to maintain a healthy environment.

In addition, the environment is closely linked to the economy and public health, and changes in temperature and precipitation have rippling effects socially and economically. Some of the potential economic impacts of climate change include disruptions to agriculture and food production, strains on the health care system and labor market due to health-related illnesses and deaths, declines in recreation opportunities and tourism, and changes in energy costs due to regional shifts in cooling and heating demand.

PUBLIC HEALTH

County residents who are already more vulnerable to health challenges are likely to be among the most affected by climate change, as they face more difficulty accessing medical services; pay more for healthy food as a proportion of income; and are more likely to live in conditions that leave them vulnerable to flooding, high temperatures, and degraded air quality. The graphic on the opposite page shows potential climate change health effects such as heat-related illness and death as a result of an increase in extreme heat days. This will lead to increased hospitalization rates and the need for health care facilities to be better prepared to respond to emergencies, which also has potential planning and economic impacts.

The graphic below shows how the population may be affected by climate change through public health impacts. The extent to which these changes produce negative impacts will depend on actions taken today to ensure resilience in the face of climate change and adaptation to its impacts. Additional detail is provided in Chapter 5, Adaptation.

Over the short term, implementing GHG-reduction measures that could also improve public health is an important part of the CAP. The County’s “Live Well, San Diego!, Building Better Health” initiative is a 10-year strategic vision for improving health and wellness and combating the toll of chronic diseases, including obesity, with aspects of the program focusing on increasing levels of physical activity and improving the accessibility of nutritious foods. **Many of the CAP measures are directly aligned with the projects being implemented under the County’s public health initiative,** such as working with land use and transportation planners

to increase opportunities for residents to be physically active, thereby reducing the risk for obesity and chronic diseases. Other measures are designed to improve air quality indoors, where Californian’s spend more than 90% of their time, and outdoors, where chronic health conditions such as asthma can be exacerbated under adverse conditions.

The following strategies promote healthy communities while reducing GHG emissions, and are included in this CAP (and further described in Chapter 3):

STRATEGY	PUBLIC HEALTH IMPLICATION
Building Retrofits	Improve indoor air quality
Mixed-Use Development	Increase physical activity and decrease vehicle emissions and related air pollutants through more walkable communities
Walking and Biking	Increase physical activity
Transit Use	Decrease vehicle emissions and related air pollutants
Electric Vehicle Use	Decrease vehicle emissions and lower noise levels
Ridesharing	Encourage social engagement, support, and cohesion
Landscaping and Open Space	Increase opportunities for formation of close social bonds through community green space access; reduce stress



CLIMATE CHANGE AND VULNERABLE POPULATIONS:

Climate change will not affect everyone equally. People with a high probability of exposure, increased sensitivity, and without resources to adapt and prepare will be hit harder by climate change. The most vulnerable tend to be the young and the old, the poor, and those who are already sick.

POTENTIAL CLIMATE CHANGE HEALTH EFFECTS¹

CLIMATE CHANGE EFFECT	EXAMPLES OF HUMAN HEALTH RISKS
 Increase in Extreme Heat Events	Heat-Related Illness/Death Worsening of Chronic Health Conditions
 Increased Air Pollution	Increased Respiratory Illness and Seasonal Allergies
 Floods, Droughts, Wildfires, Storms, Changes in Weather Patterns	Injury/Death Respiratory Illness Waterborne Illness Foodborne Illness Displacement Stress-Related Disorders Mental Health Impacts Increase/Shift in Infectious Disease
 Higher Food Prices and Food Scarcity	Increased Hunger Decreased Nutrition
 Sea-Level Rise, Storm Surge, Longer Red Tides (toxic algae blooms in the ocean)	Injury/Death Wastewater System Impacts Displacement Stress-Related Disorders Mental Health Impacts Poisoning from Contaminated Shellfish

¹ This graphic provides an overview of the impacts of climate change on human health; it is not meant to be an exhaustive list of health impacts. Additional information on the relationship between climate change and public health can be found at the Centers for Disease Control and Prevention's Climate Change and Public Health website: <http://www.cdc.gov/climatechange/>.

While the measures included in this CAP focus on those that will lead to quantifiable GHG reductions, there are many other examples of strategies that can serve to benefit public health while reducing GHG emissions and are supported by this CAP and other County programs. A part of the “Live Well, San Diego! Building Better Health”

initiative, for example, is to increase consumption of healthy and locally grown food. This may improve access to healthy food and, although difficult to quantify, reduce emissions related to transporting food from non-local sources.

RELATIONSHIP TO OTHER STATE AND COUNTY DOCUMENTS

Climate change legislation and policy have been in place at the state level since 2005 (Table 1.2). Local governments have a responsibility to promote these efforts and are considered “essential partners” in achieving GHG reductions.

This CAP documents the County’s plan to meet the obligations defined in AB 32. The CAP creates a framework for ensuring that emissions reductions are in compliance with the County’s obligations while also safeguarding equity among residents and businesses. In addition, the County’s goals reflect the goals shared by other local and state governments, and draw on lessons learned through the efforts of others.

This CAP incorporates already-established County goals described in the recently adopted General Plan and in the County Strategic Energy Plan (SEP), which identifies

measures to develop a cohesive, long-term strategy that addresses climate change. The CAP includes more specific approaches for the actions outlined by the General Plan, and broadens the SEP’s scope to include water conservation, waste reduction, land use strategies, and adaptation, while also extending the County’s emissions reduction goals to 2020 and beyond.

Other public agencies and private developers may also use this CAP to comply with CEQA through tiering for projects that trigger CEQA review. A lead agency may determine that a project’s GHG impact is not cumulatively considerable if the project demonstrates consistency with this CAP (CEQA Guidelines Section 15183.5[h][3]), thereby reducing overall project costs. Details of project-level compliance are provided in Chapter 6.

PLAN ADJUSTMENTS AND FLEXIBILITY

This 2012 CAP represents the County’s strategies, at the time of preparation, to respond to the threat of climate change. It is a guiding document that will be used by the County, businesses, and residents to reduce GHG emissions from energy, transportation, solid waste, water, and agriculture through 2035. It is a “living” document and will need to be updated as new information, technology, and legislation require. GHG reduction-measure monitoring and regular inventory updates will be necessary to evaluate the efficacy of the CAP, including at least one inventory by 2020.

TABLE 1.2 | CLIMATE CHANGE LEGISLATION AND POLICY¹

BILL & DATE OF ISSUANCE	TITLE	DESCRIPTION	IMPLEMENTING AGENCY
Executive Order S-3-05 (2005)	Greenhouse Gas Initiative	Set statewide GHG emissions targets to 2000 levels by 2010; 1990 levels by 2020; 80% below 1990 levels by 2050	California Air Resources Board (ARB)
Assembly Bill (AB) 32 (2006)	Global Warming Solutions Act	State must reduce GHG emissions to 1990 levels by 2020	ARB
Senate Bill (SB) 97 (2007)	CEQA Guideline Amendments	Guidelines for addressing GHG emissions in CEQA documents must be formulated and adopted	California Office of Planning and Research (OPR)
SB 375 (2008)	Sustainable Communities and Climate Protection Act	GHG emissions from passenger vehicles must be reduced by set targets (developed by ARB) for 2020 and 2035, and planning organizations must prepare sustainable communities strategies	Metropolitan planning organizations (MPO)
AB 1493 (2002)	Pavley	GHG emissions must be reduced from passenger vehicles, light-duty trucks, and other non-commercial vehicles for personal transportation	ARB
Executive Order S-1-07 (2007)	The Low Carbon Fuel Standard (LCFS)	The carbon intensity of California's transportation fuels must be reduced by at least 10% by 2020	ARB
SB X1-2 (2011)	Renewable Portfolio Standard	California investor-owned utilities must provide at least 33% of their electricity from renewable resources by 2020	California Public Utilities Commission
SB 7X 7 (2009)	Statewide Water Conservation	State must achieve 20% reduction in per capita urban water use by 2020	Department of Water Resources
California Code of Regulations (CCR) Subarticle 8 § 95550 (2010)	Regulation for Under Inflated Vehicle Tires (T-4 in the Scoping Plan)	Ensure proper tire inflation; reducing tailpipe GHG emissions by reducing tire rolling resistance and increasing vehicle efficiency	ARB
CCR Subarticle 1 § 95300 (2009)	Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Measure	Require existing trucks/ trailers to be retrofitted with the best available technology and/or ARB-approved technology	ARB

¹ Additional details regarding legislation can be found in Appendix B.

SCOPE AND CONTENT OF THE CAP

This CAP consists of seven chapters:

Introduction; Emissions Inventory, Forecasts, and Target; Community Measures and Actions; Local Government Measures and Actions; Adaptation; Monitoring and Project Compliance; and Conclusions. The CAP includes appendices that provide additional detail, background, and methodological rationale.

- **Introduction** provides a brief description of the need for GHG-reduction planning in California, gives an overview of the topics covered in the CAP, and describes state actions related to climate change.
- **Emissions Inventory, Forecasts, and Target** outlines key steps taken to develop the CAP, including establishing a 2005 baseline GHG inventory (2006 for local government operations); projecting future emissions in 2020, 2035, and 2050; and setting the County's community-wide GHG reduction targets for 2020 and 2035.
- **Community Measures and Actions** addresses the measures and actions that will help the County meet its 2020 GHG reduction target. For each measure, the CAP includes a description of the measure and actions; estimated GHG reductions in 2020; responsible parties for implementation; cost; co-benefits; and potential funding sources for implementation, where applicable.
- **Local Government Measures and Actions** provides details on how the County hopes to achieve GHG reductions within its governmental operations.
- **Adaptation** discusses the effects and implications of climate change as they pertain to the County.
- **Monitoring and Project Compliance** describes how the CAP will be monitored and revised over time. It also defines the process for determining project-level CEQA compliance with the CAP.
- **Conclusion** reiterates the County's commitment to addressing climate change to protect the high quality of life enjoyed by its residents and businesses, and to responsibly comply with state and federal mandates.



Ch. 2

Emissions Inventory, Forecasts, and Targets

BASELINE EMISSIONS INVENTORY

The purpose of a GHG emissions inventory is to provide a snapshot of GHG emissions in a given year. The inventory is then used to assist policy makers in effectively implementing cost-effective GHG-reduction policies, actions, and control measures. An accurate inventory is necessary to understand which sectors comprise the largest portion of the GHG inventory, have the most reduction potential, and can be effectively influenced by policies and actions implemented by the County.

The County prepared baseline inventories at the community-wide and local government levels. The community-wide inventory has a baseline year of 2005, and emissions are limited to the County's unincorporated communities. The local government inventory has a baseline year of 2006 and only includes emissions related to County government operations. Each inventory is used to establish a baseline level of emissions, which then serves as the starting point for forming emissions-reduction targets and as a tool to gauge the performance of emissions-reduction measures.

For the purposes of this CAP, the community-wide and local government inventories are shown separately. In general, local government emissions are a subset of community-wide emissions. However, because the County operates in both unincorporated areas and incorporated cities, some of the County-managed facilities are not within the political boundary of the County and are not included in the community-wide emissions inventory. For example, the County manages 10 closed landfills, only three of which—Bonsall, Jamacha, and Valley Center—are within the unincorporated boundaries. The other landfills are included in their respective community-wide inventories. As a result, solid waste emissions are greater in the County government emissions inventory than in the community-wide emissions inventory.

Information from the baseline inventories is important for understanding the quantity and source of GHGs emitted in the County.

This knowledge is leveraged to create and prioritize reduction strategies that will be most effective in each circumstance.

The County's baseline inventories are organized by emissions sectors. A "sector" is a distinct subset of a market, society, industry, or economy whose components share similar characteristics. An emissions sector may also contain subsectors that provide more specificity about the source of emissions (e.g., natural gas or electricity can be a subsector of energy consumption). The community-wide inventory is divided into seven sectors: transportation, energy, water, agriculture, solid waste, wastewater, and other. The local government inventory is divided into nine sectors: solid waste (landfills), employee commutes, buildings and facilities, vehicle fleet, wastewater facilities, government-generated solid waste, public lighting, airport facilities, and water. All emissions are standardized to metric tons (MT) of CO₂e, as described on page 4.

WHAT IS A METRIC TON OF CO₂E?

GHG emissions are reported as metric tons (MT) of CO₂e.

Emitting 1 MT CO₂e is equal to the following:

- 102 gallons of gasoline
- 41 propane cylinders used for home barbecues
- One month's worth of energy used in a house

In contrast, reducing 1 MT CO₂e would require:

- Growing 25 tree seedlings for 10 years
- Recycling 600 pounds of waste instead of throwing it away

Equivalencies are approximate and were adapted from <http://www.epa.gov/cleanenergy/energy-resources/calculator.html>

COMMUNITY INVENTORY

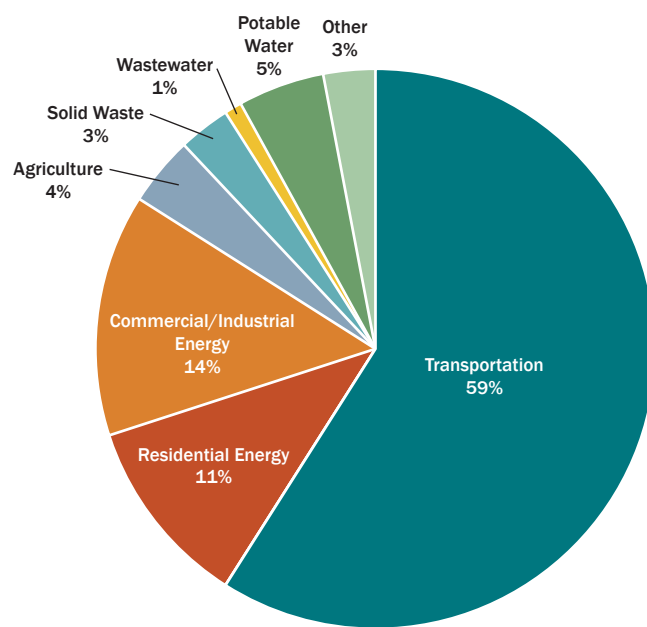
Table 2.1 and Figure 2.1, below, show the baseline community-wide emissions by sector for 2005. The largest source of emissions in the unincorporated County is transportation, which accounts for 59% of total GHG emissions. Of the 4.5 million metric tons (MMT) CO₂e emitted in 2005 from all sources, more than 2.6 MMT CO₂e resulted from the transportation sector. The energy sector accounted for nearly 25% of emissions, while agriculture, solid waste, wastewater, and other sources accounted for the remaining 16% of community emissions in 2005. Additional details are provided in Appendix C.

TABLE 2.1 | COMMUNITY EMISSIONS BY SECTOR

SECTOR	2005 GHG EMISSIONS (MT CO ₂ E)
Transportation	2,636,702
Agriculture	190,025
Solid Waste	144,865
Wastewater	50,412
Potable Water	236,435
Other	132,490
Energy	1,121,650
Total¹	4,512,580

¹ Because of rounding, the total does not equal the sum of sectors.

FIGURE 2.1 | COMMUNITY EMISSIONS BY SECTOR



LOCAL GOVERNMENT INVENTORY

Table 2.2 and Figure 2.2 provide the baseline local government emissions by sector for 2006. The County emitted 220,633 MT CO₂e in 2006 from government operations. Although all of the County-managed landfills are currently closed, methane emissions continue to be released, and are currently the single largest source of emissions for local government. Emissions from landfills accounted for 29% of all local government emissions, while employee commutes constituted 26% of emissions. Buildings and facilities were the next largest source, with

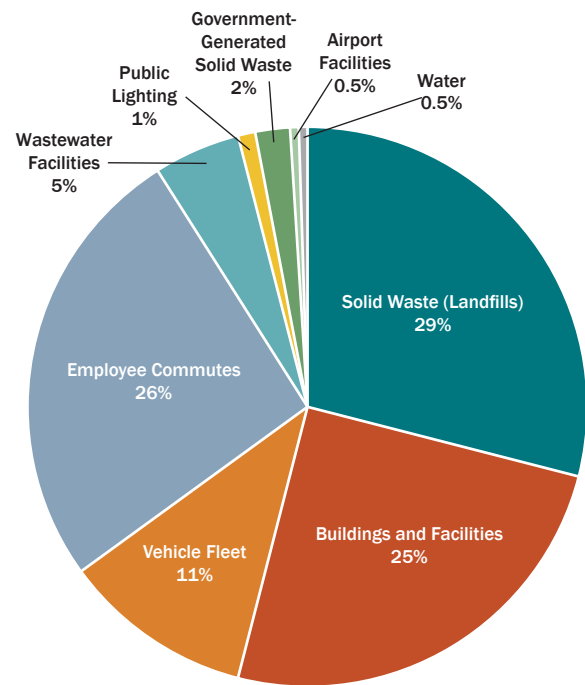
25% of total emissions. The County's sizeable vehicle fleet (more than 2,900 vehicles) accounted for more than 10% of baseline year emissions, while wastewater, solid waste, public lighting, airport facilities, and water accounted for the remaining 9% of 2006 emissions. The large vehicle fleet is a result of the numerous region-wide services that the County provides, including sheriff; infrastructure repair, maintenance, and improvement; care, management, and development of public parks and community centers; and legal services.

TABLE 2.2 | LOCAL GOVERNMENT EMISSIONS

SECTOR	2006 GHG EMISSIONS (MT CO ₂ e)
Solid Waste (Landfills)	64,192
Buildings and Facilities	55,291
Vehicle Fleet	23,231
Employee Commutes	57,572
Wastewater Facilities	11,656
Public Lighting	2,160
Government-Generated Solid Waste	4,892
Airport Facilities	1,153
Water	488
Total¹	220,633

¹ Because of rounding, the total does not equal the sum of sectors.

FIGURE 2.2 | LOCAL GOVERNMENT EMISSIONS



BUSINESS-AS-USUAL PROJECTIONS

Community-wide GHG emissions were projected for the years 2020, 2035, and 2050 under a business-as-usual (BAU) scenario. The BAU scenario estimates future trends in each sector based on forecasts from the San Diego Association of Governments (SANDAG) for population, housing, agricultural land, and employment for the County, and assuming that historic trends in energy consumption and waste generation continue. The BAU scenarios are what would be likely to occur without implementation of a CAP or other GHG-reducing measures, like the Low Carbon Fuel Standard (LCFS); Pavley legislation, which covers passenger auto and light truck fuel efficiency; and the Renewable Portfolio Standard (RPS). State-level regulations, including those just listed, are part of the

CAP's strategies to achieve the County's targets, and are discussed in detail in Appendix D. Community-wide baseline and projected emissions are shown by sector in Table 2.3.

The County projected future community-wide emissions using land use data from the General Plan and use-specific emissions factors. Community-wide emissions will increase by approximately 680,109 MT CO₂e per year (15%) from 2005 to 2020, and by approximately 1,839,892 MT CO₂e per year (41%) from 2005 to 2035. Much of the increase is attributable to the anticipated growth in population and employment in the region (see Figure 2.3).

TABLE 2.3 | COMMUNITY BASELINE AND PROJECTED EMISSIONS

SECTOR	2005 BASELINE	2020 BAU	2035 BAU	2050 BAU
	MT CO ₂ E			
Transportation	2,636,702	3,098,307	4,004,966	4,785,555
Residential Energy	505,963	566,033	666,952	707,334
Commercial/Industrial Energy	615,687	737,916	818,698	934,503
Agriculture	190,025	159,246	118,134	83,520
Solid Waste	144,865	162,064	190,959	202,521
Wastewater	50,412	56,397	66,452	70,475
Potable Water	236,435	264,506	311,665	330,535
Other	132,490	148,220	174,646	185,221
Total¹	4,512,580	5,192,689	6,352,472	7,299,664
GHG Emissions per Service Population ²	7.47	7.48	7.80	8.23
GHG Emissions per Population	9.57	9.52	9.83	10.51

¹ Because of rounding, the total does not equal the sum of sectors.

² Service population refers to the number of residents and employees in the region. This is often used to provide an equitable evaluation between regions with many employment or commercial centers versus many residential areas.

While projected emissions can vary based on a number of factors, including estimates of growth and economic conditions, forecasted emissions illustrate the anticipated emissions sources and quantities, which allows for more informed planning choices. In the County, GHG emissions (see Table 2.4) associated with transportation are the largest source at the baseline year (2005), and are anticipated to increase over time. By 2020, transportation emissions are expected to account for 60% of emissions and increase to 66% by 2050. Commercial and industrial sources and residential emissions are expected to decline in relative contribution, while only agricultural emissions (4%) are expected to decline in absolute terms, due to fewer lands dedicated to agriculture in the future.

TABLE 2.4 | COUNTY GOVERNMENT GHG BASELINE AND PROJECTED EMISSIONS

SECTOR	2006	BAU 2020	BAU 2035	BAU 2050
	MT CO ₂ E			
Solid Waste Facilities	64,192	48,516	35,943	26,627
Employee Commute	57,572	63,017	70,776	73,893
Buildings and Facilities	55,291	61,420	67,987	75,256
Vehicle Fleet	23,231	24,960	27,428	28,611
Wastewater Facilities	11,656	13,451	16,232	17,661
Government-Generated Solid Waste	4,892	5,256	5,776	6,025
Public Lighting	2,160	2,493	3,008	3,273
Airport Facilities	1,153	1,331	1,606	1,747
Water	488	524	576	601
Total¹	220,633	220,968	229,331	233,695

¹ Because of rounding, the total does not equal the sum of sectors.

FIGURE 2.3 | POPULATION AND JOB GROWTH



GHG EMISSIONS-REDUCTION TARGETS

The County established a GHG emissions-reduction target of 15% below 2005 levels by 2020 (Figure 2.4), which aligns with the recommendation by the California Air Resources Board (ARB) and the GHG emissions-reduction targets set by other local governments (see Table 1.1).¹

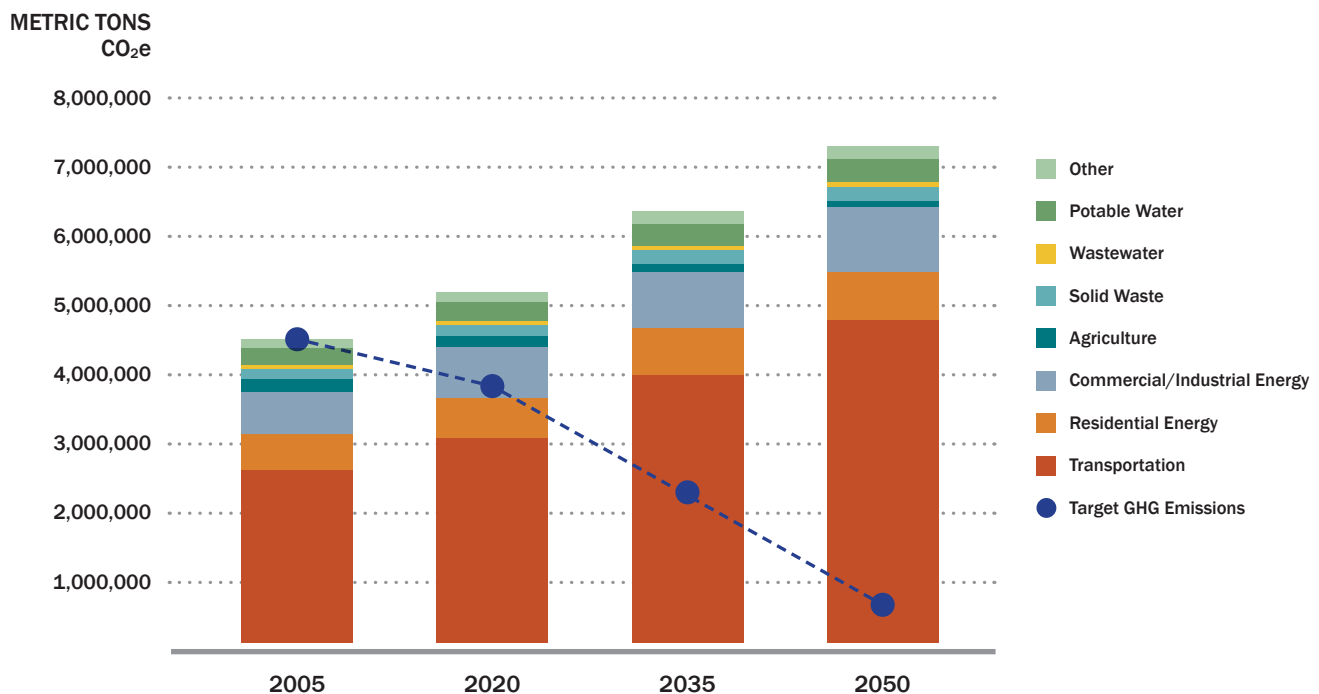
In addition, the County recognizes the goal established by Executive Order S-3-05, which calls for emissions reductions of 80% below 1990 levels by 2050. Therefore, the County developed emissions forecasts

for 2035 and 2050 to demonstrate the BAU path for the County and the emissions reductions that would be needed to meet the 2050 goal. To be on the path toward that goal, the County would need to reach 49% below 2005 levels by 2035.

The following chapter details potential measures and actions that demonstrate how the County can achieve the 2020 reduction target and work toward the 2035 target.

¹ The County of San Diego General Plan EIR stated a 9% reduction from 2005 levels would be achieved by 2020. Subsequent guidance from the state has recommended that local governments achieve 15% reductions from 2005 by 2020. The County is adopting this goal and, therefore, will achieve greater reductions than stated in its General Plan EIR.

FIGURE 2.4 | COMMUNITY BAU EMISSIONS AND EMISSIONS-REDUCTION TARGETS





Ch. 3

Community Measures and Actions

Emissions-reducing actions and objectives

were developed with reference to the regulatory requirements discussed in Chapter 1 and the emissions profile of County residents. Annual per capita emissions in the County were 9.57 MT CO₂e in 2005. To meet the 2020 emissions targets, each resident of the County would need to reduce annual emissions by an average of 2 MT CO₂e to achieve emissions of just over 7 MT CO₂e per year. This goal can be reached through participation by County residents and businesses, corporate partnerships and initiatives, and government policies and programs. The County has demonstrated its ability to meet sustainability goals through effective planning in complying with the California Integrated Waste Management Act (AB 939). The latest County solid waste data (2006) indicates a 54% diversion rate, exceeding the 50% diversion rate set by AB 939. Through the diversion of solid waste, less waste is being sent to landfills, extending their life and reducing GHG emissions caused by waste decomposition. This high diversion rate was achieved and sustained through a process similar to that used for the CAP, whereby the County identified possible areas of action and worked with stakeholders

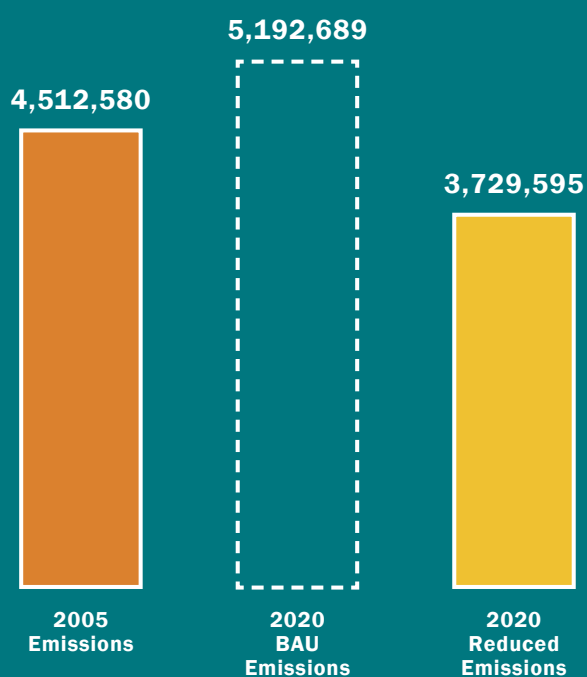
to implement measures that increased waste diversion. The success of this approach can be seen in the portfolio of the 47 waste-diversion programs that assist and encourage County residents and businesses to recycle.

The goals and strategies recommended in the CAP establish the framework for meeting the 2020 target (see graphic on this page). The following sections detail strategies recommended to achieve emissions-reductions goals, which are both described and quantified where possible (see Measure Structure on page 23). Although most actions resulting from the CAP's strategies will yield quantifiable emissions reductions, a few will not. These strategies still merit discussion and monitoring, as they are included as part of the County's comprehensive approach to climate change.

In addition to the description and quantification, co-benefits are identified for each GHG reduction measure. Co-benefits are secondary benefits—beyond GHG reduction—that are generally felt at a local or regional level. Examples of co-benefits are improved water quality from reduced fertilizer use, improved economy by creating “green” jobs, and improved public health through lowered vehicle emissions. The co-benefits identified in this CAP are displayed by icons described on the next page.

Table 3.1 on pages 24 and 25 summarizes each measure and its GHG reduction potential. By implementing the CAP, the County can achieve the goal of reducing emissions to 15% below 2005 levels by 2020. Figure 3.1 shows the GHG reduction potential by sector.

GHG reduction measures are shown by sector: Water, Energy, Land Use and Transportation, Agriculture, and Landscaping and Open Space. Measure structure is shown on the following page and additional details are provided in Appendix C. Specific information related to programs and resources for residents and business owners are provided in Appendix E.



MEASURE STRUCTURE

Measure Name

Community Co-Benefits illustrate how the measure may positively impact other areas in the community. Below is a key to the icons that are shown in this section.

The measure description provides more detailed information about how the measure will be implemented.

Implementation Partners include some of the agencies, organizations, and County departments that will help realize the measure, while Performance Indicators explain the anticipated level of participation for each measure.

Cost and Savings list the monetary gains or losses and whether they would be realized by the private or public sector. The box below shows the category of cost and savings.

Potential Funding Sources include current sources of public and private funding. Funding sources change and should be verified at the time of implementation.

GHG Reductions are the anticipated level of reductions achieved in 2020 with full implementation of the measure.

W1 Water Conservation

IMPLEMENTATION
Implementation Partners: SDCEW, Local water districts and County Staff
Performance Indicator: 20% per capita reductions

COST: Very Low (Public)
County costs would consist of an existing outreach program costing less than \$20,000 to achieve water conservation goals.

SAVINGS: Very Low, Recurring (Private)
Approximately \$40 in annual savings per capita from avoided water purchases.

POTENTIAL FUNDING SOURCES
Partnerships with Other Jurisdictions and Organizations, American Recovery and Reinvestment Act (Energy Efficiency Conservation Block Grant)

Community Co-Benefits

GHG Reductions (MT CO₂e/Year)
20,200

WATER CONSERVATION IS VITAL TO ENSURE THAT FUTURE GENERATIONS HAVE CLEAN AND ABUNDANT WATER

In 2009, the state of California passed a package of legislation focusing on improving the quality and availability of water for residents and ecosystems of California. One part of this package was Senate Bill 7X7, which requires local water districts to reduce per capita water usage 20% by 2020. Using this state mandated reduction as a goal, the County has developed a strategy to work with the San Diego County Water Authority and other Local Water Districts that provide water to County residents to promote existing conservation programs, such as rebates for water efficient appliances and design assistance to help homeowners create water smart landscapes around their homes.

ECONOMIC ANALYSIS COST AND SAVINGS KEY

COST TO PRIVATE PARTIES (RESIDENTS, BUSINESSES, ETC.)

Very Low:	\$0–\$100
Low:	\$101–\$250
Medium:	\$251–\$500
High:	More than \$500

COST TO COUNTY

Very Low:	\$0–\$10,000
Low:	\$10,001–\$50,000
Medium:	\$50,000–\$100,000
High:	More than \$100,000

PRIVATE SAVINGS

Very Low:	\$0–\$100
Low:	\$101–\$250
Medium:	\$251–\$500
High:	More than \$500

CO-BENEFIT KEY



Improve
Water Quality



Reduce
Water Usage



Improve
Air Quality



Reduce
Energy Use



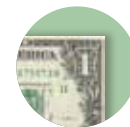
Increase
Habitat



Improve
Connectivity



Improve
Public Health



Improve Local
Green Economy

TABLE 3.1 | SUMMARY TABLE OF 2020 GREENHOUSE GAS REDUCTION MEASURES

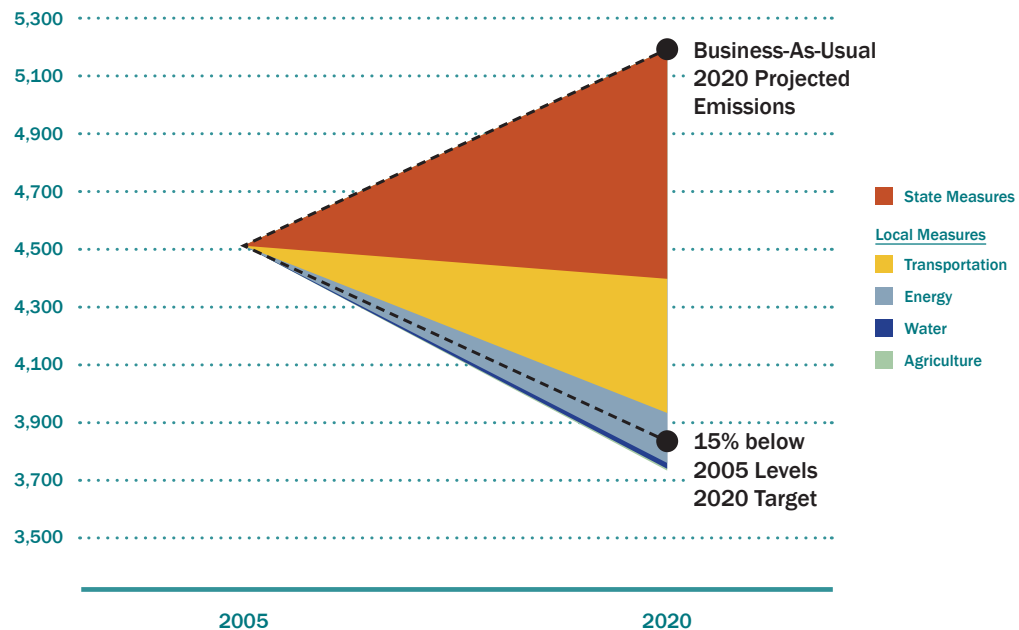
MEASURE NUMBER	MEASURE	ANNUAL MT CO ₂ E REDUCTIONS IN 2020 (FROM BAU 2020)	SCALED MEASURE PERFORMANCE (% REDUCTION IN GHG EMISSIONS)	ASSUMPTIONS	
				PARTICIPATION RATE	PERFORMANCE LEVEL
Water					
W1	Water Conservation	20,200	1.4%	100% of residents	20% per capita reductions
Energy					
E1	Energy-Efficient New Development	12,997	0.9%	10% until 2015, 100% after 2015	15% above 2008 Title 24 energy efficiency standards
E2.1	Residential Building Retrofits	27,999	1.9%	15% of pre-2002 residential units	Savings vary per residential type and building vintage
E2.2	Commercial Building Retrofits	5,257	0.4%	30% of pre-2002 commercial units	Reduce energy used for lighting by 40%
E3	Appliance Upgrades	20,060	1.4%	40% of existing homes and 95% of new homes	Average saving of 380 kilowatt hours (kWh) per appliance and 32 kWh per light bulb replaced
E4	Smart Meters	8,880	0.6%	10% of residents with SDG&E accounts will use the enhanced energy monitoring capabilities to reduce energy usage	Reductions in energy consumption: Existing homes: 5% New homes: 6%
R1	Solar Water Heating (Residential and Commercial)	37,618	2.6%	19% of commercial and residential units	Reductions in energy used to heat water: Commercial: 59% Residential: 70%
R2	Alternative Energy Systems (Residential and Commercial)	45,290	2.9%	5% of residential and 8% of commercial energy will be supplied through renewable sources	10 watts per square foot, 5 hours per day
Land Use					
LU1	Mixed-Use Development	124,180	8.5%	25% of new development will occur in high-density areas	4% reduction in vehicle miles traveled (VMT)
Transportation					
T1	Increase Transit Use	62,090	4.2%	2% increase in transit ridership	2% reduction in VMT
T2	Increase Walking and Biking	93,135	6.4%	50% increase of bicycle and pedestrian facilities	3% reduction in VMT
T3	Increase Ridesharing	93,135	6.4%	50% of employers using transportation demand management	3% reduction in VMT
T4	Alternative-Fuel Vehicles	93,135	6.4%	15% increase in electric vehicle purchase	3% reduction in VMT
Agriculture					
A1	Nitrogen Optimization	199	0.0%	5% of farmers reduce nitrogen usage	20% reduction in nitrogen fertilizer usage
A2	Field Equipment Fuel Efficiency	4,433	0.3%	35% of farmers increase fuel efficiency of equipment	15% increase in fuel efficiency of equipment
A3	Agriculture Irrigation Pump Efficiency	1,826	0.1%	40% of farmers increase efficiency of irrigation pumps	50% increase in efficiency of irrigation pumps

MEASURE NUMBER	MEASURE	ANNUAL MT CO ₂ E REDUCTIONS IN 2020 (FROM BAU 2020)	SCALED MEASURE PERFORMANCE (% REDUCTION IN GHG EMISSIONS)	ASSUMPTIONS	
				PARTICIPATION RATE	PERFORMANCE LEVEL
Landscaping and Open Space					
LS1	Plant Trees	2,475	0.3%	10,000 trees planted	1,696 MT CO ₂ e reduction from energy savings; 779 MT CO ₂ e sequestration benefit
Total County Action		652,909	44.6%		
State and Federal					
SF1	Pavley – Passenger Auto and Light Truck Fuel Efficiency	416,210	28.4%	Regulatory	
SF2	Low Carbon Fuel Standard	175,075	12.0%	Regulatory	
SF3	Renewable Portfolio Standard	200,665	13.7%	Regulatory	
SF4	Tire Pressure Program	8,482	0.6%	Regulatory	
SF5	Heavy-Duty Vehicle Aerodynamics	9,753	0.7%	Regulatory	
Total State and Federal Action		810,185	55.4% ¹		
Total Reductions (County, State, and Federal Actions)		1,463,094	100%		
2020 Emissions with Reduction Measures		3,729,595			
Percent Reduction below 2005 Baseline (4,512,580 MT CO ₂ e)		17.4%			

¹ Numbers may not total to 100% due to independent rounding.

THOUSAND
METRIC TONS
CO₂E PER YEAR

FIGURE 3.1 | 2020 GHG REDUCTION POTENTIAL BY SECTOR



WATER

Only 5% of the County's community-wide emissions are related to water use; however, because of the arid nature of San Diego's climate, conservation is vital to ensure that future generations have clean and abundant water.

Water-related GHG emissions are mainly generated by energy used to pump, transport, heat, cool, and treat water and wastewater. In San Diego County, only 18% of the water comes from local sources, with the rest coming from either the Sacramento Delta serving the State Water Project or the Colorado River. Because of the great distance this water travels to reach San Diego, it has high embedded energy and GHG emissions.



W1 Water Conservation



IMPLEMENTATION

Implementation Partners:

San Diego County Water Authority (SDCWA), local water districts, residents, businesses

Performance Indicator: 20% per capita reductions

COST: Very Low (Public)

An existing outreach program costing less than \$10,000 would achieve water conservation goals

SAVINGS: Very Low, Recurring (Private)

Approximately \$40 in annual savings per capita from avoided water purchases

POTENTIAL FUNDING SOURCES

Partnerships with other jurisdictions and organizations, American Recovery and Reinvestment Act (ARRA) (Energy Efficiency Conservation Block Grant [EECBG])

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

20,200

In 2009, the State of California passed a legislative package focused on improving the quality and availability of water for residents and ecosystems. Senate Bill (SB) 7X7 was included in that package, and requires local water districts to **reduce per capita water usage 20% by 2020**. Using the state-mandated reduction as a goal, the County developed a strategy to promote existing conservation programs, like those offering rebates for water-efficient appliances and design assistance to help homeowners create water-smart landscapes around homes.

CONSERVATION IS VITAL
TO ENSURE THAT FUTURE
GENERATIONS HAVE CLEAN
AND ABUNDANT WATER

ENERGY

Residences and commercial operations in the County emit more than 1.1 MMT CO₂e each year through electricity and natural gas use. Projections of population and business growth in the County, together with the prospect of climate-change-induced heating and cooling demand increases, suggest that County energy demand is likely to grow in the future unless changes are implemented now. The primary ways to reduce GHG emissions generated through energy consumption are by increasing building efficiency and increasing the amount of energy provided by renewable resources.

BUILDING EFFICIENCY

Investing in energy efficiency is a prudent decision for residents and businesses. Increasing a building's long-term performance can achieve lower operating costs, improve occupant comfort, hedge against utility price increases, and help improve air quality. Given that energy used to cool, heat, and power homes and businesses makes up 25% of the County's GHG emissions and overall energy consumption, the County has focused many of its actions on building efficiency to help achieve its emissions-reduction goals by 2020.



E1 Energy-Efficient New Development



IMPLEMENTATION

Implementation Partners:

San Diego Gas & Electric (SDG&E), California Energy Commission (CEC), residents, businesses

Performance Indicator:

10% of new development exceeds 2008 Title 24 standards by 15% until 2015, when measure becomes mandatory

COST: High, One Time (Private)

SAVINGS: Low, Recurring (Private)

Savings of approximately \$225 annually from improved efficiency

POTENTIAL FUNDING SOURCES

Partnerships with organizations, SDG&E, ARRA (EECBG), self-financing

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

Residential: **5,168**

Commercial: **7,829**

The newest edition of Title 24, California's Building Code, is intended to increase the energy efficiency of retrofits, renovations, and new construction. The County, in coordination with the California Energy Commission (CEC) and San Diego Gas and Electric (SDG&E), will **use incentives to encourage builders to exceed current (2008) energy efficiency standards by 15%**. In 2015, this higher standard will become a regulatory requirement for all new development. Developers and building owners can leverage the assistance provided by the County by also participating in other "green" building programs, such as the Leadership in Energy

and Environmental Design (LEED) or GreenPoint rating programs. By participating in these programs, builders and building owners will be able to add value to their projects and increase the benefits of building green. The County's Green Building Incentive program is designed to decrease the time and cost of "building green." There are also educational programs led by other organization that work with builders to educate them about green building principles and practices. Some examples of these programs are the San Diego Green Building Apprenticeship Readiness Partnership, led by the San Diego Workforce Partnership,

and the San Diego Green Building Training Collaborative, which is offered by the Grossmont-Cuyamaca Community College District. These are just two of the many on-going workforce development programs that will help create the educated and experienced workforce that is needed to take advantage of the County's Green Building Incentive program.

E2.1 Residential Building Retrofits



IMPLEMENTATION

Implementation Partners:

SDG&E (Energy Upgrade California), California Center for Sustainable Energy (CCSE) (Energy Upgrade California), residents, businesses

Residential Performance Indicator:

Retrofit 15% of existing buildings

COST: High, One Time (Private)

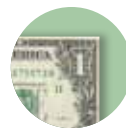
SAVINGS: Low, Recurring (Private)

Average savings of approximately \$250 per year per retrofit

POTENTIAL FUNDING SOURCES

ARRA (EECBG), CEC Energy Efficiency Financing, other public finance (Qualified Energy Conservation Bonds [QECBs])

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

27,999

Of the total GHG emissions in the County, 25% are a result of energy used for commercial and residential buildings. Having affordable energy to heat and cool buildings, turn on lights, wash clothes, cook food, run computers, and support the daily functions of home, work, and commerce is essential to a functioning regional economy. Since the vast majority of buildings in the County were built before 2002, there is tremendous potential to increase the overall energy efficiency of buildings in the region with a range of energy efficiency upgrades.

There are a range of state and federal incentives to help promote

and fund energy efficiency upgrades. Energy Upgrade California, a statewide program to help homeowners retrofit and renovate homes with more energy-efficient appliances, heating/cooling systems, and other improvements, lowers the cost barrier by offering rebates based on percent increase in energy efficiency. Retrofits are generally done as part of a “package” of options, such as sealing leaks in air conditioning/heating systems and installing insulation in the walls and ceilings.

Using \$3 million provided by the U.S. Department of Energy through the CEC, the County created

a comprehensive residential building energy retrofit program for the region. This program will encourage energy efficiency retrofits of single- and multi-family residential properties, with a focus on economically disadvantaged communities. This program is designed to **maximize participation in existing energy efficiency retrofit programs in the County**, such as the Energy Upgrade California program or SDG&E's Energy Savings Assistance Program. By working with partners such as the California Center for Sustainable Energy (CCSE), SANDAG, and SDG&E, who are already operating energy efficiency programs in the



San Diego area, the County can focus its resources on providing the information and assistance residents need to take advantage of existing programs. Participating in these existing programs will help residents improve the efficiency, comfort, health, and value of their homes.

THERE IS TREMENDOUS POTENTIAL TO INCREASE THE OVERALL ENERGY EFFICIENCY OF BUILDINGS IN THE COUNTY WITH A RANGE OF ENERGY EFFICIENCY UPGRADES.

E2.2 Commercial Building Retrofits



IMPLEMENTATION

Implementation Partners:

SDG&E, CCSE, residents, businesses

Performance Indicator:

Retrofit 30% of existing businesses

COST: High, One Time (Private)

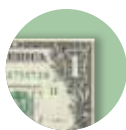
SAVINGS: Medium-High, Recurring (Private)

Savings from lighting retrofits can reduce operation costs by up to 40% from current costs in commercial buildings, depending on building type and the existing lighting system

POTENTIAL FUNDING SOURCES

ARRA (EECBG), partnerships with organizations (CCSE), SDG&E Local Government Partnership

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

5,257

Businesses can gain long-term savings from upgrading ceiling and duct insulation; installing an Energy Management System (EMS) that controls air conditioning, heating, and lighting systems, and operates efficiently when needed and shuts off when not needed; converting to light-colored roofs; or simply using more efficient lighting fixtures and bulbs. According to the Database for Energy Efficiency Resources (DEER), a basic energy efficiency package for commercial buildings includes reset/calibration of chilled and hot water systems, addition of heating and cooling time-clocks, and reduction of nighttime lighting levels. SDG&E currently offers

assistance and incentive programs such as the Savings by Design, Direct Install, Rebate, and On-Bill Financing programs to help commercial customers make energy efficiency improvements. The County currently displays all collateral and marketing materials provided by SDG&E to provide business owners a “one-stop shop” to learn about SDG&E programs. With funding from Energy Efficiency and Conservation Block Grants (EECBG), the County is also working to re-start the Green Business Program. **These efforts will help businesses to take advantage of existing energy efficiency programs and reduce their energy use.** Because of the amount of older, inefficient

lighting systems, and because of the SDG&E programs already in place to assist business owners in upgrading their old equipment to energy-efficient technology, it is assumed that the bulk of energy-efficient upgrades will come from the lighting sector. To help facilitate this conversion, the County is using other EECBG funds to partner with SDG&E, and has conducted various recycling programs focused on fluorescent lamps. By giving business owners the option to recycle older, inefficient lamps, the County is making it easier to upgrade to newer technology.

E3 Appliance Upgrades



IMPLEMENTATION

Implementation Partners:

SDG&E, residents, businesses

Performance Indicator:

Energy Star appliances in 40% of existing homes and 95% of new homes

COST: High, One Time (Private)

Energy-efficient Energy Star appliances are more expensive than standard appliances. On average, a package composed of a refrigerator, dishwasher, clothes washer, and ceiling fan with the Energy Star certification will cost about \$390 more than a standard appliance package.

SAVINGS: Very Low, Recurring (Private¹)

POTENTIAL FUNDING SOURCES

ARRA (EECBG), partnerships with organizations (SDG&E), SDG&E Local Government Partnership

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

Existing Homes: **14,680**

New Homes: **5,380**

According to the U.S. Environmental Protection Agency (USEPA), devices that have an Energy Star certification, such as office equipment, home appliances, and lighting products, generally use 20% to 30% less energy than required by federal standards. With more Energy-Star-rated home and business appliances, County residents can help to reduce GHG emissions compared to the use of older, less efficient appliances. This measure assumes that **refrigerators, dishwashers, clothes washers, and light bulbs will be upgraded to Energy-Star-rated appliances.**

Upgrades to other Energy Star appliances, such as air conditioning units, computers, televisions, and

photocopiers, would augment the estimated reductions. The County will promote SDG&E's existing programs to increase community awareness of rebates and incentives, the efficiencies that may be gained from Energy-Star-rated appliances, and the cost savings associated with Energy Star appliances.

¹Appliances in the home are major users of energy, and using Energy Star appliances, which are rated for efficiency by USEPA, can help to reduce residential energy consumption and energy bills. By using a refrigerator, dishwasher, clothes washer, and ceiling fans with the Energy Star certification, households can reduce their electricity bills by about \$450 over the lifetime of the appliances, even after paying back the difference in purchase price over standard appliances. Across the County, this will result in almost \$16 million in savings during the lifetimes of the appliances.

E4 Smart Meters



IMPLEMENTATION

Implementation Partners:

SDG&E, residents, businesses

Performance Indicator:

10% of residents use Smart Meters to reduce energy consumption

COST: Very Low to High, One Time (Private)

SAVINGS: Very Low to High, Recurring (Private)

Savings of about \$20 per month per household after monthly cost of equipment; savings of about \$175 million annually across all commercial buildings, not including equipment fees of \$500 per commercial installation

POTENTIAL FUNDING SOURCES

Partnerships with organizations (SDG&E), SDG&E Local Government Partnership

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

Existing Homes: **1,993**

New Homes: **6,887**

Emerging energy management systems, such as Smart Meters, have been installed by SDG&E throughout its service territory, and this has significantly improved how electricity consumption is managed for building climate control, appliances, and all other uses. These new Smart Meters will eventually provide utility customers with access to detailed, instantaneous energy use and cost information; new dynamic pricing programs based on peak-energy demand; and the ability to program home appliances and devices to respond to energy use preferences based on cost, comfort, and convenience. The County will promote the efforts of SDG&E, other

jurisdictions, and organizations to **accelerate “Smart Grid” integration in the community.** The true value of the Smart Meter program will be fully realized when community residents and businesses begin accessing and using this information to make more informed energy-use decisions based on the two-way communication enabled by these meters. For example, Smart Meters will allow a homeowner to program the washing machine to run when energy is cheapest. Customers will have access to their daily energy usage through the My Account feature on SDG&E’s website, which will help increase awareness and, thus, reduce consumption and energy costs.

THIS HAS
SIGNIFICANTLY
IMPROVED HOW
ELECTRICITY
CONSUMPTION
IS MANAGED
FOR BUILDING
CLIMATE
CONTROL,
APPLIANCES,
AND ALL
OTHER USES.

INCREASE RENEWABLE ENERGY GENERATION

Green building and net-zero energy practices are creating a new framework for how energy is used in homes and businesses. Net-zero refers to the idea that buildings consume no more energy than they produce on-site and produce no annual energy emissions. This is accomplished through three key methods: reducing the building's overall energy demand by using energy-efficient appliances (e.g., heating, ventilation, and air conditioning [HVAC] units; washers and dryers); creating an energy-efficient building envelope with properly sealed doors, windows, and ducts; and installing renewable energy technologies such as solar water heaters and solar panels. The result is a building that can produce as much energy as it consumes. While the measures in this chapter are focused on the most prevalent

renewable systems—solar photovoltaic (PV) and solar hot water—there are other opportunities to generate clean renewable energy, such as large- and small-scale wind power. To assist residents and businesses in developing wind power, the County created a zoning ordinance that lays out the review and steps that property owners must take to produce wind power on their properties. These smaller scale renewable energy developments will work with more established technologies to help the County reach its emissions-reduction goals. Note that this CAP only evaluates proven and cost-effective technologies that are currently on the marketplace; there is a chance that a technological breakthrough will enable future renewable energy systems to be installed at a faster pace than is forecasted in this document.



R1 Solar Water Heating (Residential and Commercial)

RESIDENTIAL

COST: High, One Time (Private)

Solar water heaters are more costly than traditional water heaters, although state incentives help to reduce the larger upfront cost. On average, the state incentive for solar water heaters offsets the cost of purchase and installation by about \$1,050, which reduces the difference in cost from traditional water heaters to just more than \$5,500.

SAVINGS: Low, Recurring (Private)

By using renewable energy to heat water, solar water heaters provide an efficient solution to water heating, which is a major component of utility costs for households. Solar water heaters save enough money to pay for their higher installation and purchase costs, and save more than \$2,600 over their lifetimes. Across the County, households will save more than \$5.6 million.

COMMERCIAL

COST: High, One Time (Private)

SAVINGS: High, Recurring (Private)

Institutional systems generally provide about 40% to 80% of water heating needs.

IMPLEMENTATION

Implementation Partners:

CCSE, SDG&E, residents, businesses

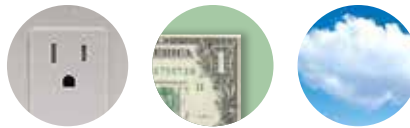
Performance Indicator:

Solar water heating systems on 19% of residential commercial buildings

POTENTIAL FUNDING SOURCES

Public finance (Clean Renewable Energy Bonds [CREBs]), partnerships with private companies (Power Purchase Agreements [PPAs], Energy Performance Contract with Energy Service Provider [ESP]), partnerships with organizations

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

Residential: **21,496**
Commercial: **16,122**

Solar hot water systems are a simple, reliable, and cost-effective method for harnessing the sun's energy to provide for hot water needs. Solar collectors, usually placed on the roof, absorb the sun's energy to heat water that is stored in a water tank. According to the California Solar Initiative (CSI), a statewide effort to promote solar hot water systems through outreach, education, and incentives, solar hot water systems can lower water heating costs by meeting 50% to 80% of hot water needs over a year. The California Solar Water Heating and Efficiency Act of 2007 (AB 1470) created a 10-year program aimed at installing solar water heaters in

homes and businesses. AB 1470 was designed to lower the initial costs of purchasing a system, which averages around \$3,000 to \$6,000.

The County will support CSI's Solar Water Heating Incentive program to replace and recycle water heaters in homes and commercial buildings. Although solar water heater upgrades require an up-front investment from the resident or business owner, there are a range of financing and rebate options to offset these initial investment costs.

R2 Alternative Energy Systems (Residential and Commercial)

RESIDENTIAL

COST: One Time (Private); Low to High, Recurring (Public)

Private: Average cost to install a 4.2-kilowatt (kW) system, the average size system, in San Diego is about \$32,550, including CSI and County incentives. Public: The County has waived the approximately \$200 to \$325 in fees per system since 2002, and has waived more than \$750,000 in fees since that date.

SAVINGS: Medium, Recurring (Private)

Solar PV systems generate renewable electricity that is used to offset the electricity consumed by households. Although these systems are relatively costly to install, they can pay for themselves and save money on electricity bills. Over a 30-year lifespan, a solar PV system can save about \$14,000 after paying for themselves, and incentives from the state and County have averaged over \$6,500.

COMMERCIAL

COST: High, One Time (Private)

SAVINGS: High, Recurring (Private)

Savings vary based on system size, but typically larger commercial systems earn positive returns more quickly than smaller residential installations.

IMPLEMENTATION

Implementation Leads:

CCSE, SDG&E, residents, businesses

Residential Performance Indicator:

Generate 5% of existing residential electricity

Commercial Performance Indicator:

Generate 8% of existing commercial electricity

POTENTIAL FUNDING SOURCES

Partnerships with private companies (PPAs) and other organizations (CCSE), SDG&E Local Government Partnership, public finance (CREBs), existing rebates and incentives

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

Residential: 16,821

Commercial: 28,469

Alternative energy systems include wind, solar, and geothermal sources to provide energy with low GHG emissions. Many of these systems are being installed in the region as part of SDG&E's compliance with the RPS, while smaller systems are being installed to provide on-site alternative energy to homes and businesses. All are potential resources for the community, and increased use is encouraged by the County; however, solar PV systems are the most common. PV systems generate electrical power by converting solar radiation into direct-current electricity using semiconductors. PV systems can be retrofitted into existing

buildings, usually by mounting them onto an existing roof or walls. According to the CSI (www.californiasolarstatistics.org), there are currently approximately 1,420 solar PV installations in the County, with a total capacity of approximately 15 megawatts (MW). **The County is promoting PV solar panels as a way for residents to harness clean, renewable energy.** Currently, the County offers support in the form of reduced fees and expedited permits. Because the funding for these PV preferential programs is tied to EECBG funds, they will expire in 2012.

LAND USE AND TRANSPORTATION

The single largest sector contributing to GHG emissions within the County is transportation. The 2.6 MMT CO₂e accounts for more than 59% of the community's emissions, which are derived from on- and off-road vehicle use. To ensure that emissions-reduction goals are met, this is the area where the most significant reductions must be made.

Reducing vehicle miles traveled (VMT) and replacing older vehicles with more fuel-efficient options are two strategies that will generate significant emissions reductions.

The County can also work with local businesses to expand access to alternative means of travel through actions such as providing additional bike lanes, increasing access to bus and trolley lines, installing recharge stations for electric vehicles, and increasing park and ride centers.

The County can work with other agencies' transportation departments to ensure traffic control efficiency and increase the attractiveness of alternate means of travel through charging for parking to encourage ride sharing or use of mass transit.

An added challenge to reducing VMT in the County results from the significant growth forecast for the coming decades. Given this challenge, planning to ensure use of energy-efficient resources is essential. Under the County's General Plan, the County calls for mixed-use, higher density development near service centers in high-growth areas, which will reduce VMT by locating homes, schools, and businesses near commerce.



LU1 Mixed-Use Development



IMPLEMENTATION

Implementation Partners:

SANDAG and County staff, Department of Planning and Land Use (DPLU)

Performance Indicator:

4% decrease in VMT

COST: None

County use of regulatory, not financial, incentives

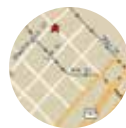
SAVINGS: Medium, Recurring (Private)

Per capita savings of about \$300 annually from avoided driving costs

POTENTIAL FUNDING SOURCES

State and regional grants (California Department of Transportation [Caltrans] Planning Grants), partnerships with organizations

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

124,180

Increasing the availability, effectiveness, and use of transit could result in a 4% reduction in overall VMT in the County by 2020. Using the General Plan as a tool to reduce transportation emissions, the County adopted specific language to promote mixed-use, high-density, and transit-oriented development in appropriate locations. However, because this measure will only change the composition and location of future development and redevelopment, the estimated reduction in VMT and emissions come only from decreases in new VMT generated by these projects. To meet the GHG-reduction target, **the County**

will create additional incentives to encourage new mixed-use development near existing and planned transit corridors. These additional incentives might include reductions in parking, expedited permitting, reductions in fees, or other similar measures that would be finalized through an update of the County's regulations related to the processing and approval of development proposals. With a combination of new planned developments, existing commercial center retrofits, and mixed-use infill development, the County can increase access to goods and services and options to reach those amenities, thereby reducing

the need for automobile trips. An important co-benefit of incentivizing growth in higher density areas around transportation facilities is the preservation of open space. A majority of the land in the unincorporated area of the County is open space or undeveloped, and includes large tracts of federal, state, or regional parklands, and agricultural production areas.

T1 Increase Transit Use



IMPLEMENTATION

Implementation Partners:

SANDAG, Metropolitan Transit System (MTS), and County staff

Performance Indicator:

2% decrease in VMT

COST: Very Low (Public)

Public costs to improve transit facilities, such as bus stops, and expand County rideshare program

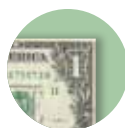
SAVINGS: Low, Recurring (Private)

Per capita savings of \$150 annually from avoided driving costs

POTENTIAL FUNDING SOURCES

State and regional grants (Caltrans Planning Grants), partnerships with organizations

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

62,090

Because the County is composed primarily of suburban and rural communities, there is limited access to, and facilities to support, regional transit. The transit system operated by the Metropolitan Transit System (MTS) includes three trolley lines (with a total of 53 miles of track) and 89 fixed bus routes. With development guided by the newly adopted General Plan, it is assumed that more development will occur near existing and planned transit locations. Locating development close to public transit will encourage residents to use these services for daily activities. The County will also encourage SANDAG and MTS to **develop new transit facilities where densities permit and to improve existing facilities** (mainly existing

stations and stops). The County will also work with developers to ensure that all transit facilities required by building ordinances are built. By improving existing transit facilities, SANDAG and MTS will be able to make the transit experience more convenient and appealing to County residents. Combined with facility improvements, these efforts will **expand transit ridership within the County**. Given the potential for increased ridership, County-wide VMT could be reduced by 2% by 2020.

LOCATING
DEVELOPMENT
CLOSE TO
PUBLIC
TRANSIT WILL
ENCOURAGE
RESIDENTS
TO USE THESE
SERVICES
FOR DAILY
ACTIVITIES.

T2 Increase Walking and Biking



IMPLEMENTATION

Implementation Partners:

SANDAG and County staff (DPLU and Department of Public Works [DPW])

Performance Indicator:

50% increase in bicycle and pedestrian facilities

COST: Varied

Costs to install 92.5 miles of bike and pedestrian paths vary based on the type of paths chosen, but costs per mile range from \$14,800 per 1 mile for a Class III facility to \$2.6 million per 1 mile for a Class I facility.

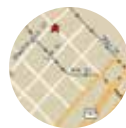
SAVINGS: Medium, Recurring (Private)

Per capita savings of nearly \$220 annually from avoided driving costs

POTENTIAL FUNDING SOURCES

State and regional grants (Caltrans Planning Grants), partnerships with organizations

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

93,135

Walking or biking in place of driving reduces GHG emissions, increases personal fitness, and adds to the sense of community as more people interact on sidewalks and bike paths. A number of actions can facilitate walking and biking, as identified below.

The County has adopted Pedestrian Area Plans for portions of five unincorporated communities. Pedestrian Area Plans look at existing pedestrian conditions, identify deficiencies, and recommend solutions. As more Pedestrian Area Plans are prepared in unincorporated communities, they will collectively form the Pedestrian Master Plan. The County also worked with SANDAG to create the “Riding to 2050, San Diego Regional Bicycle Plan,” which is intended to guide the development of

the regional bicycle system by creating interconnected bicycle corridors, support facilities, and programs to make bicycling more practical and desirable to a broader range of people.

Based on the General Plan, Pedestrian Area Plans, and the Regional Bicycle Plan, the County will widen existing sidewalks, complete gaps in the sidewalk network, and extend existing sidewalks to provide access to desired areas. **These efforts will be focused on expanding the pedestrian network to make walking an attractive travel mode.**

The County will also encourage bicycle travel by **developing and implementing off-street bicycle trails** that can be used for recreational travel and commuting purposes. These off-street trails will allow

residents to cycle safely, which will make cycling a more attractive transportation option for cyclists of all levels of expertise. In addition to any facilities that will be developed directly by the County, the County will also coordinate with private development to ensure that facilities are constructed in and adjacent to new development/redevelopment, where appropriate. Another way to promote awareness of bicycling as an alternative means of transportation and encourage road-sharing between bicyclists and motorists is to develop a promotional and awareness campaign for drivers and cyclists to encourage cyclists and make drivers aware of cyclists.

T3 Increase Ridesharing



IMPLEMENTATION

Implementation Partners:

SANDAG and County staff

Performance Indicator:

50% of employers using transportation demand management

COST: Very Low (Private); Very Low (Public)

Public cost of promoting programs; private costs of telecommuting and transit use, including for home electricity and unreimbursed share of transit passes

SAVINGS: Low, Recurring (Private)

Per capita savings of about \$300 annually from avoided driving costs

POTENTIAL FUNDING SOURCES

State and regional grants (Caltrans Planning Grants), partnerships with organizations

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

93,135

Transportation demand management (TDM) is a series of strategies that aim to reduce single-occupancy automobile trips. These strategies frequently target commute trips associated with employment. Private industry employs the majority of employees who work within the County. To facilitate a change in commuting patterns, **the County will encourage private industry to incorporate TDM emissions-reduction measures in the workplace through outreach conducted by County staff.**

It is anticipated that this outreach could be implemented through existing forums involving business owners and operators. Under this measure, private employers will be encouraged, but not required, to implement a

TDM program for their employees, including incentivizing transit use or implementing a rideshare or telecommuting program. **The County will showcase the current local government program as an example, and encourage additional TDM at existing and future businesses.** Where feasible, the County will expand the shuttle network to accommodate additional ridership. This strategy will focus on County staff and what they can do to reduce their use of automobiles to travel to and from County offices. These changes would equate to a 3% County-wide reduction in VMT by 2020.

THIS STRATEGY
WILL FOCUS ON
COUNTY STAFF
AND HOW THEY
CAN REDUCE
THEIR USE OF
AUTOMOBILES
TO TRAVEL
TO AND FROM
COUNTY
OFFICES.

T4 Alternative-Fuel Vehicles



IMPLEMENTATION

Implementation Partners:

Ecotality, CCSE, SDG&E, and County staff

Performance Indicator:

15% increase in electric vehicle purchase

COST: High (Private)

Purchase price is higher than comparable vehicles in the same class by approximately \$14,000

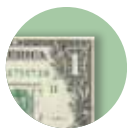
SAVINGS: None by 2020 (Private)

Just under \$600 in operational savings, but no net savings by 2020 due to high purchase cost

POTENTIAL FUNDING SOURCES

Partnerships with organizations (SANDAG, CCSE, SDG&E, Ecotality)

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

93,135

Hybrid and electric vehicles emit fewer GHGs than gasoline- and diesel-powered vehicles, and their use could help lower GHG emissions. While some transition to alternative vehicles is accounted for in projections at the state and regional (SANDAG) levels, the County is currently participating in a program that is being implemented by Ecotality and funded by agencies such as the U.S. Department of Energy, SANDAG, and SDG&E to further increase the number of electric vehicles in the community. A key component of this effort is to **facilitate the purchase and use of electric cars through installation of chargers at various public sites**. This is designed to overcome one of the

limitations of electric vehicles: their limited range. As another part of this strategy, the County will provide outreach to encourage purchase and use of electric cars by residents and employees living and working in the unincorporated areas of the County and using County facilities. This strategy will focus solely on an expansion of electric vehicles so that there will be limited overlap with programs that encourage use of hybrid vehicles and other alternative-fueled vehicles that are being implemented by the state of California and the U.S. government.

HYBRID AND
ELECTRIC
VEHICLES
EMIT FEWER
GHGS THAN
GASOLINE-
AND DIESEL-
POWERED
VEHICLES, AND
THEIR USE
COULD HELP
LOWER GHG
EMISSIONS.

AGRICULTURE

While GHG emissions from the County's agricultural sector are relatively minor, it is important to maximize emissions reductions from all available sectors. To leverage existing programs and minimize program implementation costs, these measures will be implemented by existing staff already working with farmers in the County. This will include farm advisors from the Farm and Home Advisor, which is a collaboration among the County; the U.S. Department

of Agriculture; the University of California; the San Diego County Farm Bureau; and the County's Department of Agriculture, Weights, and Measures. These measures will complement existing program goals by helping to minimize the resources that are required from County farmers, which will help farmers reduce costs and increase the profitability and sustainability of agriculture in the County.



A1 Nitrogen Optimization



IMPLEMENTATION

Implementation Partners:

San Diego Farm Bureau and County staff (the Farm and Home Advisor and Department of Agriculture, Weights, and Measures)

Performance Indicator:

5% of farmers decrease nitrogen usage

COST: None

SAVINGS: Low, Recurring (Private)

Approximately \$230,000 in savings County-wide to 2020

POTENTIAL FUNDING SOURCES

This measure will leverage existing outreach

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

199

Using organic or mineral nitrogen fertilizers is essential to maintain soil fertility and provide profitable yields. While these fertilizers are necessary, excessive application generates large amounts of nitrous oxide, a potent GHG. The purpose of this measure is to reduce nitrogen fertilizer use by providing information to farmers about optimizing nitrogen application rates, decreasing fertilizer input costs, maintaining crop yields, and decreasing nitrous oxide emissions. Working through the existing programs mentioned above, the County will **educate farmers about the advantages of reducing nitrogen fertilizer, with a goal of reducing use by 20%.**

This effort will use the most recent techniques to maintain crop yields and ensure that County farmers still benefit financially.

THIS EFFORT
WILL USE THE
MOST RECENT
TECHNIQUES
TO MAINTAIN
CROP YIELDS
AND ENSURE
THAT FARMERS
BENEFIT
FINANCIALLY.

A2 Field Equipment Fuel Efficiency



IMPLEMENTATION

Implementation Partners:

San Diego Farm Bureau and County staff (the Farm and Home Advisor and Department of Agriculture, Weights, and Measures)

Performance Indicator:

35% of farmers increase fuel efficiency of field equipment

COST: None

SAVINGS: Very Low, Recurring (Private)

Approximately \$400 in savings per farm to 2020

POTENTIAL FUNDING SOURCES

This measure will leverage existing outreach.

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

4,433

Farms use a considerable amount of fossil fuel within their field operations, but routine maintenance and more efficient equipment operation can provide valuable fuel savings. Engine and equipment upgrades are also expected to increase fuel efficiency. The County will incorporate information about on-farm fuel efficiency into existing outreach and education efforts that are underway through various agriculture resources. This will ensure that farm equipment is in top operating condition, which will save fuel and money, and help reduce repair costs, improve equipment reliability, and reduce harmful exhaust emissions.

ROUTINE
MAINTENANCE
AND MORE
EFFICIENT
EQUIPMENT
OPERATION
CAN PROVIDE
VALUABLE FUEL
SAVINGS.

A3 Agriculture Irrigation Pump Efficiency



IMPLEMENTATION

Implementation Partners:

San Diego Farm Bureau and County staff (the Farm and Home Advisor and Department of Agriculture, Weights, and Measures)

Performance Indicator:

40% of farmers increase fuel efficiency of irrigation pumps

COST: High (Private)

Approximately \$9,000 to purchase and install a variable-speed, 20-horsepower agricultural pump without rebates (information on rebates available through the San Diego Farm Bureau)

SAVINGS: Medium (Private)

Savings per farm of about \$3,200 in electricity (not including water) through 2020

POTENTIAL FUNDING SOURCES

SDG&E (Incentives)

Community Co-Benefits



GHG Reductions (MT CO₂e/Year)

1,826

Diesel, natural gas, and electric irrigation pumps are used to pump groundwater from agricultural wells and return irrigation tail water for reuse in fields. This measure proposes to reduce irrigation emissions associated with pumping water by **increasing the efficiency of irrigation pumps**. Routine repairs to pump bowl components can decrease pump energy use by one-third. Using the same existing outreach as the other two agriculture measures, the County will provide information through already established programs about incentives and advantages of increasing irrigation pump efficiency.

ROUTINE
REPAIRS
TO PUMP
COMPONENTS
CAN DECREASE
PUMP ENERGY
USE BY
ONE-THIRD.

LANDSCAPING AND OPEN SPACE

LS1 Plant Trees



IMPLEMENTATION

Implementation Partners:

CCSE's Advice and Technical Assistance Center for Urban Forestry, County staff (DPW), residents, businesses

Performance Indicator:

10,000 trees planted

COST: Medium, One Time (Private)

Initial purchase cost of about \$110, and just under \$350 for irrigation, trimming, and pest control over a 40-year tree lifetime

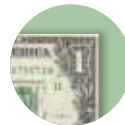
SAVINGS: Low, Recurring (Private¹)

POTENTIAL FUNDING SOURCES

State and regional grants (CalFire Climate Change Program, California ReLeaf), partnerships with private companies and other organizations

Community Co-Benefits

GHG Reductions (MT CO₂e/Year)



2,475

The County recognizes trees as a valuable asset that will provide GHG-reduction benefits and many other co-benefits that will improve the quality of life for all County residents. This measure will encourage residents to plant trees near their home so they can benefit from the shade of the tree in the summer. This shade will decrease the cooling load of a home and allow the resident to reduce electrical usage. Over the lifespan of the tree, this reduction in energy costs will save the homeowner more than \$1,000. To assist residents and business in planting trees around their buildings, the California Center for Sustainable Energy created the Advice and Technical Assistance Center for Urban Forestry,

which has a full catalog of educational information about tree planting. The capacity of a tree to reduce GHG emissions is dependent on its age and species. As trees mature, their canopies increase in size and provide greater amounts of shade, which results in a higher capacity for building cooling in hot weather. To maximize energy savings from shade trees, residents and businesses will need to plan what type of trees to plant and where to plant so that the shade will provide cooling in the summer but not prevent the sun from heating the building in the winter. For further information, see the "planting guide" in Appendix E. Additionally, trees gain carbon-capturing biomass in their trunks

and roots as they absorb carbon from the air to grow. The trees will also provide the County with increased water and air quality, increased habitat for wildlife, decreased urban heat island effect, and beautification of County neighborhoods.

¹Because trees planted near homes provide shade, they can lower home utility bills by keeping homes in the shade cooler than those that receive direct sun, especially in the afternoon. In addition to the other benefits of planting trees, like improving air quality and increasing real estate value, trees can pay for themselves and lower home utility bills by about \$1,060 over their lifetimes.

2035 REDUCTIONS

The County acknowledges Executive Order S-3-05, which sets a GHG-emissions-reduction goal of 80% below 1990 levels by 2050. While this is not a binding mandate, the County is committed to creating a healthy, energy-efficient, and sustainable future for its residents and visitors, and the County recognizes that the need to reduce GHG emissions will not end in 2020. Therefore, as stated in Chapter 2, the County developed an emissions-reduction goal for 2035 to put the County on the path toward the 2050 goal. To be on track to meet the state's emissions goal for 2050, the County determined that emissions reductions of 49% below 2005 levels will be necessary by 2035.

Similar to the 2020 analysis, the County developed a framework for reducing emissions by 2035 that will work in the context of the unincorporated County. The measures developed for the 2020 scenario were also used in the 2035 scenario, but with increased rates of participation. Maintaining the measures developed for 2020 reduces the cost of implementing new measures and builds on existing outreach structure, yielding higher participation over time. In addition, it is anticipated that technology will improve and/or lower in cost, making the measures more feasible for a greater percentage of the population in the future. For example, Measure E 2.1, Residential Building Retrofits, assumes a feasible participation rate of 15% by 2020, but increases to 90% by 2035.

Assuming aggressive, but feasible, goals, Table 3.2 shows the actions, assumptions, and reduction potential by measure that the County will achieve by 2035. The

potential reductions total 2,456,619 MT CO₂e, or 13.7% below 2005 levels, as shown in Figure 3.2.

While this does not achieve the 49% reduction target, the assumptions in the 2035 scenario include only current technology and existing state and federal regulations. There are likely to be advances in technology that cannot be accounted for now, as well as additional regulations that will enhance the reductions achieved at the state and federal levels by 2035. In the 2020 scenario, state and federal actions account for more than 55% of the reductions needed to achieve the 2020 goal, whereas they account for only 34% of the reductions needed to achieve the 2035 goal.

Meeting GHG-reduction goals beyond 2020 will require even greater participation in existing measures, inclusion of additional measures, guidance from state and federal authorities, additional state and federal regulations, improved technology, and infrastructure changes. As described in Chapter 6, the CAP will be revisited periodically to reflect any changes in emissions projections or reduction potential, and the County will leverage additional or new resources and incentives to further work toward this ambitious target. Monitoring the progress of implementing CAP measures will be essential to understanding which actions are being fulfilled and which are not. A full GHG emissions inventory will be necessary to assess County-wide progress, but progress indicators may be monitored yearly to track the success of specific actions. Chapter 6 discusses this next step in the process of reducing GHG emissions.

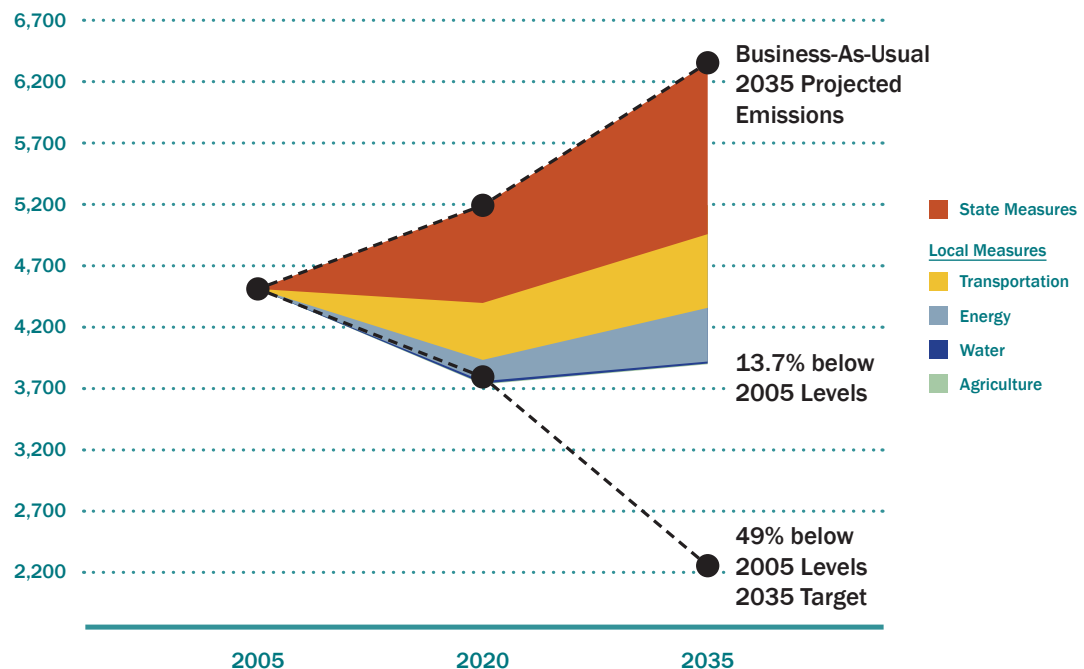
TABLE 3.2 | SUMMARY TABLE OF 2035 GREENHOUSE GAS REDUCTION MEASURES

MEASURE NUMBER	MEASURE	ANNUAL MT CO ₂ E REDUCTIONS IN 2035 (FROM BAU 2035)	SCALED MEASURE PERFORMANCE (% REDUCTION IN GHG EMISSIONS)	ASSUMPTIONS	
				PARTICIPATION RATE	PERFORMANCE LEVEL
Water					
W1	Water Conservation	16,227	0.7%	100% of residents	20% per capita reductions
Energy					
E1	Energy-Efficient New Development	22,302	0.9%	100% of new development	15% above 2008 Title 24 requirements
E2.1	Residential Building Retrofits	158,662	6.5%	90% pre-2005 residential units	Savings vary per residential type and building vintage
E2.2	Commercial Building Retrofits	14,019	0.6%	90% pre-2005 commercial units	40% reduction in lighting kilowatt hours (kWh)
E3	Appliance Upgrades	53,290	2.2%	90% pre-2005 units; 100% post-2020 units	Average saving of 380 kWh per appliance and 32 kWh per light bulb replaced
E4	Smart Meters	32,106	1.3%	50% of residents with SDG&E accounts will use the enhanced energy monitoring capabilities to reduce energy usage	5% reductions in electrical usage
R1	Solar Water Heating (Residential and Commercial)	71,267	2.9%	Residential: 66% Commercial: 73% (90% colleges/schools, 70% other)	Reductions in energy usage: Residential: 70% Commercial: 59%
R2	Alternative Energy Systems (Residential and Commercial)	85,915	3.5%	Residential: 10% residential electricity from solar Commercial: 100 MW (13% commercial electricity use)	10 watts per square food for 6 hours
Land Use					
LU1	Mixed-Use Development	160,199	6.5%	25% of new development will occur in high-density areas	4% VMT reduction
Transportation					
T1	Increase Transit Use	80,099	4.9%	2% increase in transit ridership	2% VMT reduction
T2	Increase Walking and Biking	120,149	4.9%	50% increase of bicycle and pedestrian facilities	3% VMT reduction
T3	Increase Ridesharing	120,149	3.3%	50% of employers using TDM	3% VMT reduction
T4	Alternative-Fuel Vehicles	120,149	4.9%	15% increase in electric vehicle purchase	3% VMT reduction
Agriculture					
A1	Nitrogen Optimization	177	0.01%	5% growers	20% reduction in nitrogen fertilizer
A2	Field Equipment Fuel Efficiency	3,924	0.2%	35% field equipment	15% fuel efficiency increase
A3	Agriculture Irrigation Pump Efficiency	1,616	0.1%	40% pumps	50% reduction in energy usage

MEASURE NUMBER	MEASURE	ANNUAL MT CO ₂ E REDUCTIONS IN 2035 (FROM BAU 2035)	SCALED MEASURE PERFORMANCE (% REDUCTION IN GHG EMISSIONS)	ASSUMPTIONS	
				PARTICIPATION RATE	PERFORMANCE LEVEL
Landscaping and Open Space					
LS1	Plant Trees	2,475	0.2%	10,000 trees planted by 2035	1,696 MT CO ₂ e reduction from energy savings; 779 MT CO ₂ e sequestration benefit
Total County Action		1,062,724	43.3%		
State and Federal					
SF1	Pavley – Passenger Auto and Light Truck Fuel Efficiency	782,246	31.8%	Regulatory	
SF2	Low Carbon Fuel Standard	180,808	7.4%	Regulatory	
SF3	Renewable Portfolio Standard	198,821	8.1%	Regulatory	
SF4	Tire Pressure Program	10,063	0.4%	Regulatory	
SF5	Heavy-Duty Vehicle Aerodynamics	11,211	0.5%	Regulatory	
Total State and Federal Action		1,393,895	56.7%		
Total Reductions (County, State, and Federal Actions)		2,456,619	100%		
2035 Emissions with Reduction Measures		3,895,853			
Percent Reduction below 2005 Baseline (4,512,580 MT CO ₂ e)		13.7%			

THOUSAND
METRIC TONS
CO₂e PER YEAR

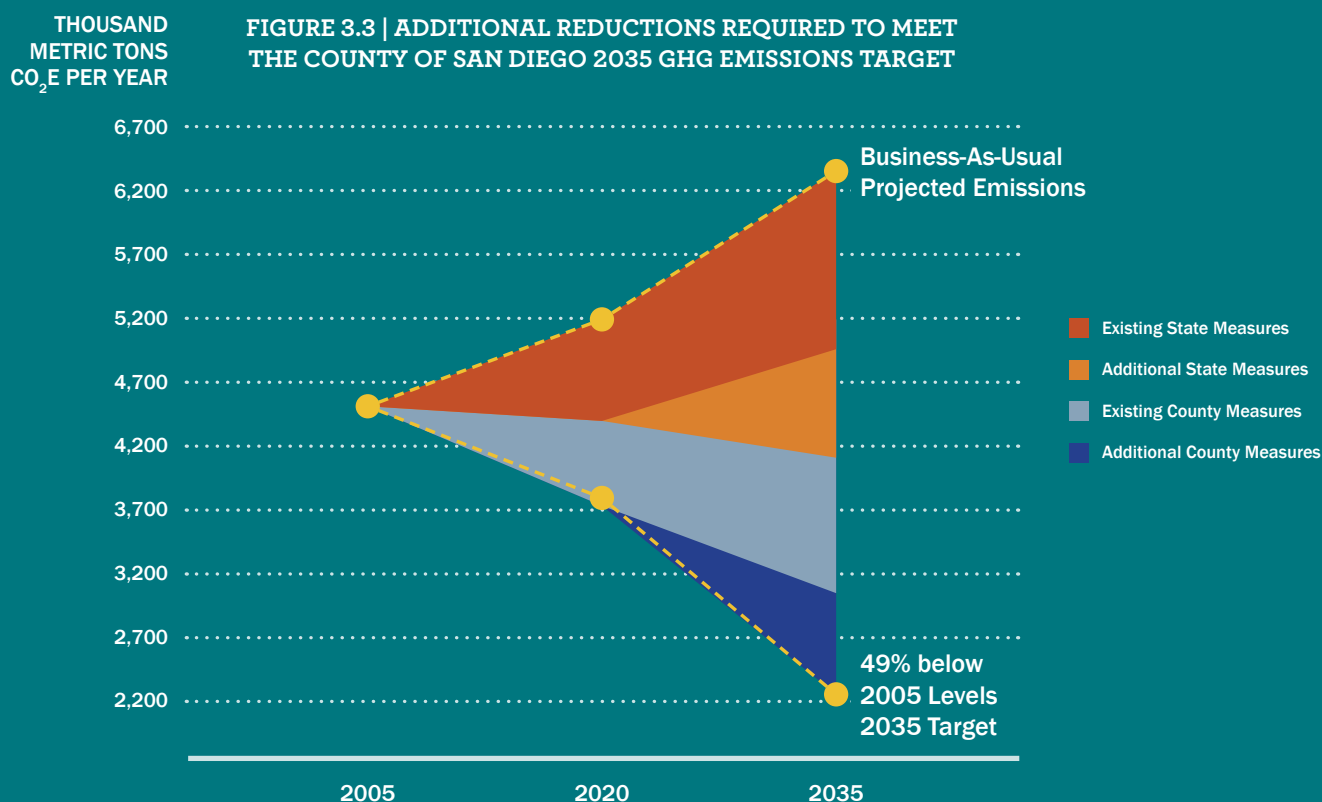
FIGURE 3.2 | 2035 GHG REDUCTION POTENTIAL BY SECTOR



MEETING THE 2035 TARGET

The current 2035 scenario represents the County's best assessment of what would be achievable given existing conditions. The County is dedicated to meeting legislative goals and has developed scenarios to determine how it could reduce emissions 49% below 2005 levels by 2035. Reducing emissions from a BAU scenario will require mitigating more than 4 MMT CO₂e, which will only be achievable through additional local, state, and federal actions. Figure 3.3 illustrates the additional reductions that will be needed to meet the target. The level of reductions that were assumed for the local level is proportional to those in 2020 (44.6%), while the remaining gap will need to be filled by additional state and federal measures. Details

of how this scenario could be achieved are provided in Appendix F, and include measures that may not currently be economically, technically, or politically feasible, such as implementing net-zero energy requirements on new buildings, increasing the LCFS to 30% at the state/federal level, and requiring organic waste diversion and 20% reduction in VMT at the local level. This demonstrates the challenge facing the state, and the level of commitment needed at many levels to achieve these ambitious targets. As discussed throughout this CAP, the measures will be monitored and the CAP will be updated to reflect changing conditions, which may make the goal achievable as 2035 approaches.



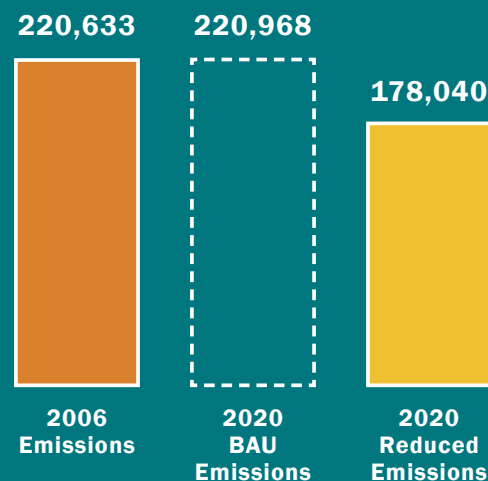


Ch. 4

Local Government Measures and Actions

The County of San Diego is a leader in energy conservation,

exemplified within the community and within County operations. Since the energy crisis of 2000, the County has reduced internal consumption by 14% through retrofits, new construction standards, and energy use policies. The County will continue to work toward reducing energy use. There are more than 15,000 County government employees serving more than 3 million residents. There are more than 300 County-operated buildings with nearly 10 million square feet; therefore, this is an area where large, strategically planned reductions can occur. The County devised a Strategic Energy Plan (SEP) to last through 2012 to help reach energy reduction goals. The actions in this CAP align with the SEP goals and extend some of them beyond the 2012 SEP horizon year.



The County's internal operational goals for GHG emissions reductions are the same as those for the community: to achieve 15% below baseline emissions by 2020.¹ The following table summarizes the local government-level strategies and GHG reductions, plus applicable state-level reductions. Through the CAP, the County can exceed its goal and achieve 19% GHG emissions reductions relative to 2006 by 2020.

The County identified five overarching strategies, with many actions within each strategy, to achieve significant reductions by 2020:

- Reduce Energy Consumption
- Energy-Efficient New Construction
- Renewable Energy
- Utility Monitoring and Reporting
- Fleet and Fuel Efficiency

MEASURE NUMBER	STRATEGY	2020 REDUCTIONS MT CO ₂ E/YEAR FROM BAU 2020	PERFORMANCE LEVEL
M-1	Reduce Energy Consumption	6,443	Reduce energy consumption 1% per square foot per year
M-2	Energy-Efficient New Construction	2,005	Exceed Title 24 Building Standards for new construction and major renovations
M-3	Renewable Energy	NA ¹	Provide at least 2% of the County's annual electricity usage from renewable energy systems by 2012
M-4	Utility Monitoring and Reporting	NA ¹	Monitor and track energy and water usage of all large facilities
M-5	Fleet and Fuel Efficiency	2,859	5% increase in fuel efficiency by 2013 and 1% increase in fuel efficiency per year from 2014–2020
State	RPS	13,135	Regulatory
State	Pavley	12,362	Regulatory
State	LCFS	5,848	Regulatory
State	Tire Pressure	273	Regulatory
State	HDV ²	3	Regulatory
2006 Baseline Emissions		220,633	
Business-as-Usual 2020 Emissions		220,968	
Total Reductions		42,928	
Net 2020 Emissions		178,040	
Percent Reduction Below 2006 Baseline		19%	

¹ The emissions reductions from these measures could not be quantified.

² Heavy-Duty Vehicle GHG Emission Reduction Measure; applied only to vehicle fleet, not employee commutes.

¹ The County of San Diego General Plan EIR stated that a 17% reduction from 2006 levels would be achieved by 2020; to align the goals with the recommendation from the state, the County is adopting a 15% reduction from 2006 by 2020.

M-1 Reduce Energy Consumption

The County was proactive in auditing and retrofitting buildings well before AB 32 and other climate change measures were enacted. By 2006, the County had performed retrofits on more than two dozen major facilities. These actions resulted in 14% reductions in electricity usage and 9% reduction in natural gas usage per square foot. The East Mesa Detention Center, North County Regional Center, and Health Services Complex have all undergone retrofits since the baseline inventory, helping to achieve the SEP and CAP goals. Ongoing retrofits, largely funded by the federal government's EECBG, will account for additional reductions by 2012.

Specific actions that the County has or can take are as follows:

- Energy Efficiency Retrofits
- Energy-Efficient Purchasing Policy
- Optimization of Building Operations

	STRATEGY ¹	GHG EMISSIONS REDUCTION POTENTIAL (MT CO ₂ E)
Existing SEP Strategy	Reduce energy consumption 1% per square foot per year; 2009–2012	1,828
Continued Strategy	Reduce energy consumption 1% per square foot per year; 2009–2020	6,443

¹ SEP strategies are assumed to be fully implemented and effective; therefore, projected GHG reductions may include past years.

COUNTY ACTION IN FOCUS

As part of its ongoing effort to reduce energy consumption, the County replaced existing compressors for its 450-ton chiller at the Juvenile Hall Complex with new energy-efficient Turbocor TT400 compressors. These new compressors use magnetic bearings to levitate the rotor shaft and impellers during compression, which reduces noise and vibration during operation. With an integrated variable-frequency drive, energy efficiency is maximized even with a partial or low load. This project helps the County save an estimated \$109,000 per year in energy costs. This is just one of the many energy efficiency projects that have already been completed or are in the construction or planning phases in the County.



M-2 Energy-Efficient New Construction

The County is currently undertaking major construction projects that provide an opportunity for energy efficiency in new buildings. California's Title 24 establishes standards for energy efficiency in new and renovated buildings; however, the County has committed to exceeding these standards both to reduce emissions and to distinguish itself as a leader of energy efficiency in the community. The San Elijo Nature Center, for example, is LEED Platinum certified—the highest possible certification from the Green Building Rating System. Future plans include achieving LEED Platinum rating for the Planning Commission Facility, set for completion in August 2012, and the County Operations Center, which will encompass a campus of LEED-certified buildings and replace older, less-efficient County buildings.

	STRATEGY ¹	GHG EMISSIONS REDUCTION POTENTIAL (MT CO ₂ E)
Existing SEP Strategy	Exceed Title 24 Building Standards for new construction and major renovation 2009–2012	1,320
Continued Strategy	Continue through 2020	2,005

¹ The level of development within County and community operations is uncertain. To assess the potential reductions related to new construction or major renovations, only active projects (approved and funded) were included in the estimates through 2012. For the continued strategy, all active, approved, and proposed projects over the next 5 years were assumed to be constructed by 2020.

COUNTY ACTION IN FOCUS

Still under construction, the County's new Operations Center represents the ongoing implementation of emissions-reduction measure M-2. It is on track to achieve a LEED Gold rating, and will exceed Title 24 energy requirements by 28% and reduce water consumption by 40%. To maximize energy efficiency, the new buildings will implement the following:

- A 400-kilowatt PV system
- Energy-efficient roofing and glazing systems to reduce heat gain and improve interior day lighting
- High-efficiency lighting and mechanical ventilation systems to reduce energy consumption and improve occupant comfort



M-3 Renewable Energy

Part of the SEP is to provide at least 2% of the County's annual electricity usage from renewable energy systems by 2012. The County has already begun investing in renewable energy systems. New construction of County buildings (e.g., the recently completed Medical Examiner and Forensic Center, and the current construction of the East Mesa Detention Center and Crime Lab) includes installation of renewable energy systems. This strategy supports M-1 and M-2, which seek to reduce energy in existing and new buildings. While this measure could result in greater emissions reductions, the potential for overlap between measures would make this a supporting measure; therefore, the emissions reductions from this measure were not quantified in this document.

M-4 Utility Monitoring and Reporting

One of the County goals is to monitor and track energy and water usage of large facilities and to provide this information to facility operators. While this strategy does not call for direct action related to GHG emissions reductions, this type of information is useful in reducing demand, identifying where efficiencies can be achieved, and ultimately reducing GHG emissions. Therefore, the emissions reductions from this measure could not be quantified, but the goal is included as an important supporting measure to the other energy efficiency strategies. This tool will be valuable for the CAP monitoring plan, as discussed in Chapter 7.



M-5 Fleet and Fuel Efficiency

The County's vehicle fleet provides services to both the unincorporated County and to cities. Sheriff's, Parks and Recreation, Registrar of Voters, and Health and Human Services are just some of the County departments that rely on the fleet's 2,900 vehicles. The nearly 3 million miles traveled in these vehicles accounted for 11% of the County's emissions in 2006. The County is already making progress toward reducing emissions related to its vehicle fleet. The County's vehicle fleet makeup includes 167 hybrid, 25 electric, and 16 compressed natural gas vehicles. To reduce miles traveled, the County uses WebEx to conduct remote meetings, resulting in less fuel used for travel. The large vehicle fleet operated by the County provides an opportunity for significant emissions reductions through the strategies described below. In addition, the mobility of the County fleet provides the added benefit of promoting energy efficiency in the community by example.

	STRATEGY ¹	GHG EMISSIONS REDUCTION POTENTIAL (MT CO ₂ E)
Existing SEP Strategy	5% fuel efficiency gain 2009–2012	1,248
Continued Strategy	Continue at 1% greater efficiency per year 2013–2020	2,859

¹ SEP strategies are assumed to be fully implemented and effective; therefore, projected GHG reductions may include past years.

COUNTY ACTION IN FOCUS

Spanning roughly 4,200 square miles, San Diego County covers an expansive area, with 1,680 government buildings located throughout the region. Because of this, some employees in the same department can often be separated by more than 30 miles. To meet the significant challenge of meeting and communicating over such large distances, the County incorporated WebEx technology into its operations. This telepresence technology allows County employees to meet and discuss work right from their desks. This eliminates the need to drive to meetings, helps reduce carbon emissions, and also helps reduce costs and save taxpayer funds. Costs for meetings have been reduced from \$59 per person for a single meeting to less than \$20 per person for an entire month of meetings. Furthermore, based on cost data tracked for 900 Cisco WebEx sessions and 3,500 employees, the County estimates that this saved taxpayers more than \$45,000 in staff time and travel costs.





Ch. 5

Adaptation

ADAPTATION IN SAN DIEGO COUNTY

Although rising awareness and concern regarding potential climate change impacts has led to many policy responses and programs aimed at reducing GHG emissions at the County, state, national, and global level, we are likely already seeing and feeling some impacts of climate change, and other more serious consequences will occur despite climate mitigation efforts. While GHG mitigation initiatives are important for long-term climate stabilization, scientists warn of the time it takes for the climate system to respond to GHG reductions. Regardless of future emissions, the GHG concentrations already in the atmosphere commit us to a likely range of climate change impacts in the near future. Because of this, jurisdictions are recognizing the role of adaptation planning, which is an essential extension of climate change mitigation. Local governments can make important decisions relevant to adaptation, such as emergency preparedness, and are beginning to take a more active role in climate adaptation planning. While this document is not meant to serve as a climate adaptation plan, it is important to recognize the potential effects of climate change in the County, and to highlight potential strategies that may help the County adapt to those effects. This chapter outlines some climate change effects and potential adaptation strategies that the County may consider to best prepare for or co-exist with the actual or expected effects of climate change.

Several studies on the effects of climate change in the County have been conducted. The San Diego Foundation's Focus 2050 Report, San Diego County Water Authority's 2010 Urban Water Management Plan and the 2009 Annual Report, and the 2007 San Diego County Firestorms After Action Report detail some of the possible effects of climate change in the County, including a hotter and drier climate, increased droughts, rising sea level, an increased frequency and severity of wildfires, and decreasing water and energy security. These effects could have a significant impact on property, public health, safety, wildlife, and habitat.

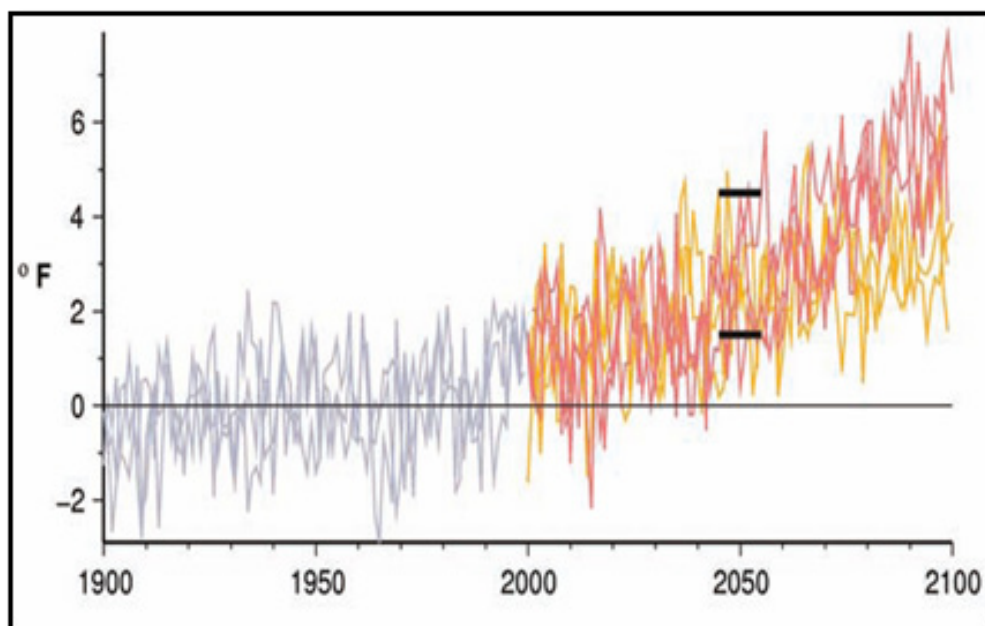
INCREASING FREQUENCY OF EXTREME WEATHER EVENTS

HEATWAVES

One of the most significant risks of heat waves is the likely increased levels of heat stress and death caused by extreme temperatures. Heat waves have claimed more lives over the past 15 years than all other declared disaster events combined in California. While many of these deaths occurred in more central parts of the state, the San Diego region reported at least five deaths during the 2006 heat wave. This is of particular concern for older adults and the infirm, as well as for those with heart or respiratory problems. By 2050, almost one-quarter of the region's residents (more than 1 million people) will be 65 and older, with more than half being older than 41. This older population will be more vulnerable to the public health impacts of climate change, such as heat waves and air pollution. With the prevalence of air-conditioner use during high-temperature

events, demand for power may outstrip supply and cause a power blackout; this was the case during the heat waves of 2007 when thousands of residents lost power. This risk is compounded during a heat wave, because even more people and businesses will manage their heat stress with air conditioning. If the outage is sufficient to disrupt public transportation, mass stranding of passengers may also occur. The Focus 2050 report estimates that temperatures in the San Diego region will rise between 1.5°F and 4.5°F by 2050 (see graph below). This warming will be exaggerated in the summer, when temperatures will warm by as much as 2°F more than in the winter, and in the inland areas of the County, where the majority of County residents live, where warming could be as much as 2°F higher than the warming that occurs near the coast.

PROJECTED TEMPERATURE INCREASE FOR SAN DIEGO COUNTY



Source: San Diego Foundation Regional Focus 2050 Study

FLASH FLOODING

With a high degree of variability of annual precipitation, San Diego County can be vulnerable to flash flooding, especially in the central and eastern areas where mountain canyons, dry creek beds, and high deserts are the prevailing terrain. These floods have serious impacts on public health, transportation infrastructure, and power service, and can result in severe property damage and even deaths. Even small flooding events have been known to cause public transportation disruptions. Power outages due to storm damage can compound transport delays and put populations dependent on electricity for health needs at risk. Deaths, injuries, and destruction of

property due to storm damage, flash flooding, and erosion of hillsides are also significant risks in these events. Storm events, although providing water inflows, are also a main case of toxin infiltration, because as storm water runoff passes through developed parts of the County, it picks up pollutants such as animal waste, automotive fluids, and anything else in its path. The effects of storm events may be mitigated by habitat restoration projects, which would restore the native vegetation that absorbs floodwaters and slowly releases runoff into watersheds. As a result, these habitats increase the resiliency of adjacent areas in times of significant precipitation.

ELECTRICAL DEMAND

In addition to the health and public safety risks associated with warmer temperatures, and compounded by the region's growing population, the County faces challenges to its energy supply. In 2006, peak demand for electricity was the highest on record for the region, mostly because of air conditioners

running during that year's unusually hot summer. Additionally, efficiencies of electricity generation and transmission decrease as air temperatures increase, which further inhibit the ability of electric providers to meet the increased demand expected as changes in the climate take place.

INCREASING VARIABILITY OF PRECIPITATION

DROUGHT

Water availability is and has been a vital issue in Southern California. Multiyear droughts can push the limits of water supplies, while population growth keeps the demand for water increasing. This will only intensify as climate change stresses water supplies available from the San Diego County Water Authority, with expected demand to increase by as much as 60% (or 39% after adjusting for planned water conservation) by 2035. San Diego's water is supplied from three main sources: the Colorado River (54%), the State Water Project (28%), and local sources (18%). Another source of water for County residents is water pumped from private wells. While the full extent of water availability from these wells is not known, it can be assumed that a growth in population and increased demand due to reduced natural rainfall and increased temperatures will stress this water supply source as well. Each of these sources already faces challenges, which will be further stressed by climate change. The Sierra Nevada snowpack provides water for the State Water Project by accumulating snow during wet winters and releasing it slowly during dry springs and summers. Warmer temperatures will cause smaller snow packs to melt faster and earlier, making it more difficult to store and use. By 2050, scientists project a loss of at least 25% of the Sierra Nevada snowpack. This loss of snowpack means less water will be available for Californians to use in the summer when it is needed the most. The Colorado River is also vulnerable to climate change, with some estimates stating that water flows will decrease by up to 20% by 2050. Climate change is also expected to result in more variable weather patterns throughout California. More variability can lead to longer and more severe droughts. SB 7X 7, discussed in Chapter 3, is already anticipating this change by requiring a significant reduction in urban water consumption by 2020. The most significant and inherent risk of drought is insufficient water supply. While it is a positive sign that many County residents are aware of the scarcity of potable water and have made significant reductions in consumption in recent times, this may also mean that many water savings measures have already been addressed and, with an increasing population, further savings may be challenging.

WILDFIRES

San Diego's unique combination of fire-prone vegetation and, at times, high temperatures combined with high winds means that fires are not only frequent, but can be large and intense. This was demonstrated by the 2007 firestorms that, at its maximum, consisted of seven fires burning simultaneously. The 2007 fires resulted in 10 civilian deaths, 23 civilian injuries, and 89 firefighter injuries, and consumed approximately 369,000 acres, or about 13% of the County's total land mass. Additionally, the fires destroyed an estimated 1,600 homes, 1,055 outbuildings and structures, and 239 vehicles. The costs incurred to contain the fires are estimated at more than \$40 million, and the total damage costs are expected to exceed \$1.5 billion. As a result of these fires, more than 515,000 County residents received voluntary or mandatory evacuation notices, which exceeded the number of residents evacuated from New Orleans during Hurricane Katrina. As a result of climate change, higher spring temperatures, scorching summers, drier vegetation, and longer fire seasons can be expected, which will all lead to an increased risk of wildfires.



CLIMATE ADAPTATION STRATEGIES

The effects of climate change will increase over time; however, there are a range of strategies that begin to address the new and different conditions that climate change will bring to the County. Many of the strategies that would be part of a comprehensive adaptation plan for the County also provide immediate benefits, such as improved water supply, public health, and energy efficiency. While not an all-inclusive list, the strategies below provide a useful starting point for the County to begin to adapt to new environmental and legislative realities. Many of the adaptation strategies also overlap with the GHG-reduction strategies listed above. In these cases, the GHG-reduction strategies are noted in italics.

POTENTIAL STRATEGIES FOR WILDLIFE AND OPEN SPACE

- The Multiple Species Conservation Program (MSCP) protects valuable habitat for sensitive biological species in San Diego County. As climate change affects habitats throughout the County, it is important that species continue to have access to suitable habitats. An expanded MSCP will provide more habitat options for species affected by climate change. It is important that the MSCP be evaluated and updated, where necessary, to ensure that its goals are not compromised by climate change.
- Another benefit of ensuring that land is preserved for wildlife is that the natural process of carbon sequestration in the soil and plants will continue. If this land were developed, carbon sequestration would be stopped, and the carbon that was sequestered would most likely be released.
Strategy: Landscaping and Open Space

POTENTIAL STRATEGIES FOR WATER AND WASTEWATER

- Encourage the application of Low Impact Development, which would ease peak water flows. For example, require projects to capture and manage a specific amount of rainwater per storm event through on-site infiltration, retention, and biofiltration.
- Expand water recycling and develop local water supplies that would not be affected by climate change. Examples include storm water harvesting, which can assist in both controlling flash flooding events and serve as a water supply, and single-source grey water reuse. *Strategy: Water*
- Implement all best management practices for water use efficiency and encourage the public to implement similar measures to reduce water demand, wastewater discharges, and energy demand. Efficient water use can help the County cope with water shortages, thus reducing economic and environmental impacts. *Strategy: Water*

POTENTIAL STRATEGIES FOR PUBLIC HEALTH

- Reduce the urban heat island effect through cool-roof technology, consideration of cool roadway materials, addition of shade trees in parking lots and next to sidewalks, and creation of additional green space throughout the County. *Strategy: Energy and Landscaping and Open Space*
- Consider mapping neighborhoods that could be more vulnerable to the effects of climate change, such as sea-level rise, flooding, fire, and the urban heat island effect. Include considerations of housing quality and transportation access.

POTENTIAL STRATEGIES FOR BUILDINGS AND ENERGY

- Improve building envelopes and encourage the application of green-roof or cool-roof technology to reduce the urban heat island effect of development and reduce the need to cool buildings with air conditioning during hot weather. *Strategy: Energy*
- Plant shade trees and follow up with proper maintenance to ensure that they are able to grow and thrive. A 10% increase in vegetation cover can reduce ambient temperatures by 1°F to 2°F. The trees also provide significant co-benefits such as reducing habitat fragmentation, storm water pollution, and flooding. *Strategy: Landscaping and Open Space*
- Encourage energy conservation, implement energy efficiency strategies, and facilitate renewable energy installation to reduce pressure on the electrical grid during heat waves and drought conditions. *Strategy: Energy*

POTENTIAL STRATEGIES FOR WILDFIRES

- Develop short- and medium-term climate change adaptation strategies for forests and other fire-prone habitats, and improve development standards to reduce exposure to fire risk at the urban/wildland interface.
- Restore fire-adapted ecosystems that can withstand naturally recurring wildfires.
- The County's fire departments, in conjunction with other regional firefighting agencies, should evaluate and plan for an increased risk of larger and more frequent wildfires.



Ch. 6

Monitoring and Project Compliance

MONITORING

The CAP itself does not ensure reductions and, therefore, it is imperative to monitor progress toward the goals set in this document and to revisit and update the CAP periodically. Each strategy in this CAP includes performance indicators that describe how the potential reductions may be achieved, including assumptions about participation rates and efficiencies.

To track the CAP's progress toward GHG emissions-reduction goals, the County's Climate Team will coordinate monitoring efforts at the community and local government levels. A monitoring tool was created to easily assess key components of the CAP annually, and the County will regularly conduct a GHG emissions inventory to gain the full picture of GHG emissions in the County. While a full GHG emissions inventory is necessary to assess community-wide and government-wide progress toward the 2020 goal, the monitoring tool can track progress between inventories and examine the effectiveness of specific actions. This tool, created specifically for use with the County's CAP, includes easily attainable metrics that are related to specific measures. These metrics are generally already available to the County, but can be used with the tool to show progress toward the goals set in the CAP. For example, when commercial applicants apply for a permit to install solar PV systems, the County Department of Planning and Land Use (DPLU) will then know the square footage of anticipated PV to be installed. The CAP includes a goal of achieving 5.5 million square feet of PV on commercial buildings by 2020; the information already collected by the County can be put into the tool to see the progress toward the individual goal, the sector goal, and the overall community-wide goal (see graph at right). The tabular and graphic output will allow for quick understanding of measure performance, which can be used to apply for grants, provide information to decision-makers to reallocate funding, or show compliance with the goals of AB 32.

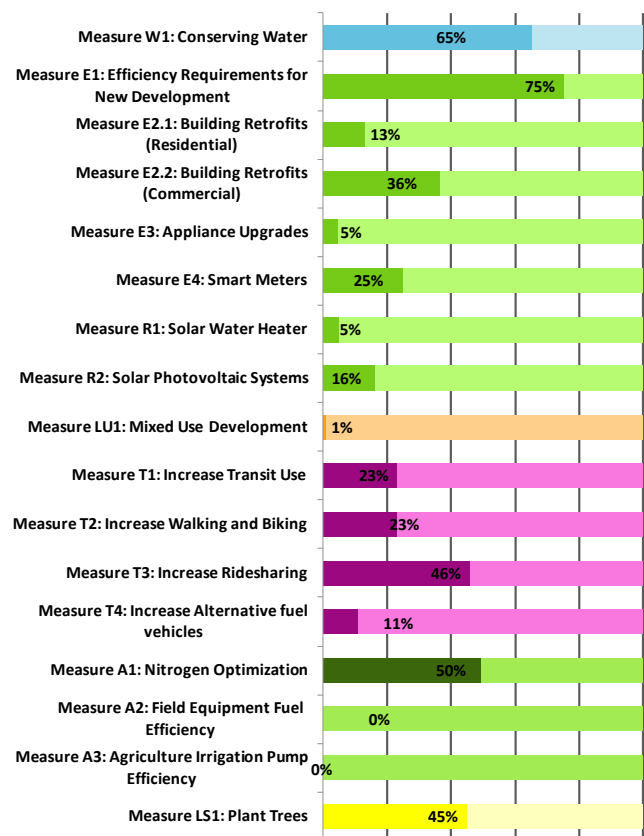
The County is already undergoing a 2010 GHG emissions inventory that will be submitted to The Climate Registry and may be used as a benchmark of programs implemented since the baseline inventory.

Success of the CAP will rely on the County, public, and private entities participating and becoming engaged in this process.

The County recognizes that reducing GHG emissions is one of the most critical challenges facing the world today. This CAP provides an implementation pathway for the County's GHG reduction efforts. This chapter describes how the County will implement the GHG reduction measures and actions contained in the CAP.

EXAMPLE OUTPUT FROM MONITORING TOOL

Community Goals: Percent Complete



PLAN EVALUATION

Two types of performance evaluations are important: evaluation of the CAP as a whole and evaluation of individual measures. Community-wide GHG emissions inventories will provide the best indication of CAP effectiveness, although it will be important to reconcile actual growth in the County versus the growth projected when the CAP was developed. Conducting these inventories periodically will enable direct comparison to the 2005 baseline inventory, and will demonstrate the CAP's ability to achieve the adopted reduction target. The County will coordinate community-wide inventories in the future to assess the level of GHG-reduction-goal attainment.

While community-wide inventories provide information about overall GHG reductions, it is also important to understand the effectiveness of each measure. Evaluation of the emissions-reduction capacity of individual measures will improve the ability of staff and decision-makers to manage and implement the CAP. The County can promote successful measures and reevaluate or replace under-performing ones. Evaluating measure performance will require data on actual community participation rates and GHG reductions.

The County DPLU, in conjunction with the Department of Public Works and Department of General Services, will coordinate measure evaluation on the same schedule as the community-wide inventories, and summarize the progress toward meeting the GHG-reduction goals. This report will describe the following:

- Estimated annual GHG reductions in 2020
- Achievement of progress indicators
- Participation rates (where applicable)
- Remaining barriers to implementation

If a more frequent progress review period is deemed appropriate, an annual or bi-annual monitoring program that tracks the performance of individual measures could be instituted. The data collection and processing necessary to establish performance levels would be conducted by the responsible parties identified for each measure (as noted in the measure tables), and summarized at the level of each action area and for the CAP as a whole.

PLAN EVOLUTION

The County must be prepared to adapt and transform the CAP over time so that it remains relevant. It is likely that new information about climate change science and risk will emerge, new GHG-reduction technologies and innovative local government strategies will be developed, new financing will be available, and state and federal legislation will advance. It is also possible that community-wide inventories will indicate that the community is not achieving its reduction targets. As part of the evaluations identified above, the County will

assess the implications of new scientific findings and technology, explore new opportunities for GHG reduction, respond to changes in climate policy, and incorporate these changes into future updates of the CAP to ensure an effective and efficient plan. CAP monitoring will occur on an annual basis as part of the General Plan annual progress report, required under Government Code Section 65400(a)(2). It is anticipated that, 5 years from adoption of the General Plan, the CAP will be evaluated to determine whether revisions are required.

RELATIONSHIP TO THE COUNTY OF SAN DIEGO GENERAL PLAN EIR

The General Plan EIR evaluated the potential effects of implementation of the General Plan on global climate change. Two issue areas were evaluated: compliance with AB 32 and the effects of global climate change on the General Plan. The issue of effects of global climate change on the General Plan was determined to be mitigable through General Plan policies and mitigation measures, as well as through compliance with AB 32.

The issue of compliance with AB 32 was evaluated by estimating the County's 1990 GHG emissions and anticipated 2020 GHG emissions. AB 32 requires that California reduce GHG emissions by 2020 to 1990 levels. The analysis concluded that emissions in 2020 would be greater than in 1990, resulting in a potentially significant

impact. The EIR cited ongoing local and state measures that would help to mitigate the impacts to climate change. In addition, numerous General Plan policies were cited (Table I-1 of the General Plan) that would reduce future project-related impacts. Finally, mitigation measures were proposed to further reduce the impacts of climate change, implementation of which would reduce the General Plan's impacts to a less-than-significant level. Among the mitigation measures was CC-1.2, Preparation of a Climate Change Action Plan. This measure called for a baseline GHG emissions inventory; detailed GHG-reduction targets and deadlines; comprehensive and enforceable GHG emissions-reduction measures; and implementation, monitoring, and reporting of progress toward the targets defined in the CAP.

The CAP contains quantified estimates for current (2005) and future (2020, 2035, and 2050) GHG emissions based on historical data and anticipated growth factors for the unincorporated area of San Diego County. The CAP includes strategies that show compliance with ARB's Scoping Plan for local governments, which is to achieve a reduction of 15% below current levels by 2020. ARB's Scoping Plan also establishes a reduction target for 2035, recognizing that the cumulative and long-term nature of this issue necessitates planning beyond the 2020 horizon established under AB 32. The County has a range of measures that would help meet a target that is consistent with the intent of AB 32. As part of the CAP development process, a monitoring tool is being prepared to regularly assess progress toward the measure-level performance goals and overall CAP targets. The CAP will be monitored and updated, as needed, to include new legislation, technological changes, and adjustments in measures to achieve the County's target for 2020. This CAP includes all elements listed in, and therefore acts as the implementation of, mitigation measure CC-1.2 from the General Plan.

PROJECT CONSISTENCY WITH THE CAP

Another important goal of the County is to adopt the CAP as a GHG Reduction Plan, as defined in Section 15183.5 of the CEQA Guidelines, to provide tiering and streamlining benefits to future projects. Section 15183.5(b)(1) states that a GHG Reduction Plan should do the following:

- (A) Quantify GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area.
- (B) Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the GHG Reduction Plan would not be cumulatively considerable.
- (C) Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area.
- (D) Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates would collectively achieve the specified emissions level if implemented on a project-by-project basis.
- (E) Establish a mechanism to monitor the GHG Reduction Plan's progress toward achieving the specified emissions level, and require amendment if the plan is not achieving specified levels.
- (F) Be adopted in a public process following environmental review.

Guidelines (A) through (D) are contained in the CAP, and (E) is being prepared concurrent with the CAP. In addition, an Initial Study and the appropriate environmental documentation and public review were prepared to assess the effects of implementing the CAP. With adoption of the CAP, later projects may use the CAP for a cumulative impacts analysis if the projects demonstrate compliance.

Demonstrating compliance with the CAP is determined by use of the County CAP Compliance Checklist (Appendix G) during project review, and must be completed for all relevant projects undergoing environmental review in the County by the DPLU.

CEQA Guidelines Section 15183.5(b)(2) provides direction for use of a "plan for the reduction of greenhouse gas emissions" by later projects. The guidelines state that "an environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project." Through the County's discretionary review process and completion of the CAP Compliance Checklist, the design features or mitigation measures applied to individual development projects are considered binding and enforceable, including those applied to projects with GHG emissions that are either above or below the Bright Line Threshold.

DETERMINATION OF SIGNIFICANCE FOR PROJECT IMPACTS ON CLIMATE CHANGE

The CAP includes GHG-reduction measures that, if fully implemented, would achieve an emissions reduction target that is consistent with and supports the state-mandated reduction target embodied in AB 32. Many of the measures, such as installing solar water heaters, may be applied and measured at the project level to show project-level compliance with the CAP and with AB 32. Other measures, such as increase walking and biking, are community-wide implementation strategies for which GHG reductions at the project level cannot be easily or reliably quantified; their benefit is derived from community-wide implementation. County staff identified a range of feasible reduction measures in the CAP, and quantified the effectiveness of these measures to various projects that would be implemented during buildout of the General Plan. For some project types, many CAP reduction measures would be relevant and should be incorporated as part of project design or mitigation. For other project types, there may be fewer CAP reduction targets that would apply.

To further ensure that the County's overall reduction target is achieved, and considering the wide range of project types the County may approve during buildout of the General Plan, the County prepared a companion document that presents a range of substantiated significance thresholds designed to apply to different project types. This document is called "Guidelines for Determining Significance: Climate Change" (Significance Guidelines). The Significance Guidelines document provides detailed steps on how to apply thresholds to projects, and should be used by projects for the evaluation of impacts on climate change. A summary of the Significance Guidelines is shown in Table 6.1.

The CEQA Guidelines (Section 15064.7) encourage lead agencies to develop and publish thresholds of significance for assessing environmental impacts. The County elected to develop guidelines to help determine GHG emissions thresholds and to provide clear and consistent guidance for assessing the significance of GHG emissions impacts of proposed projects under CEQA, as a supplement to the measures outlined in the CAP.

The "dual approach" of using the County's CAP with the Significance Guidelines document is intended to provide flexibility to individual projects when addressing GHG emissions, and to ensure that new development in the County will achieve its "fair share" of emissions reductions. The CAP provides a range of feasible measures and quantifies their effectiveness to demonstrate that the County's reduction target can be met. The Significance Guidelines document demonstrates that if the largest individual projects incorporate their "fair share" of feasible emissions reductions, new development in the County will occur consistent with the statewide mandate set in AB 32.

TABLE 6.1 | GHG GUIDELINES FOR DETERMINING PROJECT-LEVEL SIGNIFICANCE

TITLE	LEVEL FOR DETERMINING SIGNIFICANCE
Efficiency Threshold	4.32 MT CO ₂ e per year per service population (residents + employees)
Bright Line Threshold	2,500 MT CO ₂ e per year
Performance Threshold	16% GHG emissions reductions below unmitigated project in 2020
Stationary Source Threshold	10,000 MT CO ₂ e per year

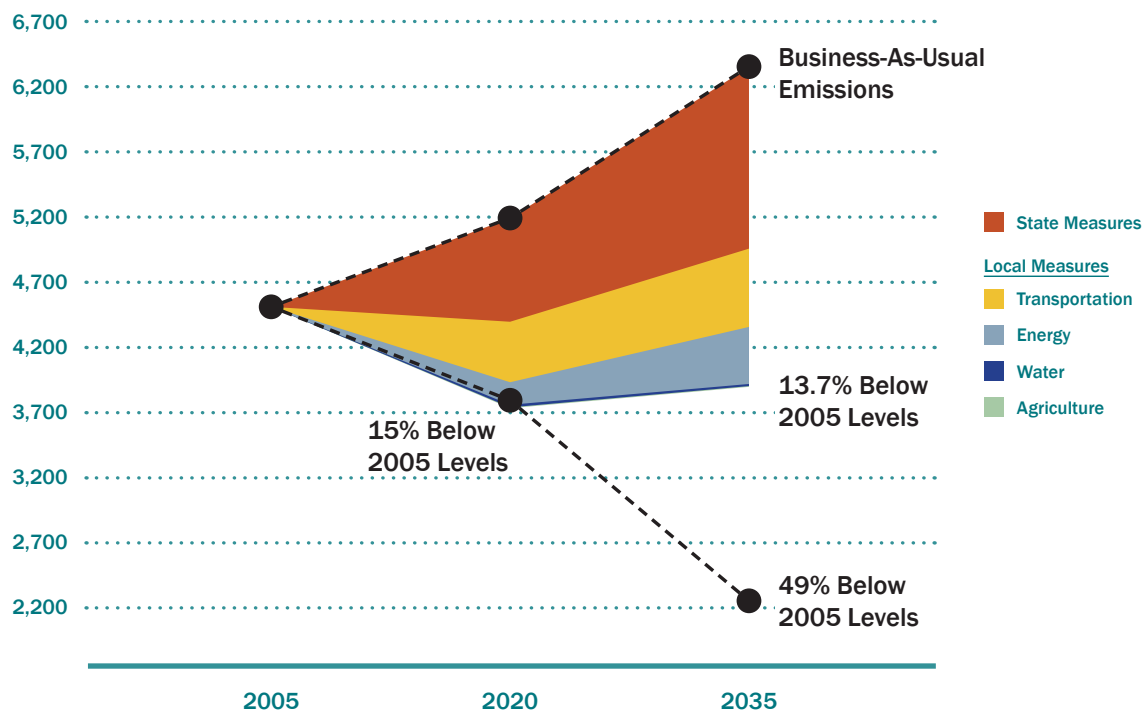


Ch. 7

Conclusion

THOUSAND
METRIC TONS
CO₂E PER YEAR

FIGURE 7.1 | GHG REDUCTION POTENTIAL



This CAP represents the County's commitment to fighting global climate change and complying with state and federal legislative mandates by reducing GHG emissions from both government operations and community activities. Although climate change presents a new type of challenge for residents and businesses, this CAP is a powerful tool in meeting the County's goals.

With this document, the County has demonstrated its commitment to mitigating GHG emissions by thoroughly examining the sources of emissions, GHG reduction strategies, and the costs and efficacy of these strategies.

There are local benefits to taking action against global climate change, and the citizens of the County will benefit from improved public health from reduced air and water pollution, reduced potential disruptions to the climate system that protects people from extreme weather events, and decreased dependence on fossil-fuel-based energy sources, among other benefits.

Although County agencies are taking action against climate change, community action is critical to achieving the emissions-reduction goals that support physical well-being and economic vitality. By building on the framework set out in this CAP and the accompanying User's Guide (Appendix E), the citizens of the County have the necessary tools to build a community that not only creates a sustainable, healthy environment for themselves and future generations, but also sets an example for other communities and affects climate systems throughout the world.



Appendices

APPENDIX A: ACRONYM LIST

°F	degrees Fahrenheit
AB	Assembly Bill
ARB	California Air Resources Board
ARRA	American Recovery and Reinvestment Act
BAU	business as usual
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CCSE	California Center for Sustainable Energy
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH ₄	methane
CO ₂	carbon dioxide
CO ₂ e	CO ₂ equivalent
County	County of San Diego
CREBS	Clean Renewable Energy Bonds
CSI	California Solar Initiative
DEER	Database for Energy Efficiency Resources
DPLU	Department of Planning and Land Use
DPW	Department of Public Works
EECBG	Energy Efficiency and Conservation Block Grant
EIR	Environmental Impact Report
EMS	Energy Management System
EO	Executive Order
ESP	Energy Service Provider
GHG	greenhouse gas
GWP	global warming potential
HVAC	heating, ventilation, and air conditioning
IPCC	International Panel on Climate Change
LCFS	Low Carbon Fuel Standard
LEED	Leadership in Energy and Environmental Design
MMT	million metric tons
MSCP	Multiple Species Conservation Program
MT	metric tons
MTS	Metropolitan Transit System
MW	megawatt
PPA	Power Purchase Agreement
ppm	parts per million
PV	photovoltaic
QECB	Qualified Energy Conservation Bond
RPS	Renewable Portfolio Standard
SANDAG	San Diego Association of Governments
SB	Senate Bill
SDG&E	San Diego Gas & Electric
SEP	Strategic Energy Plan
TDM	transportation demand management
USEPA	U.S. Environmental Protection Agency
VMT	vehicle miles traveled

APPENDIX B: LEGISLATIVE DETAIL

This appendix provides additional detail regarding the legislative requirements related to greenhouse gas (GHG) reductions in California.

State Legislation

California has adopted a wide variety of regulations aimed at reducing state GHG emissions. While state actions alone cannot stop global warming, the adoption and implementation of this legislation demonstrates California's leadership in addressing this challenge.

Executive Order S-3-05

Executive Order S-3-05 states that California is vulnerable to the effects of climate change, including reduced snowpack in the Sierra Nevada Mountains, exacerbation of California's existing air quality problems, and sea level rise. To address these concerns, the executive order established statewide targets to reduce GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80% below 1990 levels by 2050.

Assembly Bill 32 and Climate Change Scoping Plan

Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006, requires California to reduce statewide GHG emissions to 1990 levels by 2020. AB 32 directs the California Air Resources Board (ARB) to develop and implement regulations that reduce statewide GHG emissions. The Climate Change Scoping Plan (Scoping Plan) was approved by ARB in December 2008 and outlines California's plan to achieve the GHG reductions required in AB 32. The Scoping Plan contains the primary strategies California will implement to achieve a reduction of 169 million metric tons of carbon dioxide equivalent, or approximately 28% from state projected 2020 emissions levels.

In the Scoping Plan, ARB encourages local governments to adopt a reduction goal for municipal operations emissions and to move toward establishing similar goals for community emissions that parallel the state's commitment to reduce GHGs. The Scoping Plan identifies California's cities and counties as "essential partners" within the overall statewide effort, and recommends that local governments set a GHG reduction target of 15% below 2005–2008 levels by 2020. Although the specific role local governments will play in meeting California's GHG reduction goals is still being defined, they will nonetheless be key players.

Senate Bill 375

Senate Bill (SB) 375 (2008) established a process whereby regional targets for reduced passenger-vehicle and light-duty-truck GHG emissions were established for each Metropolitan Planning Organization (MPO) in the state, including the San Diego Association of Governments (SANDAG). ARB's adopted targets for the SANDAG region include a 7% per capita reduction in emissions by 2020 and a 13% per capita reduction by 2035. This is a regional target, and not necessarily a target for each member jurisdiction.

Senate Bill 97

SB 97 acknowledges that climate change is a prominent environmental issue that requires analysis under the California Environmental Quality Act (CEQA). Pursuant to SB 97, the State CEQA Guidelines were

updated in 2010 to include provisions for mitigating GHG emissions and/or the effects of GHG emissions. The amended CEQA Guidelines (Section 15183.5) allow jurisdictions to analyze and mitigate the significant effects of GHGs at a programmatic level by adopting a plan for the reduction of GHG emissions. Later, as individual projects are proposed, project-specific environmental documents may tier from and/or incorporate by reference that existing programmatic review in the cumulative impacts analysis. If a plan is to be used for tiering or incorporation by reference purposes, it should contain enforceable reduction measures and demonstrate that it can reliably reduce the community's GHG emissions to a degree that contributes its fair share to state emissions-reduction efforts.

Attorney General Guidance

In a March 2009 correspondence to local governments completing general plan updates, the State Attorney General's Office emphasized and expanded on SB 97 by stating that community-wide targets should align with an emissions trajectory that reflects aggressive GHG mitigation in the near term, and California's interim (1990 levels by 2020) and long-term (80% below 1990 levels by 2050) GHG emissions levels limits set in AB 32 and Executive Order S-3-05.

The Attorney General's August 31, 2009, letter to the County of San Diego states that GHG projections associated with a general plan update should estimate the emissions levels through the full planning horizon, not just for 2020. Although the letter only explicitly calls for 2030 projections, it could be assumed that an emissions-reduction target for 2030 would also be required.

AB 1493

AB 1493, California's mobile-source GHG emissions regulations for passenger vehicles, was signed into law in 2002. AB 1493 requires ARB to develop and adopt regulations that reduce GHG emissions from passenger vehicles, light-duty trucks, and other non-commercial vehicles for personal transportation. In 2004, ARB approved amendments to the California Code of Regulations, adding GHG emissions standards to California's existing standards for motor vehicle emissions.

Executive Order S-1-07 – The Low Carbon Fuel Standard

Executive Order S-01-07 reduces the carbon intensity of California's transportation fuels by at least 10% by 2020. The Low Carbon Fuel Standard (LCFS) is a performance standard with flexible compliance mechanisms that incentivizes the development of a diverse set of clean, low-carbon transportation fuel options to reduce GHG emissions.

Renewable Portfolio Standard

SB 1078, SB 107, Executive Order S-14-08, and SB X1-2 have established increasingly stringent Renewable Portfolio Standard (RPS) requirements for California utilities. RPS-eligible energy sources include wind, solar, geothermal, biomass, and small-scale hydro. The standards are as follows:

- SB 1078 required investor-owned utilities to provide at least 20% of their electricity from renewable resources by 2020.
- SB 107 accelerated the SB 1078 timeframe to take effect in 2010.
- Executive Order S-14-08 increased the RPS further to 33% by 2020. San Diego Gas & Electric (SDG&E), the San Diego County's electricity provider, delivered 5.2% of its electricity from renewable sources in 2005.

- SB X1-2 codified the 33% RPS by 2020 requirement established by EO-S-14-08.

SB 7X 7

SB 7x 7 requires the state to achieve a 20% reduction in urban per-capita water use by December 31, 2020. The state is required to make incremental progress toward this goal by reducing per-capita water use by at least 10% on or before December 31, 2015. SB 7X 7 requires each urban retail water supplier to develop long-term urban water-use targets and an interim urban water-use target. SB 7X 7 also creates a framework for future planning and actions for urban and agricultural users to reduce per-capita water consumption 20% by 2020.

Vehicle Efficiency Measures

Vehicle efficiency reductions in the CAP were calculated based on the following two regulations:

- **Tire Pressure Program** – Ensuring that vehicles have proper tire inflation to reduce tailpipe GHG emissions by reducing tire rolling-resistance and increasing vehicle efficiency. ARB identified the tire inflation measure as a Discrete Early Action in 2007, which means a regulation enforceable starting in 2010. The tire inflation and tire program would affect vehicle service facilities such as dealerships, maintenance garages, oil change facilities, tire centers, and smog check facilities.
- **Medium/Heavy-Duty Vehicle Efficiency** – Heavy-Duty Vehicle GHG Emissions Reduction (Aerodynamic Efficiency) regulations require existing trucks/trailers to be retrofitted with the best available technology and/or ARB-approved technology. This measure was identified as a Discrete Early Action in the Scoping Plan, which means it was enforceable beginning in 2010. Technologies that reduce GHG emissions and improve the fuel efficiency of trucks may include devices that reduce aerodynamic drag and rolling resistance. These requirements apply to both California-registered trucks and out-of-state-registered trucks that travel in California.

APPENDIX C: GREENHOUSE GAS EMISSIONS INVENTORY AND FORECASTS

This appendix summarizes the methodologies and assumptions that were used to create the greenhouse gas (GHG) emissions inventory and forecasts.

Introduction

The purpose of a GHG emissions inventory is to identify sources and levels of GHG emissions to enable policy makers to implement GHG reduction strategies in policy areas over which they have operational or discretionary control.

Reporting GHG inventories on a calendar-year basis is considered standard internationally; the United Nations Framework Convention on Climate Change, the Kyoto Protocol, the European Union Emission Trading System, the Climate Registry, the California Climate Action Registry (CCAR), and the state's mandatory reporting regulation under Assembly Bill 32 all require GHG inventories to be tracked and reported on a calendar-year basis. A community-wide GHG emissions inventory was created for the 2005 "baseline" year for the County of San Diego (County), and a local government GHG emissions inventory was created for the 2006 baseline year for the County's local government operations. The difference in baseline years was due to data availability.

The community-wide inventory was completed for the following sectors: transportation, energy (electricity and natural gas), solid waste, wastewater, potable water, agriculture, and other. Government emissions are generally considered a subset of community emissions.

Forecast GHG emissions were estimated for 2020, 2035, and 2050 for both community and local government emissions under a business-as-usual (BAU) scenario. A BAU scenario is the expected emissions that would occur if the Climate Action Plan (CAP) and other GHG-reducing measures (such as statewide legislation) were not implemented.

The state of the art in preparing GHG inventories and forecasts is evolving rapidly. During preparation of the County's General Plan, the University of San Diego's Energy Policy Initiatives Center (EPIC) calculated GHG emissions for the County for both community-wide sectors and County government operations for the years 1990 and 2006, with emissions projections for 2020. Since the completion of the EPIC inventory, methodologies for conducting an emissions inventory have been refined to provide consistency among communities and municipalities. Currently, the California Air Resources Board (ARB) has a methodology only for local government operations, called the Local Government Operations Protocol (LGOP), although there are some methodologies that apply equally to community inventories. In addition, there are best-practices for community inventory methodology, including from the Intergovernmental Panel on Climate Change (IPCC). While these provide a much more accurate inventory, they also require substantial data, often preventing a 1990 inventory that meets the LGOP standards. To adhere to the adopted LGOP and to provide a more accurate estimate of the community-wide GHG emissions to be used in a CAP, the County updated its existing inventories. Consequently, 1990 inventories were not possible, but the baseline years were updated (2006 for government operations, 2005 for community-wide). A summary of the baseline and forecast community-wide and local government GHG emissions and forecasts are provided in Tables C.1 and C.2.

Table C.1 | County of San Diego Community GHG Baseline and Projected Emissions

Sector	2005 Baseline	2020 BAU	2035 BAU	2050 BAU
	MT CO ₂ e			
Transportation	2,636,702	3,098,307	4,004,966	4,785,555
Residential Energy	505,963	566,033	666,952	707,334
Commercial/Industrial Energy	615,687	737,916	818,698	934,503
Agriculture	190,025	159,246	118,134	83,520
Solid Waste	144,865	162,064	190,959	202,521
Wastewater	50,412	56,397	66,452	70,475
Potable Water	236,435	264,506	311,665	330,535
Other	132,490	148,220	174,646	185,221
Total	4,512,580	5,192,689	6,352,472	7,299,664
GHG emissions per service population ¹	7.47	7.48	7.80	8.23
GHG emissions per population	9.57	9.52	9.83	10.51

¹ Service population refers to the residents and employees in the County as estimated by the San Diego Association of Governments (SANDAG).

MT CO₂e = metric tons of carbon dioxide equivalent

Table C.2 | County of San Diego Government GHG Baseline and Projected Emissions

County Government GHG Baseline and Projected Emissions				
Sector	2006	2020	2035	2050
	MT CO ₂ e			
Solid Waste Facilities	64,192	48,516	35,943	26,627
Employee Commute	57,572	63,017	70,776	73,893
Buildings and Facilities	55,291	61,420	67,987	75,256
Vehicle Fleet	23,231	24,960	27,428	28,611
Wastewater Facilities	11,656	13,451	16,232	17,661
Government-Generated Solid Waste	4,892	5,256	5,776	6,025
Public Lighting	2,160	2,493	3,008	3,273
Airport Facilities	1,153	1,331	1,606	1,747
Water	488	524	576	601
Total	220,633	220,968	229,331	233,695

MT CO₂e = metric tons of carbon dioxide equivalent

Transportation

The transportation sector includes the operation of on-road vehicles. Emissions from mobile combustion can be estimated based on vehicle fuel use and miles traveled data. Carbon dioxide (CO₂) emissions, which account for the majority of emissions from mobile sources, are directly related to the quantity of fuel combusted and, thus, can be calculated using fuel consumption data. Methane (CH₄) and nitrous oxide (N₂O) emissions depend more on the emissions-control technologies employed in the vehicle and the distance traveled. Calculating emissions of CH₄ and N₂O requires data on vehicle characteristics (which takes into account emissions-control technologies) and vehicle miles traveled (VMT).

Community-wide VMT for 2005, 2020, 2035, and 2050 were provided by the traffic consultant Fehr & Peers. Fehr & Peers used the San Diego Association of Governments (SANDAG) travel demand model and adjusted outputs to include travel only within the unincorporated portions of the County and to exclude VMT associated with roadways in the Camp Pendleton area, which is located within the boundary of the County but not within the jurisdiction of the County. (The County has no land use authority over the activities at Camp Pendleton and, therefore, cannot affect VMT associated with roadways within its boundary.)

Employee commute VMTs were estimated using the average commute distance for County residents, as provided in the County's General Plan Environmental Impact Report, and the number of full-time-equivalent employees in 2006. Forecasts of the number of employees for 2020 and 2035 were estimated assuming a change in employees equal to one-half the growth rate of the County residential population.

Emissions factors for the transportation sector were obtained using the California ARB vehicle emissions model EMFAC. EMFAC is a mobile-source emissions model for California that provides vehicle emissions factors by county and vehicle class. For the County inventory, emissions factors were used for 2005 (community), 2006 (County government), 2020, and 2035. EMFAC does not project vehicle emissions factors beyond 2040; therefore, 2040 was used to estimate emissions in 2050. Pursuant to U.S. Environmental Protection Agency guidance, carbon dioxide equivalent (CO₂e) emissions were calculated by dividing CO₂ emissions by 0.95, which accounts for other GHGs such as N₂O, CH₄, and other high global warming potential gases.

Energy

The energy consumption sector includes the use of electricity and natural gas (subsectors) in residential, commercial, and industrial land uses within the legal boundaries of the County. Electricity-related GHG emissions are considered indirect emissions. For indirect emissions, although emissions associated with electricity production are likely to occur in a different jurisdiction, consumers are considered accountable for the generation of those emissions. For example, a resident may consume electricity within the County, but the electricity may be generated in a different region. Direct emissions occur from activities that directly generate the emissions (e.g., natural gas combustion for heating or cooling). San Diego Gas & Electric (SDG&E) provides electricity consumption data in kilowatt-hours per year, and natural gas consumption data in therms per year.

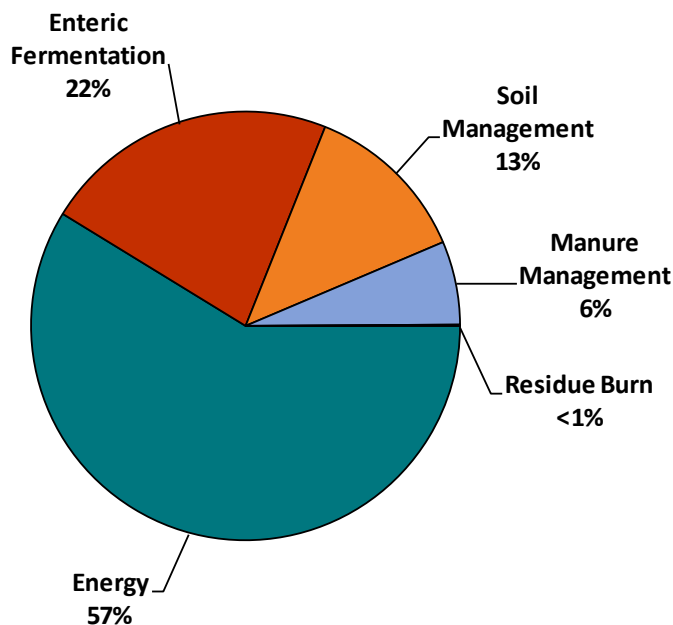
Electricity-related GHG emissions were quantified using an SDG&E-specific emissions factor for CO₂ emissions from the Climate Registry for 2005 (community) and 2006 (County government); emissions factors for CH₄ and N₂O were obtained from the CCAR protocol, which provides a statewide average. Emissions factors for CO₂, CH₄, and N₂O for natural gas were obtained from the CCAR protocol.

Forecasts of community-wide energy consumption were based on the change in number of households (residential energy) and the change in commercial/industrial development (commercial/industrial energy) anticipated by SANDAG for 2020 and 2035. Forecasts of County government energy consumption were based on the anticipated square footage under County control (buildings and facilities) and estimated County population (public lighting and airport facilities) for 2020 and 2035.

Agriculture

The following agricultural GHG emissions sources are recommended by ARB, and used in its annual statewide inventory. Methodologies used for analysis of agricultural GHG emissions are those recommended by ARB (generally derived from the IPCC), except where noted. In general, a bottom-up approach is applied when possible. Forecasts of agricultural GHG emissions were estimated using SANDAG's forecasted developed acres of agricultural land in 2020 and 2035. Within the agriculture sector, energy emissions (from diesel-operated pumps and off-road vehicles) accounted for the majority (57%) of total emissions. Other agricultural emissions calculated included enteric fermentation (22%), soil management (12%), manure management (9%), and residue burn (less than 1%), and are shown in Figure C.1.

Figure C.1 | San Diego County Agricultural Emissions (2005)



Energy Emissions

The majority of energy-related agriculture emissions are captured in the electricity/natural gas energy sectors; however, some energy sources, such those that fuel off-road vehicles and irrigation pumps, are not. ARB uses information from the Energy Information Administration for statewide agricultural fuel consumption. County agricultural energy emissions were derived using a bottom-up approach to estimate emissions from vehicles and pumps.

Agricultural Vehicles

Off-road agricultural vehicles such as mowers, sprayers, tractors, balers, and tillers emit CO₂, CH₄, and N₂O. The emissions associated with off-road agricultural vehicles were derived using the modeling software OFFROAD2007. OFFROAD2007 is a software package used to generate emissions inventory data for off-road mobile sources. The software reports monthly or annual emissions for different calendar years by county, district, air basin, and the entire state. For the inventory updates for the CAP, San Diego County, 2005, was used. Because most agriculture within the County occurs in the unincorporated areas, 100% of off-road agricultural-vehicle emissions were assumed to be derived from the unincorporated County.

Agricultural Pumps

According to ARB, diesel-fueled agricultural irrigation pump engines are a significant source of emissions in California. ARB conducted a statewide inventory for diesel-fueled agricultural irrigation pumps in 2003. From this survey, it was estimated that the County had 178 irrigation pumps. Emissions factors were determined using OFFROAD2007 and assumptions on horsepower ratings, engine efficiency, and hours of engine run-time per year.

Residue Burning

GHG emissions occur from the common practice of burning corn, wheat, barley, walnut, almond, and rice crops after harvest. According to the San Diego 2005 Annual Crop Report, the County only has significant corn and barley crops. The CAP calculated CO₂, CH₄, and N₂O emissions associated with the burning of these crops according to ARB methodology. Although CO₂ emissions are biogenic, they are created as a result of a management practice that would not occur naturally. Therefore, they are important to consider in the GHG emissions inventory.

Soil Management

Soil management emissions are primarily a result of nitrogen in synthetic fertilizer, but can also come from organic fertilizer, dolomite, lime, and manure. Emissions associated with synthetic fertilizer, dolomite, and limestone application were calculated using the methodology defined by ARB. The lack of reliable information regarding application rates and an emissions calculation methodology prevented the calculation of emissions from organic fertilizer application and manure (and crop residue).

Enteric Fermentation

Livestock produce CH₄ emissions from enteric fermentation. Enteric fermentation is a digestive process in ruminant animals, and results in methane emissions through exhalation or belching by the animal. CH₄ is also produced in the large intestines of ruminants and is expelled. Animals that exhibit enteric fermentation include cattle, sheep, and swine. The ARB methodology was used to calculate enteric fermentation in cattle, sheep, and swine that are present in the County.

Histosol Cultivation and Rice Cultivation

Histosols are defined as having more than 50% organic matter in the upper 30 inches of soil, and generally form in wetland areas where plant litter (roots, stems, leaves) accumulates faster than it can

fully decompose. The vast majority of histosols within California are found in the Sacramento-San Joaquin Delta, and are not found in significant quantities in San Diego County; therefore, emissions from histosols are considered negligible and are not quantified. Rice is not a commodity of San Diego County, and, therefore, emissions due to rice cultivation are not applicable.

Manure Management

Livestock holdings result in CH₄ and N₂O emissions from manure. Methane emissions from manure management tends to be smaller than enteric emissions. N₂O emissions from manure management vary significantly between the types of management system used, and can also result in indirect emissions due to other forms of nitrogen loss from the system. The amount of detail required for N₂O analysis was not available for the County, and, statewide, N₂O emissions account for less than 15% of total manure management emissions and less than 1% of total statewide emissions. Therefore, N₂O emissions due to manure management were considered negligible for the County.

Solid Waste

GHG emissions attributed to the solid waste sector include emissions from annual solid waste disposal and annual alternative daily cover (i.e., organic material used to cover waste piles, which also decomposes and generates GHG emissions). In addition, the inventory includes waste-in-place emissions associated with existing solid waste decomposition (i.e., anaerobic and aerobic decomposition that primarily produce CH₄ and CO₂ emissions, respectively). Annual GHG emissions associated with 2005 solid waste disposal and alternative daily cover were calculated using ICLEI's CACP software. The ICLEI CACP software allows the user to enter the amount (i.e., tons) of solid waste and/or alternative daily cover disposed per year, and specify waste categorization percentages (e.g., paper products, food waste, plant debris). Solid waste and alternative daily cover disposal data for the unincorporated County in 2005 were obtained from CalRecycle's database.

Waste-in-place emissions associated with existing solid waste were calculated using methodologies from ARB's Landfill Emissions Tool. This method involves evaluating the portion of waste-in-place that is anaerobically degradable organic carbon to calculate annual CH₄ and CO₂ emissions. Waste-in-place data for each unincorporated County landfill were obtained from CalRecycle. Waste categorization data for waste-in-place were obtained from multiple sources (i.e., CalRecycle, the Environmental Protection Agency, and IPCC) to develop a full 1990 through 2005 waste-in-place profile. The waste-in-place profile includes the amount of solid waste disposed of each year (i.e., tons) along with the corresponding waste categorization percentages.

Forecasts for solid-waste-related GHG emissions were estimated using anticipated number of households (community solid waste), number of County government employees (County-government-generated solid waste), and a natural decay rate of 1.98% per year from closed landfills (solid waste facilities).

Wastewater

Wastewater originates from a variety of sources, and is generally treated on-site or through a sewer system connected to a centralized plant. In San Diego County, there are six facilities that manage wastewater: Rancho del Campo, Pine Valley, Julian, Heise Park, San Pasqual Academy, and the Descanso Detention Facility. For facilities that monitor nitrogen flow, direct, bottom-up emissions may be calculated. For facilities located in the unincorporated County, nitrogen monitoring is not required, and, therefore, an alternative approach was necessary. IPCC guidelines suggest a methodology using local population and default values for estimating CH₄ production associated with wastewater treatment; this approach was used. The SANDAG-estimated number of households in the County was used to forecast wastewater-related emissions in 2020, 2035, and 2050.

Potable Water

Potable water is a scarce resource in San Diego County, and there are a number of measures that help to conserve water resources. To adequately quantify any reductions, GHG emissions related to potable water should be calculated in the baseline inventory. The San Diego County Water Authority 2005 Annual Report includes water conveyance data for the entire County. Agricultural water is separated from municipal and industrial water consumption. Water used in agricultural operations was assumed to be 100% within the unincorporated areas of the County. Municipal and industrial water consumption was not separated into city/unincorporated areas; therefore, the unincorporated portion was assumed to be directly proportional to population. While some industrial sources are included within the cities, other major industrial centers are in the unincorporated areas as well, and the proportional assumptions are believed to be reasonable. Forecasts for potable-water-related GHG emissions were derived using the estimated number of households in the County (community) and the number of employees (County government) in 2020, 2035, and 2050.

Other

Other emissions sources in the County include emissions associated with construction, light commercial, industrial, lawn and gardening, and off-road vehicles. Data for community activities were estimated using OFFROAD2007, which provides County-level emissions for off-road equipment.

ARB's OFFROAD2007 model was used to quantify GHG emissions associated with community sources. OFFROAD2007 is an off-road mobile-source emissions model for California that provides emissions by county for equipment such as construction, light commercial, industrial, lawn and garden, and recreational vehicles. Indicators specific to the County were used to allocate County-wide emissions. Statistics from the U.S. Census Bureau and U.S. Department of Housing and Urban Development on households, retail jobs, and manufacturing jobs for construction, lawn and garden, light commercial, and industrial off-road equipment allocation were used. GHG emissions associated with the County's sources were estimated using CO₂ emissions factors for gasoline and diesel from EMFAC, and adjusted to reflect emissions due to CH₄ and N₂O, similar to the methodology described for transportation. Forecasts of these emissions sources were estimated using anticipated changes in County population over time.

APPENDIX D: GREENHOUSE GAS REDUCTION STRATEGIES

This appendix summarizes the assumptions and parameters used to calculate the emissions-reduction performance of recommended Climate Action Plan (CAP) measures to reduce greenhouse gas (GHG) emissions in San Diego County (County). Emissions-reduction measures are discussed and organized by the emissions sectors that they would affect (see Figure C.1). Supporting measures that do not have an associated quantification calculation are not included in this section. For all measures, quantification is expressed as metric tons of carbon dioxide equivalent (MT CO₂e) emissions avoided per year, by 2020 (Table D.1); similar methodology was used to estimate 2035 GHG emissions-reduction potential. Reduction in GHG emissions associated with the measures was estimated using the 2010 California Air Pollution Control Officers Association (CAPCOA) document, Quantifying Greenhouse Gas Mitigation Measures (CAPCOA Quantification Report), modeling, and expertise.

Figure C.1 | 2020 GHG Reduction Potential by Sector

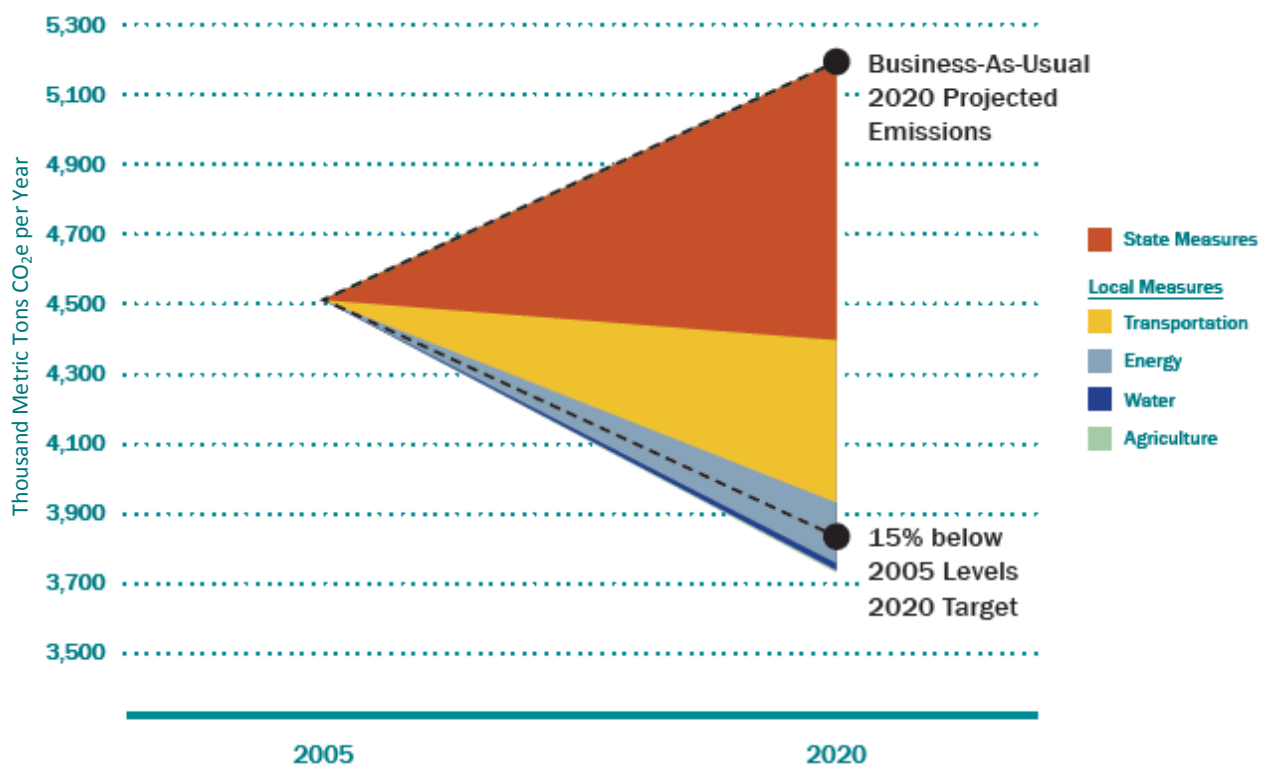


Table D.1 | Summary Table of 2020 GHG Reduction Measures

CAP Measure Number	Measure	Reductions from 2020 BAU MT CO ₂ e/YR	Scaled Measure Performance (% reduction in GHG emissions)
Water			
W1	Conserving Water	20,200	1.4%
Energy			
E1	Energy Efficiency for New Development	12,997	0.9%
E2.1	Residential Building Retrofits	27,999	1.9%
E2.2	Commercial Building Retrofits	5,257	0.4%
E3	Appliance Upgrade	20,060	1.4%
E4	Smart Meters	8,880	0.6%
R1	Solar Water Heating	37,618	2.6%
R2	Alternative Energy Systems	45,290	3.1%
Land Use			
LU1	Mixed-Use Development	124,180	8.5%
Transportation			
T1	Increase Transit Use	62,090	4.2%
T2	Increase Biking and Walking	93,135	6.4%
T3	Increase Ride Sharing	93,135	6.4%
T4	Electric Vehicles	93,135	6.4%
Agriculture			
A1	Nitrogen Optimization	199	0.0%
A2	Field Equipment Fuel Efficiency	4,433	0.3%
A3	Agriculture Irrigation Pump Efficiency	1,826	0.1%
Landscaping and Open Space			
LS1	Plant Trees	2,475	0.3%
TOTAL COUNTY ACTION		652,909	44%
State and Federal			
SF1	Pavley I & II - Passenger Auto and Light Truck Fuel Efficiency	416,210	28.4%
SF2	Low Carbon Fuel Standard	175,075	12.0%
SF3	Renewable Portfolio Standard	200,665	13.7%
SF4	T-4 Tire Pressure Program	8,482	0.6%
SF5	T-7 Heavy-Duty Vehicle GHG Emission Reduction Measure – Aerodynamic	9,753	0.7%
TOTAL STATE AND FEDERAL ACTION		810,185	55%
TOTAL REDUCTIONS (COUNTY, STATE, AND FEDERAL ACTIONS)		1,463,094	100%
Percent Reduction from 2005 Baseline		17.4%	

Appendix Format

Sector Name

Measure Number – Title (S = Supporting Measure)

Goal (Performance indicator)

Methodology description

Sectors

Landscaping and Open Space

LS1 – Plant Trees

Plant 10,000 trees throughout the unincorporated area of the County.

Quantification of carbon reductions associated with this measure is based on both the mitigated carbon from energy savings associated with having shade trees near residential and commercial properties and the carbon sequestered in the trees themselves. Carbon savings from reduced energy consumption assumes that planting guidelines, which control the types of trees that are planted and where they are placed around the house, are followed to ensure that the trees reduce the cooling load and electrical usage of the home. Based on these guidelines, it is assumed that the average home will save 1,696 MT CO₂e from energy savings per year and 779 MT CO₂e per year through sequestration. Carbon sequestration rates specific to the species and age of the planted trees were used to calculate the annual sequestration potential of the trees from 2010 to 2020.

Participation Rate (number of trees planted)	Efficiency – Percent of Residential and Commercial Energy Reduction	Efficiency – Amount of Carbon (MT CO ₂ e/year) Sequestered Annually	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
10,000	0.34%	779	2,475	0.3%
Source: Center for Urban Forest Research Tree Carbon Calculator (U.S. Forest Service and California Department of Forestry: http://www.fs.fed.us/ccrc/topics/urban-forests/ctcc/)				

Water

W1 – Conserving Water

Reduce per capita water consumption by 20%.

This measure evaluates the energy and emissions savings that will come from achieving the 20% reduction in the per-capita water usage goal of The Water Conservation Act of 2009 (Senate Bill [SB] 7X 7). The energy savings associated with this measure are from the decreased need to pump, treat, and distribute water. This process is energy intensive, with the typical indoor treated water consuming 13,021 kilowatt hours (kWh) per 1 million gallons to reach County residents.

Participation Rate	Efficiency – Reduction in Per Capita Water Usage	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
100%	20%	20,200	1.4%

Energy

E1 – Efficiency Requirements for New Development

Encourage new construction to meet voluntary energy efficiency standards that are 15% above 2008 Title 24 standards (will become required in 2015).

This measure focuses on the energy efficiency of new buildings that will be built in the unincorporated County. By encouraging developers and builders to exceed the state Title 24 mandate for energy efficiency by 15%, the County will be reducing the annual energy consumption of those building for their operational life. Until this measure becomes mandatory in 2015, it is assumed that 10% of the buildings will meet this higher standard; after 2015, that participation rate is assumed to increase to 100%.

Participation Rate	Efficiency	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
10% until 2015 100% after 2015	15% above Title 24 standards	Commercial: 5,168 Residential: 7,829	Commercial: 0.5% Residential: 0.4%
Source: AECOM 2011			

E2.1 – Residential Energy Efficiency Retrofits

Perform energy efficiency retrofits in 15% of existing residential buildings.

Because of the age of the County's building stock and the significant energy savings potential of increasing the efficiency of older homes, only homes older than 2002 were included in the GHG reduction calculations. To quantify energy savings from improving the energy efficiency of existing buildings, it was assumed that 15% of residential buildings will undergo either basic energy efficiency improvements (insulation installation/upgrade, duct sealing, and air conditioning refrigerant recharge) or more advanced

energy efficiency improvements (heating, ventilation, and air conditioning replacement; wall insulation; and/or water heater replacement). While the specific energy savings of each project will vary based on the individual specifications of each home, including age, type, and condition of the building, and the applied measure(s), this measure assumes that, on average, there will be a 35% energy efficiency improvement.

Participation Rate	Efficiency	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
15%	Savings vary per residential type and building vintage	27,999	1.9%
Source: AECOM SSIMe Model			

E2.2 – Existing Commercial Buildings

Improve efficiency of lighting in commercial building by 40%.

This measure assumes that 30% of commercial units built before 2002 will increase the energy efficiency of their lighting by 40%.

Participation Rate	Efficiency	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
30%	40%	5,257	0.4%
Source: CAPCOA Report, Quantifying Greenhouse Gas Mitigation Measures, August 2010			

E3 – Appliance Upgrade

Replace existing appliances with Energy-Star-qualified appliances in 40% of existing homes and 95% of new homes.

This measure encourages homeowners to replace older appliances such as refrigerators, dishwashers, clothes washers, and light bulbs with newer energy-efficient models. It assumes that each house will replace 20 incandescent light bulbs with 20 compact florescent light bulbs and one of the other appliance types with an energy-efficient model. Combined, these improvements will save 1,780 kWh annually. The Energy Star appliances modeled and annual energy savings are as follows: refrigerator – 120 kWh, dishwasher – 480 kWh, clothes washer – 540 kWh, and light bulbs – 640 kWh. Other Energy Star appliances that can help to meet or exceed this target are freezers, air purifiers, water coolers, and dehumidifiers.

Participation Rate	Efficiency – Average Increase in Efficiency of New Appliances	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
40% of existing homes 95% of new homes	Variable	20,060	1.4%
Sources: CAPCOA Report, Quantifying Greenhouse Gas Mitigation, August 2010			

E4 – Smart Meter

Help County residents conserve energy by using the enhanced features of their new Smart Meters.

It is assumed that, with more detailed and relevant information about their electrical consumption, 10% of existing residential and commercial energy users will use Smart Meter technology to reduce their electricity consumption by 5%; another 10% of new residential and commercial energy users will be able to further integrate this information into their homes and reduce their electricity consumption by 6%.

Participation Rate	Efficiency (% of reductions in electrical usage)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
10%	5% for users in existing buildings 6% for users in new buildings	8,880	0.6%
Source: Baer, Walter S., Brent Fulton, and Sergej Mahnovski. 2004. Estimating the Benefits of the GridWise Initiative Phase I Report TR-160-PNNL, May 2004, Prepared for the Pacific Northwest National Laboratory			

R1 – Solar Hot Water Heating

Install solar hot water heating systems on 19% of residential and commercial buildings.

This measure assumes that 19% of commercial water heaters will be converted to solar heaters. Looking at the commercial sector in more detail, this translates to 60% of colleges/schools and 10% of retail, office, and all other commercial users converting to solar hot water heating. To quantify GHG reductions from this measure, it was assumed that by using solar hot water heating, commercial users could reduce energy consumption for heating water by 59%. For the residential sector, it was also assumed that 19% of users would convert to solar hot water heating. Solar hot water heaters better fit the energy use patterns of residential users, so they would be able to reduce their energy consumption for water heating by 70%.

Participation Rate	Efficiency (% of reductions in energy usage)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
19%	59% for commercial users 70% for residential users	37,618	2.6%
Source: AECOM SSIMe Building Energy Analysis, 2011			

R2 – Alternative Energy Systems

Install photovoltaic (PV) systems to generate 5% of existing residential electricity and cover 5.5 million square feet of commercial owned property.

To calculate residential savings, it was assumed that 5% of electricity in existing homes would be met through PV systems.

For commercial/industrial PV systems, a bottom-up calculation was performed assuming a system efficiency of 10 watts per square foot and solar irradiance of 18 kWh per square foot per year (SolarEstimate 2010) (assuming an average of 5 hours of operation per day per year). The 2005 San Diego Gas & Electric's (SDG&E) emissions factor was multiplied by solar irradiance to calculate the reduction potential of the proposed PV systems in pounds of CO₂e per square foot PV per year. This reduction potential was then multiplied by the assumed 5,500,000 square feet of panel area to calculate total emissions reductions.

Participation Rate	Efficiency	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
Residential: 5% Commercial: 55 megawatts (5.5 million square feet) or 8%	Commercial: 10 watts per square foot, 5 hours per day	Residential: 16,821 Commercial: 28,469	Residential: 1.2% Commercial: 1.9%
Source: Solar Estimate. Energy Matters. Solar and Wind Energy Calculations. Available at http://www.solarestimate.org/ . Accessed August 2011			

Land Use

LU1 – Mixed-Use Development

Encourage high-density and mixed-use development, especially when located near existing employment areas.

This measure aims to reduce the amount of miles that community members must drive to meet the needs of daily living. The large area of the County lends itself to clustering mixed uses together and around existing employment centers to allow residents to perform tasks while reducing the need or distance to drive. These changes to land-use patterns are assumed to create a 4% decrease in overall vehicle miles

traveled (VMT). Because this measure will only change the composition and location of future development and redevelopment, of which no more than 25% is expected to occur in high-density areas, the estimated reduction in VMT and emissions comes from decreases in new VMT generated by the new developments and redevelopments only.

Participation Rate (% of new development that will occur in high density areas)	Efficiency (% VMT reductions)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
25%	4%	124,180	8.2%
Sources: Boarnet, Marlon, and Susan Handy. 2010. Draft Policy Brief on the Impacts of Residential Density Based on a Review of the Empirical Literature. Available at http://arb.ca.gov/cc/sb375/policies/policies.htm. Table 1. Ewing, R., and R. Cervero. 2010. Travel and the Built Environment – A Meta-Analysis. <i>Journal of the American Planning Association</i>. Table 4. Fehr & Peers Associates. 2001. Index 4D Method. <i>A Quick-Response Method of Estimating Travel Impacts from Land-Use Changes</i>. Technical Memorandum prepared by Criterion Planner/Engineers for USEPA, October. Nelson/Nygaard, 2005. Crediting Low-Traffic Developments (p.12). Available at http://www.montgomeryplanning.org/transportation/documents/TripGenerationAnalysisUsingURBEMIS.pdf. Song, Y., and G. Knaap. 2004. Measuring the Effects of Mixed Land Uses on Housing Values. <i>Regional Science and Urban Economics</i> 34, 663–680 (p. 669). Available at http://urban.csuohio.edu/~sugie/papers/RSUE/RSUE2005_Measuring%20the%20effects%20of%20mixed%20land%20use.pdf. TRB. 2009. <i>Driving and the Built Environment</i>, Transportation Research Board Special Report 298 (p. 4). Available at http://onlinepubs.trb.org/Onlinepubs/sr/sr298.pdf. Accessed March 2010.			

Transportation

T1 – Increase Transit Use

Increase transit use in transportation mode share.

This measure requires the County to increase the number of residents who use transit for their transportation needs. This will be achieved through two strategies: improving transit facilities and promoting the use of the transit network. The estimated VMT reductions from this strategy range from 1% to 8%, and are derived from estimates of transit service improvement. As this strategy would involve a promotional campaign and improvements to transit facilities, the level of effectiveness was assumed to result in a 2% VMT reduction.

Participation Rate (increased transit ridership)	Efficiency (% VMT reductions)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
2%	2%	62,090	4.1%
Sources: Transit Cooperative Research Program. TCRP 27 – Building Transit Ridership: An Exploration of Transit's Market Share and the Public Policies That Influence It (p.47-48). 1997. Ewing, et al, 2008. Growing Cooler – The Evidence on Urban Development and Climate Change. Urban Land Institute			

T2 – Increase Biking and Walking

Increase the pedestrian and bicycle transportation mode share.

Quantification of this measure assumes that implementation would result in a 3% mode shift from single-occupancy vehicles to bicycle travel and walking. This will be achieved through three targeted strategies: expanding the pedestrian network, promoting road sharing, and developing off-street bicycle facilities. According to the CAPCOA Quantification Report, pedestrian network improvements can yield a VMT reduction of 2%. As these improvements are limited in scale to selected areas of the County, the more limited VMT reduction at 2% was applied to the analysis. Additional research has also shown that adding bicycle facilities can increase the percentage of commuters who travel by bicycle. This increase is generally small (1% or less), and typically occurs with the construction or designation of new bicycle lanes. As such, it was assumed that the emissions-reduction benefits of this strategy would be a 1% decrease in VMT, as this represents the typical experience observed. It was assumed that the County would expand its existing facilities to provide a 50% increase in the number of bicycle and pedestrian facilities.

Participation Rate (% increase of bicycle and pedestrian facilities)	Efficiency (% VMT reductions)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
50%	3%	93,135	6.2%
Sources: 1000 Friends of Oregon. 1997. Making the Connections: A Summary of the LUTRAQ Project (p. 16). Available at http://www.onethousandfriendsoforegon.org/resources/lut_vol7.html . Cambridge Systematics. <i>Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions</i> . Technical Appendices. Prepared for the Urban Land Institute. Available at http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendix%20B_Effectiveness_102209.pdf . Center for Clean Air Policy (CCAP). Transportation Emission Guidebook. Available at http://www.ccap.org/safe/guidebook/guide_complete.html . Dill, Jennifer, and Theresa Carr. 2003. Bicycle Commuting and Facilities in Major U.S. Cities: If You Build Them, Commuters Will Use Them – Another Look. <i>TRB 2003 Annual Meeting CD-ROM</i> .			

Nelson, Arthur, and David Allen. 1997. If You Build Them, Commuters Will Use Them; Cross-Sectional Analysis of Commuters and Bicycle Facilities. *Transportation Research Record* 1578.

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Sacramento Metropolitan Air Quality Management District (SMAQMD). Recommended Guidance for Land Use Emission Reductions (p. 11). Available at <http://www.airquality.org/ceqa/GuidanceLUeMissionReductions.pdf>.

T3 – Increase Ride Sharing

Increase the number of employers that allow and offer amenities to encourage alternate commuting strategies that reduce VMT for employee commute.

Travel demand management (TDM) includes those measures that are designed to reduce travel needs, particularly those oriented around travel to and from employment. Some potential strategies that employers might implement are to expand and promote use of existing voluntary commute-trip-reduction programs, offer end-of -trip facilities (e.g., showers, lockers, bike storage), allow/promote telecommuting, and expand ride-share programs. It was assumed that no more than 50% of all potential private employers would implement these strategies. Empirical studies have shown that these TDM programs can have a maximum effectiveness of 6% in terms of commute activity VMT, based on the studies of various sites where these voluntary programs are implemented. One major limitation of this calculation is that these TDM reductions only apply to trips at the employment end; therefore, reduction in County-wide VMT should take into account the percentage contribution that employee trips make to overall County-wide travel. Estimates of employee travel indicate that only half of the County's VMT is attributable to employee travel. As a result, the potential effectiveness of this strategy was reduced by 50% to 3% for maximum potential effectiveness. Based on conservative participation rates in TDM programs, the effectiveness of this strategy was further reduced to approximately 2%. In addition, the effectiveness of a program oriented toward County residents to encourage their participation in the iCommute program, telecommuting, and other TDM strategies was considered. This strategy was determined to have an effectiveness of 1%, since it is unlikely that residents would be able to make major changes in their work-related travel behavior without the concurrence of their employers.

Participation Rate (percentage of employers using TDM)	Efficiency (% VMT reductions)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
50%	3%	93,135	6.2%
Sources:			
Center for Clean Air Policy (CCAP). <i>CCAP Transportation Emission Guidebook</i> . TIAX Results of 2005 Literature Search Conducted by TIAX on behalf of SMAQMD. Available at http://www.ccap.org/safe/guidebook/guide_complete.html .			
Herzog, Erik, Stacey Bricka, Lucie Audette, and Jeffra Rockwell. 2006. Do Employee Commuter Benefits Reduce Vehicle Emissions and Fuel Consumption? Results of Fall 2004 Survey of Best Workplaces for Commuters. <i>Transportation Research Record</i> 1956, 34–41. (Table 8).			
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T4 – Electric Vehicles

Decrease emissions associated with VMT by increasing the number of clean fuel vehicles, such as electric vehicles.

Some level of electric-vehicle adoption is already assumed in the analysis of other GHG-reduction measures, and would occur through implementation of the Pavley Fuel Efficiency Standards. This strategy is geared toward increasing the purchase and use of electric vehicles beyond what would be expected through existing policies. To quantify emissions reductions from this measure, it was assumed that there would be an increase of 15% in the population of County residents purchasing electric vehicles. The CAPCOA Quantification Report indicates that use of an electric vehicle compared to a traditional gasoline-powered vehicle reduces emissions on a per-VMT basis by approximately 20%. This reduction occurs as the GHG emissions associated with a gasoline vehicle are replaced by an electric car, which must obtain its electricity from traditional power sources, which also result in GHG emissions. If electricity were produced from alternative sources, the GHG reductions would be 100% instead of 20%.

Participation Rate (% increase in electric vehicle purchase)	Efficiency (% VMT reductions)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
15%	3%	93,135	6.2%
Sources: California Air Resources Board. EMFAC2007. Available at http://www.arb.ca.gov/msei/onroad/latest_version.htm . US Department of Energy. 2010. Alternative and Advanced Fuels – Fuel Properties. Available at http://www.afdc.energy.gov/afdc/fuels/properties.html .			

Agriculture

A1 – Nitrogen Optimization

Decrease the nitrogen fertilizer applied by 5% of County farmers by 20% each.

This measure assumes that 5% of farmers in the County will use new methods and reduce nitrogen fertilizer usage by 20%.

Participation Rate	Efficiency (% less fertilizer applied on crops)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
5%	20%	199	0.0%
Source: U.C. Davis. Agricultural and Resource Economics. Available at http://coststudies.ucdavis.edu/current.php .			

A2 – Field Equipment Fuel Efficiency

Increase the efficiency of 35% of the farm equipment used in the County by 15%.

This measure assumes that, through better maintenance and other best practices, farmers in the County can increase the efficiency of 35% of their farm equipment by 15%.

Participation Rate	Efficiency (% less energy used in farm equipment)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
35%	15%	4,433	0.3%
Source: AECOM 2011			

A3 – Agriculture Irrigation Pump Efficiency

Increase the efficiency of 40% of the irrigation pumps in the County by 50%.

This measure assumes that, by using newer technology and with consistent maintenance, 40% of the agriculture irrigation pumps in the County will be able to increase efficiency by 50%.

Participation Rate	Efficiency (% less energy used)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
40%	50%	1,826	0.1%
Source: California Agricultural Water Electrical Energy Requirements Final Report. December 2003. ITRC Report No. R 03-006.			

State and Federal

SF1 – Pavley I & II: Passenger Auto and Light-Truck Fuel Efficiency

Assembly Bill (AB) 1493, California's mobile-source GHG emissions regulations for passenger vehicles, was signed into law in 2002. The GHG reductions associated with AB 1493 that would affect the County in 2020 were calculated using the California Air Resource Board's (ARB) *Pavley I + Low Carbon Fuel Standard Postprocessor* Version 1.0 (ARB 2010). This model applies an approximately 13.7% reduction to on-road mobile-source GHG emissions for AB 1493 in 2020 in the County (ARB 2010). Emissions reductions from Pavley II were estimated using a 54.5 miles-per-gallon estimate in 2025, and integration of the model year 2017–2025 standards.

Participation Rate	Efficiency (% increase in MPG)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
100%	13.7%	416,210	28.4%
Sources: AECOM 2012 <i>Pavley I + Low Carbon Fuel Standard Postprocessor</i> Version 1.0.			

SF2 – Low Carbon Fuel Standard

The Low Carbon Fuel Standard (LCFS) was designed to accelerate the availability and diversity of low-carbon fuels and reduce the carbon intensity of fuels used within California. ARB's *Pavley I + Low Carbon Fuel Standard Postprocessor* Version 1.0 was used to quantify the GHG reductions from the LCFS that would apply to the County in 2020. This model applies an approximately 6.5% reduction to on-road mobile-source GHG emissions for 2020 in the County (ARB 2010).

Participation Rate	Efficiency (% decrease in carbon intensity of transportation fuels)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
100%	6.5%	175,075	12.0%
Source: Pavley I + Low Carbon Fuel Standard Postprocessor Version 1.0			

SF3 – Renewable Portfolio Standard

Established in 2002 under SB 1078 and accelerated in 2006 under SB 107, California set a Renewable Portfolio Standard (RPS) goal for investor-owned utilities to procure 20% of electricity from eligible renewable energy resources by 2010. This goal increased to 33% by Executive Order S-21-09, signed in 2009. The GHG reductions in this measure are based on the 2005 SDG&E RPS of 5.2%, and the assumption that SDG&E will achieve the mandated RPS of 33% by 2020.

Participation Rate	Efficiency (% increase in RPS)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
100%	33%	200,665	13.7%
Source: California Public Utilities Commission. California's Renewable Portfolio Standard. Available at www.cpuc.ca.gov/PUC/energy/Renewables/ .			

SF4 – Tire Pressure Program

ARB's Tire Pressure Regulation took effect in September 2010. For this measure, it was assumed that vehicles operating with under-inflated tires would be inflated to the recommended tire pressure rating any time they are taken in for maintenance or repair service. The energy efficiency of passenger vehicles was determined based on the estimated reductions from the Scoping Plan and scaled to the County.

Participation Rate	Efficiency (% decrease in fuel usage)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
100%	0.6%	8,482	0.6%
Source: California Environmental Protection Agency. Air Resources Board. Tire Pressure Regulation. Available at www.arb.ca.gov/cc/tire-pressure/tire-pressure.htm .			

SF5 – Heavy-Duty-Vehicle GHG Emissions-Reduction Measure – Aerodynamic

In December 2008, ARB adopted a new regulation to reduce GHG emissions by improving the fuel efficiency of heavy-duty tractors that pull 53-foot or longer box-type trailers. To measure the emissions reductions from this measure, it was assumed that all required vehicles are retrofitted to include fuel savings improvements in tractor and trailer aerodynamics and in the use of low-rolling-resistance tires. Efficiency was determined by ARB at the time of rulemaking for statewide reductions and scaled to the County.

Participation Rate	Efficiency (% decrease in fuel usage)	GHG Reduction (MT CO ₂ e/year)	Scaled Measure Performance (% reduction in GHG emissions)
100%	1.7%	9,753	0.7%
Source: California Environmental Protection Agency. Air Resources Board. Heavy-Duty-Vehicle Greenhouse Gas Regulation. Available at http://www.arb.ca.gov/cc/hdghg/hdghg.htm .			

APPENDIX E: RESIDENTIAL AND COMMERCIAL USER'S GUIDE

This appendix looks at what individual residents and businesses can do to help the County of San Diego (County) reach its community-wide greenhouse gas (GHG) reduction goal. Because GHG emissions are a global pollutant, it is vital that individuals look at their own actions and what they can do to conserve energy and reduce carbon emissions. This guide provides information about local programs and resources to help residents and commercial operators take the actions that are described in the Climate Action Plan (CAP). The information provided relates to current programs that may change or end before the CAP is revised, and, therefore, residents and commercial operators should check other resources for changes and updates to programs. This list also serves as a starting point for sustainable action; there are many more organizations and programs that are working to assist residents and businesses to combat climate change.

Water

According to the San Diego County Water Authority's (SDCWA) 2009 annual report, only 18% of the water it supplies to San Diego is from local sources; this means that much of the water consumed in the County has to be pumped great distances. Pumping uses a lot of electricity, which generates numerous GHG emissions. Conserving water in homes and businesses helps to conserve limited resources and reduce costs. Conserving also helps to save electricity and reduce carbon emissions associated with bringing water to the area.

Resources & Programs

San Diego County Water Authority: As the regional wholesaler of water in the County, SDCWA helps member water agencies promote water conservation by providing rebates for clothes washers, rotating spray nozzles, and smart irrigation controllers.

Local Water Districts: There are many water districts in the unincorporated areas of the County. These utilities not only supply water, but also supply ideas, incentives, and assistance to reduce water consumption. One available resource is the free "Smart Landscape Evaluations," provided by the Lakeside Water District. To find your water district, go to the SDCWA website (listed below) and select the "Your Local Water District" option. This is the first step in identifying what actions you can take to reduce your water usage and costs.

CAP Measure	Program & Resource	
San Diego County Water Authority (SDCWA)		
W1	Website:	www.20gallonchallenge.com
	Phone:	(858) 522-6600
Your Local Water District		
W1	Website:	www.sdcwa.org/member-agencies

Did You Know?

- The average San Diegan used 143 gallons of water a day. It takes 1.3 kilowatt hours (kWh) of electricity to transport, treat, and distribute that water—the same amount of energy as leaving 55 standard 23-Watt compact fluorescent lamp bulbs on for 1 hour.

Energy

Residents and businesses use energy to perform many tasks that are essential to their daily routines. These tasks release GHGs, which contribute to climate change. By increasing the energy efficiency of these activities, home and business owners can reduce utility bills while making San Diego County a cleaner, more energy-independent place.

Resources & Programs

San Diego Gas & Electric (SDG&E): As the provider of both electricity and natural gas in San Diego County, SDG&E has many programs to assist residents and business in saving energy. Below are a few of the most popular efficiency programs. For a full list, visit the SDG&E website or call the Energy Information Center (EIC).

Contact information:
(800) 644-6133 (EIC)
www.SDGE.com

Residential Programs

Participation in energy-reduction programs can result in cost savings. The programs described below enable residents to more effectively monitor energy consumption and receive rebates for upgrading to energy-efficient products.

Evaluate and Monitor Energy Usage: The first step in reducing energy consumption is to know how it is used. SDG&E provides tools like the free “Home Energy and Water Efficiency Survey,” which evaluates how energy is used and provides a personalized list of detailed next-steps to take to reduce energy usage. Residents can also use the new Smart Meter to access hourly electricity-use data through the “Energy Charts” online program. By reviewing energy usage per hour instead of per month, consistent energy-use spikes can be identified and behaviors associated with those spikes can be modified. Residents can also look at energy use compared to neighbors and in relation to local weather conditions.

CAP Measure	Program & Resource	
Home Energy Efficiency Survey		
E1-E3	Website	https://energyaudit-sdge.sempra.com
Energy Charts		
E4	Three steps to view data	1. Log onto “My Account” at https://myaccount.sdge.com 2. Select the “My Energy” tab 3. Click on “View Energy Use Charts”

Rebate Programs: Once residents know how they use energy and what they can do to reduce energy consumption, SDG&E offers incentives and rebates to help them take action.

SDG&E provides mail-in rebates for the following energy-efficient products: refrigerators, pool pumps, window air conditioning (AC) units, attic and wall insulation, clothes washers, whole-house fans, and dishwashers. Some retailers also provide these instantly at the point of purchase; to view a complete list of participating retailers, visit the website listed below.

Homes work as a system, with different parts interacting with each other. These interactions make it important to look at all parts of a home when making improvements. For example, a new, high-efficiency heater will continue to waste energy by heating the attic and not living spaces if air ducts are old, leaky, or disconnected. To promote more holistic energy improvements, the state of California is working with SDG&E, the California Center for Sustainable Energy (CCSE), and local contractors to provide incentives of up to \$4,000 to diagnose and fix inefficient aspects of residences. There are also financing options to help homeowners overcome the upfront costs of making multiple improvements at once.

CAP Measure	Program & Resource	
Home Energy-Efficiency Rebates		
E2.1-E3	Website:	www.sdge.com/residential/singleFamilyRebate.shtml
Energy Upgrade California		
E2.1-E3	Website:	www.energyupgradeca.org

Saving in the Summer: Cooling homes in the summer can drive up electricity bills and stress the electricity grid. To alleviate the system during peak-demand periods, SDG&E has two programs to reduce energy consumption during hot periods.

Just like in a car, if the AC in a home is not running at peak performance, it could increase operating costs by using more energy. A poorly tuned system also causes irregular wear on AC components. Even new systems that are set up incorrectly will run below peak performance. The AC TIME Program offers two **free** services to improve the energy efficiency level of AC systems: Refrigerant Charge & Airflow Test and Duct Test & Seal.

Another way to reduce energy consumption and help alleviate strain on the electrical grid is to simply turn off AC systems when the grid is close to capacity. SDG&E created the Summer Saver program to assist residents in conserving energy during these peak events. Technicians install a small Summer Saver device on the AC units of residents who sign up for the program. This device is activated remotely by a paging signal that lets SDG&E cycle central air conditioners “on and off” for a few hours on a limited number of summer days when demand for electricity is at a peak. This helps maintain electric reliability during periods of high demand. In return, SDG&E offers **an annual credit of up to \$194**.

CAP Measure		Program & Resource	
AC TIME Program			
E2.1	Website:	www.actimeprogram.com	
	Phone:	(800) 289-2440	
Summer Saver Program			
	Website:	www.sdge.com/vendor/summersaver	
	Phone:	(800) 850-1705	

Business Programs

County businesses that save energy will not only help mitigate climate change, but also increase profits. SDG&E has several energy efficiency programs targeted at helping businesses become more energy efficient and profitable.

Rebates and Incentives: Just as SDG&E offers residential customers rebates for purchasing qualified energy-efficient products, it also offers businesses rebates and incentives for purchasing energy-efficient equipment. The “Energy Efficiency Business Rebate” program provides traditional product rebates that businesses can qualify for through the replacement of old, inefficient equipment with new energy-efficient equipment. This program focuses on common equipment that exists in many businesses. For a full list of qualifying products, see the rebate catalog on the SDG&E website or call the EIC.

Because different businesses use energy in different ways, SDG&E created the “Energy Efficiency Business Incentive” and “Energy Savings Bid” programs to be more flexible and allow businesses to customize energy efficiency improvements to their unique situations. Unlike the rebate program, these programs provide businesses a set amount of cash back per kWh or therm that they save. This is similar to the “Savings By Design” and “Sustainable Communities” programs that aim to increase energy efficiency in new construction. Together, these programs can help replace old equipment with new energy-efficiency equipment, and also increase business profits.

Financing: Even after rebates and incentives, many energy-efficiency improvements require high up-front cost and provide low, but long-term, savings. To help businesses, SDG&E created “On-Bill Financing,” a **0% interest financing** program. To qualify, businesses must have an active SDG&E account, be in good standing for at least 2 years with the same business, and participate in one of the SDG&E energy efficiency programs. Because some on-site pre-inspection may be required, businesses need to let their contractor and SDG&E know that they would like to participate in the financing program before initiating a project. Once the improvements have been made, businesses are charged for the loan on their SDG&E bill. In many cases, because of the quantity of energy savings, even after the addition of the loan payment, the SDG&E bill will still be lower than before the improvements were made. This program allows businesses to save money while modernizing their equipment.

Direct Install: Some small business owners do not have time to evaluate their business energy usage and to make the needed changes. For those busy businesses with limited resources, SDG&E created the “Direct Install” program, which offers a no-cost energy audit of the business, provides individual analysis of the findings, and works with the business to make recommended improvements. Because this service is offered to many different businesses, it focuses on common improvements for various business sectors, such as improving efficiency of incandescent or florescent lights and maintaining heating, ventilation and air conditioning (HVAC) systems. For a full list of qualifying free improvements, businesses can visit the program website or call a participating contractor.

CAP Measure	Program & Resource	
Energy Efficiency Business Rebate		
E2.2	Website:	www.sdge.com/business/rebatesincentives/programs/energyEfficiency.shtml
Energy Efficiency Business Incentive		
E2.2	Website:	www.sdge.com/business/rebatesincentives/programs/standardPerformanceContract.shtml
On-Bill Financing		
E2.2	Website:	www.sdge.com/business/rebatesincentives/programs/onbillfinancing.shtml
Direct Install		
E2.2	Website:	www.sdge.com/business/rebatesincentives/programs/directinstall.shtml

California Center for Sustainability: CCSE is a non-profit organization dedicated to creating change for a clean-energy future. It offers free workshops, administers incentive programs, hosts special events, and offers technical assistance.

Contact information:

(858) 244-1177

www.energycenter.org

California Solar Initiative: The California Solar Initiative (CSI) is the California solar rebate program for customers of the investor-owned utilities Pacific Gas & Electric, Southern California Edison, and SDG&E. Through the CSI, the California Public Utilities Commission is providing \$2.1 billion to businesses, nonprofit organizations, public agencies, and homeowners to help lower their energy costs, reduce their reliance on fossil-fuel-fed power plants, and create a sustainable energy future through the use of solar technology. CCSE administers the CSI program in the SDG&E service territory. Businesses and residents can go online, call CSI, or attend a free workshop to find out how to install solar and become more energy independent.

California Solar Initiative – Thermal Program: Solar water heating (SWH) systems reduce GHG emissions and conserve fossil fuel resources while cutting energy use and saving money on utility bills. Systems can offset up to 75% of the natural gas, electricity, or propane used by traditional water heaters. SWH systems work to supplement existing water heaters, so they do not need to be replaced or removed. The CSI-Thermal Program offers cash rebates of up to \$1,875 for solar water heating systems on single-family homes. Multi-family and commercial properties qualify for rebates of up to \$500,000.

CAP Measure	Program & Resource	
California Solar Initiative – Thermal Program		
R.1	Website:	www.energycenter.org/swh
California Solar Initiative		
R.2	Website:	https://energycenter.org/index.php/incentive-programs/california-solar-initiative or www.gosolarcalifornia.org

Transportation

Transportation is the largest emissions sector in the County's baseline GHG emissions inventory, and represents an essential part of many residents' daily lives. While the majority of transportation needs in the County are met using single-occupancy vehicles, other options exist that result in fewer GHG emissions. These options include ridesharing, biking, walking, using transit, and telecommuting. There are also efforts underway toward changing the efficiency (miles per gallon) of vehicles and the carbon intensity of fuel used in the vehicles. Some examples of these efforts include converting to electric (or hybrid), natural gas, or biofuel-powered vehicles. It is a goal of this CAP to expand these alternative transportation strategies for the creation of a more sustainable and connected community.

Resources & Programs

San Diego Association of Governments (SANDAG): As the regional transportation planning agency, SANDAG secures millions of dollars each year in local, state, and federal funds for the region's transportation network. SANDAG develops the Regional Transportation Plan to implement a long-range vision for buses, the Trolley, rail, highways, major streets, bicycle travel, walking, goods movement, and airport services. It is a resource for information and incentives to change how people and goods are transported.

iCommute: This program offers resources for employees and employers who participate in alternative commuting programs. Through the iCommute program, SANDAG offers free carpool and ridematching services, a subsidized vanpool program, transit solutions, regional support for bicycling, the Guaranteed Ride Home program, SchoolPool carpooling programs for parents, and information about teleworking.

CAP Measure	Program & Resource	
	iCommute	
T1-3	Website:	www.icommutesd.com
	Phone:	call 511 and say "iCommute"

California Center for Sustainability: In addition to administering the CSI, CCSE also administers incentives for the Clean Vehicle Rebate Project, with funding provided by the California Environmental Protection Agency's Air Resources Board. This program offers rebates for individuals and business owners who purchase or lease new, eligible zero-emission or plug-in hybrid electric vehicles. CCSE also hosts regional events, workshops, and training to help residents discover how many alternative transportation options there are and how they can best take advantage of them.

CAP Measure	Program & Resource	
	Clean Vehicle Rebate Project	
T.4	Website:	www.energycenter.org/index.php/incentive-programs/clean-vehicle-rebate-project

Landscaping and Open Space

Planting trees can help improve air and water quality, provide habitat for wildlife, reduce the urban heat island effect, and help keep homes cool in the summer, thereby reducing energy consumption.

By following these tips, residences can maximize energy savings from planted trees:

- Design an overall shade tree plan, including energy savers such as planting for shading windows, doors, air conditioners, patios, and driveways.
- Plant **only** deciduous trees (not evergreen trees) on the south sides of the building. This allows the sun to warm the home during winter months.
- Plant evergreen or deciduous trees on the east and west sides of the home to produce shade that minimizes the impact of the summer sun.
- Always consider the existing landscaping when planting a tree, but, if possible, plant small trees 10 to 15 feet from buildings, medium trees within 30 feet, and large trees within 40 feet of buildings.

Resources & Programs

The California Center for Sustainable Energy's Advice and Technical Assistance Center (ATAC) for Urban Forestry: ATAC's primary goal is to enable and facilitate a wide range of urban forestry projects in the San Diego region. ATAC is the central meeting place for people interested in learning the how-to and best practices of urban landscaping. Through education, outreach, and technical assistance, ATAC provides information for decision-makers and citizens to help meet water conservation and GHG emissions-reduction goals.

The Water Conservation Garden at Cuyamaca College: This learning garden offers an opportunity to see trees best suited for the San Diego climate and learn about other parts of a sustainable yard through free educational classes on topics such as composting and irrigation.

CAP Measure	Program & Resource	
CCSE Advice and Technical Assistance Center (ATAC) for Urban Forestry		
LS1	Website:	www.energycenter.org/index.php/outreach-a-education/advice-and-technical-assistance-center
		or www.energycenter.org
	Phone:	(858) 244-1177
Water Conservation Garden at Cuyamaca College		
LS1	Website:	www.thegarden.org
	Phone:	(619) 660-0614

APPENDIX F: ALTERNATIVE 2035 SCENARIO

As stated in the Climate Action Plan (CAP), Executive Order S-3-05 asserts that California should reduce greenhouse gas (GHG) emissions to 80% below 1990 levels by 2050 to adequately address climate change impacts. To help ensure that the County continues along the path toward this long-range target, the County would need to reduce emissions 49% below 2005 levels by 2035. With current legislation, existing technology, and other factors, the County has developed a *feasible* scenario for 2035, which achieves 13.7% reductions below 2005 levels.

The County developed an alternative scenario to determine how the 2035 target could be met. This could only be done through additional federal, state, and local measures, many of which are ambitious given existing conditions. For example, at the local level, the County would need to implement retrofits of all existing residential units built before 2005 and achieve an average 35% increased efficiency. At the state and federal levels, additional transportation-related legislation could be implemented to achieve an average fuel efficiency among all vehicle model years of 44 miles per gallon (as opposed to the currently proposed Corporate Average Fuel Economy [CAFE] standards that would require model year 2025 vehicles to achieve an average of 49 miles per gallon), and a renewable portfolio standard of 50%. This scenario is only one of many that could be implemented to achieve the 2035 target. This illustrates the level of commitment needed at all levels of government. The CAP, its measures, and its performance targets will need to be revised as additional technological advances and legislation occur.

Table F.1 details the measures, reduction potential, and assumptions that were included to meet the 2035 target scenario (see also Figures F.1 and F.2). As described in the CAP, this scenario assumes that a similar proportion of reductions will be achieved through state/federal measures in 2035 as are achieved in 2020. Additional local measures are included in the target scenario that are not included in the CAP, such as wastewater-to-energy (biogas) programs and solid waste diversion beyond the County's current diversion rate.

Table F.1 | 2035 Scenario Achieving Target

CAP Measure #	Measure	2035 Reductions Metric Tons (MT) CO ₂ e/Yr	Assumptions	Scaled Measure Performance (% Reduction in GHG emissions)
Water				
W1	Per Capita Water Reduction	44,753	40% per capita water reduction	1.1%
	Wastewater (WW) to Energy	2,586	66,454 MT CO2e WW, 25% plant efficiency	0.1%
	Increased Solid Waste (SW) Diversion	114,575	60% diversion above current rates (~84% total SW diversion)	2.8%
Energy				
E2.1	Residential (Res.) Building Retrofits	176,867	100% pre-2005 units achieve 35% increased efficiency (elec + ng)	4.4%
E2.2	Commercial (Comm.) Building Retrofits	240,901	Whole-building retrofits achieve 25% increased efficiency (elec + ng)	5.9%
E3	Appliance Upgrades	57,197	100% pre-2005 residential units	1.4%
E4	Smart Meters	9,963	100% pre-2005 units	0.2%
R1	Solar Water Heating (Res. and Comm.)	196,635	100% participation	4.8%
R2	Alternative Energy Systems (Res. and Comm.)	130,575	10% residential elec from renewables; 200 MW commercial solar generation	3.2%
Land Use				
LU1	Mixed-Use Development	160,199	Achieve 20% VMT Reduction from 2035 BAU through Land Use / Transportation measures	3.9%
Transportation				
T1	Increase Biking and Walking	160,199		3.9%
T2	Increase Ride Sharing	160,199		3.9%
T3	Increase Transit Use	160,199		3.9%
T4	Electric Vehicles	160,199		3.9%
Agriculture				
A1	Nitrogen Optimization Program	3,531	100% participation	0.1%
A2	Field Equipment Fuel Efficiency Program	11,212	100% participation	0.3%
A3	Agriculture Irrigation Pump Efficiency	4,040	100% participation	0.1%
Landscaping and Open Space				
LS1	Plant Trees	2,475	Plant 10,000 trees 2020-2035	0.1%
TOTAL COUNTY ACTION		1,796,305		44.3%
State and Federal				
SF1	Passenger Auto and Light Truck Fuel Efficiency	1,487,373	Average Passenger/Lt Truck Vehicle Fuel Efficiency of 44 mpg	36.7%
SF2	Low Carbon Fuel Standard (Gasoline and Diesel)	366,242	40% carbon reduction in fuels	9.0%
SF3	Renewable Portfolio Standard	180,465	50% electricity from renewables	4.4%
SF4	Tire Pressure Program	5,192	No change from current standards	0.1%
SF5	Heavy-Duty Vehicle GHG Emission Reduction Measure – Aerodynamic	39,826	Increase MDV/HDV efficiency 10% beyond 2020 standards	1.0%
	Title 24 Standards	181,701	Net zero 2020-2035 res/comm energy standards	4.5%
TOTAL STATE AND FEDERAL ACTION		2,260,799		55.7%
		4,057,104		100%
TOTAL REDUCTIONS (COUNTY, STATE, AND FEDERAL ACTIONS)				
Percent Reduction below 2005 Baseline				49.1%

Notes: CO₂e = carbon dioxide equivalents; BAU = business as usual; elec = electricity; ng = natural gas; MDV = medium duty vehicle; VMT = vehicle miles traveled; MW = megawatt

Figure F.1 | 2035 Target Scenario by Emissions Reduction Measure

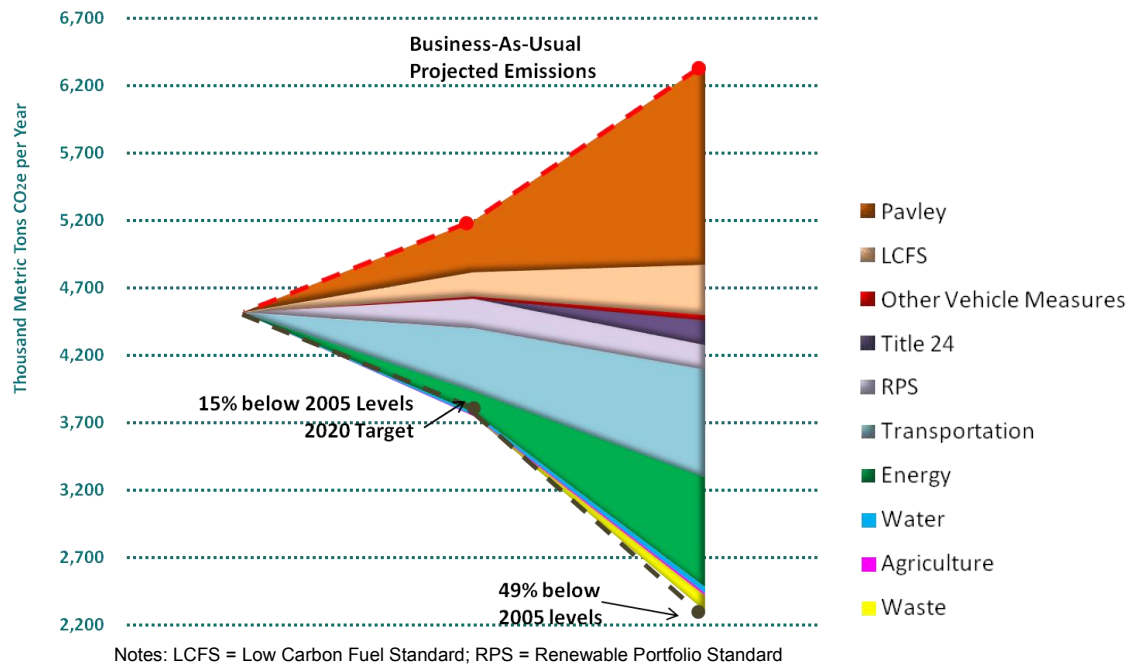
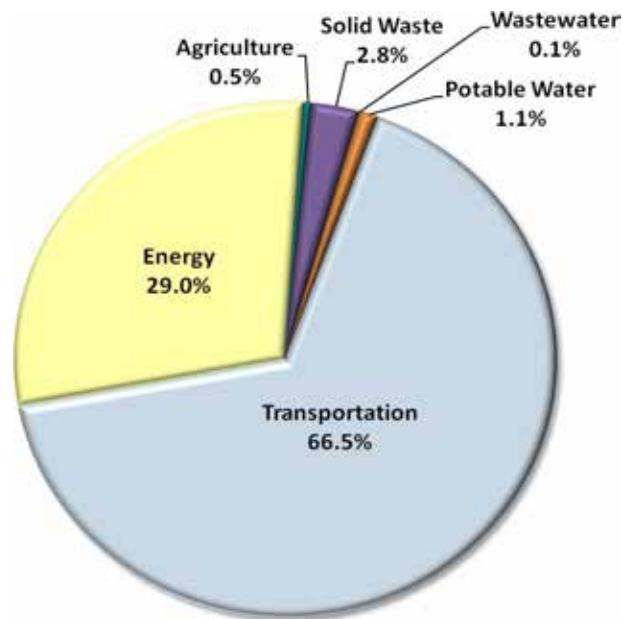


Figure F.2 | 2035 Target Scenario by Emissions Reduction Sector



APPENDIX G:

County of San Diego CAP Compliance Checklist for Greenhouse Gas Analysis

PROJECT INFORMATION

Date: _____

Project Number: _____

Project Name: _____

Project Applicant: _____

GHG Specialist: _____

Project Owner: _____

Does this project meet the screening criteria listed in Table 3 of the County of San Diego's Guidelines for Determining Significance for Climate Change, or has the project demonstrated that it is below the Bright Line Threshold, as described in the Guidelines for Determining Significance?

☐ Yes ☐ No

If Yes, project must complete the following checklist and comply with one or more (or equivalent combination¹) of the applicable Climate Action Plan (CAP) measures beyond any applicable County of San Diego (County) standards. Specify the measure(s) below.

If No, project must complete the following checklist and should comply with applicable measures listed below for the relevant project type. The project proponent must conduct a technical analysis to demonstrate that the project's design features, along with CAP measures, and, if necessary, additional measures, are incorporated to reduce emissions below the Bright Line Threshold, the Efficiency Threshold, or the Performance Threshold. The Applicability Table may be used as guidance for CAP measures, but any GHG-reducing measures may be included that achieve the Bright Line, Efficiency, or Performance Threshold.

Through the County's discretionary review process and completion of the CAP Compliance Checklist, the design features or mitigation measures applied to individual development projects are considered binding and enforceable, including those applied to projects with GHG emissions that are either above or below the Bright Line Threshold.

¹ A project must demonstrate compliance with a single CAP measure beyond any applicable County standards and requirements. If the project demonstrates one-half of one CAP measure and one-half of another CAP measure, or similar compliance with multiple CAP measures, the project may be determined to be equivalent to complying with one full measure. In these instances, the measure(s) will be subject to approval by the project reviewer. Construction-only projects that meet the Construction Screening Criteria do not need to implement a CAP measure.

General Guidance for Use in Determining Applicability of CAP Measures for Projects Under the Bright Line Threshold¹

Project Type	CAP Measures														
	E1: Energy Efficiency for New Development	E2: Building Energy Retrofits	E3: Energy Star Appliances	E4: Smart Meters	R1: Solar Water Heating	R2: Alternative Energy Systems	LU1: Mixed-Use Development	T1:Increase Transit Use	T2: Increase Walking and Biking	T3: Increase Ridesharing	T4: Alternative Fuel Vehicles	LS1:Tree Planting	A1: Nitrogen Optimization	A2: Field Equipment Fuel Efficiency	A3: Agricultural Irrigation Pump Efficiency
New Residential	●		●		●	●									
New Commercial	●				●	●									
Industrial	●				●	●									
Mixed-Use	●		●		●	●									
Agriculture + Residential	● ²	● ²	●		●	●									
Other ³	●	●	●		●	●									

¹ The determination of applicability will be made by the County Department of Planning and Land Use (DPLU) with the project applicant at the time of scoping/review; however, for most projects under the Bright Line Threshold, unchecked measures (e.g., as LU1, T1-4) will not result in measurable GHG emissions reductions and, therefore, will likely not be applicable at the project level.

² Depending on whether residential is new or existing, this measure may not apply.

³ For other project types, project reviewer will determine which measures are applicable to the project.

CHECKLIST

Instructions: All projects must complete this checklist for the relevant project type and fill in “Details of Compliance.” For projects below the Bright Line Threshold, a description of how the project will achieve conformance with the CAP measure is provided in “Description”; for projects above the Bright Line Threshold, the applicant may comply with each measure at any performance level, but must demonstrate achievement of the Bright Line Threshold, Efficiency Threshold, or Performance Threshold.

Type of Project _____ Project Number _____

CAP #	Measure	Description ²	Details of Compliance	% Reduction (for Projects Exceeding the Bright Line Threshold)	Percentage of Measure Compliance (for Projects under the Bright Line Threshold)
E1	Energy Efficiency for New Development	10% of square footage (commercial/industrial) or 10% of units (residential) exceeds Title 24 (2008) standards by 15% for projects scoped through Dec. 31, 2014; 100% of square feet per unit exceeding Title 24 (2008) standards by 15% for projects scoped after Dec. 31, 2014	Number of units Exceeding Title 24 _____		

² Description details compliance with the CAP measure. Projects must meet an equivalent of one CAP measure as described here; for projects over the Bright Line Threshold, any level of compliance is acceptable that results in meeting the threshold; and the applicant must provide substantial evidence to support reduction.

CAP #	Measure	Description ²	Details of Compliance	% Reduction (for Projects Exceeding the Bright Line Threshold)	Percentage of Measure Compliance (for Projects under the Bright Line Threshold)
E2	Building Energy Retrofits (only for existing structures)	RESIDENTIAL: Achieve overall (across all units) 5% energy efficiency ³ COMMERCIAL: Achieve 12% overall lighting efficiency ⁴	Efficiency achieved and type of retrofits _____		
E3	Appliance Upgrades	Energy Star appliances in 95% of new residential units and 40% of existing residential units; appliances include light bulbs, clothes washers, dishwashers, and refrigerators	Number of Energy Star appliances _____		
E4	Smart Meters	Detail to be provided by applicant	Number of residences joining online program _____		

³ CAP measure includes 15% participation among existing buildings achieving 35% efficiency. At the project level, this translates to (0.15 x 0.35) approximately a 5% overall efficiency goal.

⁴ CAP measure includes 30% participation among existing buildings achieving 40% efficiency. At the project level, this translates to (0.30 x 0.40) a 12% overall efficiency goal.

CAP #	Measure	Description ²	Details of Compliance	% Reduction (for Projects Exceeding the Bright Line Threshold)	Percentage of Measure Compliance (for Projects under the Bright Line Threshold)
R1	Solar Water Heating	19% of overall water heating needs derived from solar	Number of units with solar water heaters _____		
R2	Alternative Energy Systems	30% of residential electricity and 20% of commercial electricity generated from alternative energy systems	Kilowatts (KW) of solar panels installed _____		
LU1	Mixed-Use Development	Detail to be provided by applicant			
T1	Increase Transit Use	Detail to be provided by applicant			
T2	Increase Walking and Biking	Detail to be provided by applicant	Additional feet of sidewalk installed _____		
T3	Increase Ridesharing	Detail to be provided by applicant			

CAP #	Measure	Description ²	Details of Compliance	% Reduction (for Projects Exceeding the Bright Line Threshold)	Percentage of Measure Compliance (for Projects under the Bright Line Threshold)
T4	Alternative-Fuel Vehicles	Detail to be provided by applicant			
LS1	Tree Planting	Detail to be provided by applicant	New trees and types planted _____		
A1	Nitrogen Optimization	Detail to be provided by applicant			
A2	Field Equipment Fuel Efficiency	Detail to be provided by applicant			
A3	Agriculture Irrigation Pump Efficiency	Detail to be provided by applicant			

Other measures, not described in the CAP, which would achieve GHG reductions in the proposed project (for projects over the Bright Line Threshold). This includes reductions taken for statewide regulations⁵

	Measure	Description	Details of Compliance	% Reduction	

Total Reduction % (for Projects Exceeding the Bright Line Threshold)	Compliance (for Projects Under the Bright Line Threshold)
Must Equal 16% or More	Must Equal 100% or More

⁵ Refer to the County of San Diego Guidelines for Determining Significance for Climate Change for methodology in applying statewide measures. The Performance Threshold includes 20% Renewable Portfolio Standard (RPS) and Pavley I as pre-mitigation; therefore, no additional credit may be taken for these measures by the project. The Bright Line and Efficiency Thresholds do not include statewide measures and, therefore, can be calculated for credit by the project.

APPENDIX H: PHOTO SOURCES

Below is a list of the images in the CAP.

Images from San Diego County

The following images were taken by AECOM staff:

Bike path and bus stop in Valley Center, Valley Center, CA 92082, pages 38, 40, 41, 48
Fallbrook Community Garden, Alturas Road and Ali Lane, Fallbrook, CA 92028, Cover Page
Fallbrook Public Library, 113 South Main Avenue, Fallbrook, CA 92028, pages 28, 32, 39
Fallbrook Public Utility District, 990 East Mission Road, Fallbrook, CA, pages 42, 53
Highway S13 and Winterhaven Road, Fallbrook, CA 92028, page 27
Keys Creek Lavender Farm, 12460 Keys Creek Road, Valley Center, CA 92082, pages 1, 45, 77
Morning Star Ranch, 12458 Keys Creek Road, Valley Center, CA 92082, pages 2, 13, 26, 30, 44, 47, 59, 67, 75
Twin Oaks Valley Water Treatment Plant, 3566 North Twin Oaks Valley Road, San Marcos, CA 92069, pages 9, 21
Valley Center Water District Solar Installation, Valley Center, CA 92082, page 35

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Page 29 – ID# 88948309
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Page 63 – ID# 32691

www.istockphoto.com:

Page 31 – ID#15841728
Page 58 – ID#12723256

Other Sources:

Page 34 – SDG&E via <http://www.earthtechling.com/2011/07/smart-meter-privacy-rules-adopted-by-calif/>
Accessed August 19, 2011